

Serap Kurbanoğlu · Sonja Špiranec ·
Yurdagül Ünal · Joumana Boustany ·
Denis Kos (Eds.)

Communications in Computer and Information Science

1533

Information Literacy in a Post-Truth Era

7th European Conference on Information Literacy, ECIL 2021
Virtual Event, September 20–23, 2021
Revised Selected Papers

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ISSN 1865-0929 ISSN 1865-0937 (electronic)
Communications in Computer and Information Science
ISBN 978-3-030-99884-4 ISBN 978-3-030-99885-1 (eBook)
<https://doi.org/10.1007/978-3-030-99885-1>

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The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

The Seventh European Conference on Information Literacy (ECIL 2021) was co-organized by the Department of Information Management of Hacettepe University, Turkey, the Department of Information and Communication Sciences of Zagreb University, Croatia, and the Information Literacy Association (InLitAs), France. ECIL 2021 aimed to bring together researchers, information professionals, employers, media specialists, educators, policymakers, and all related parties from around the world to exchange knowledge and experience and discuss current issues and recent developments.

Our journey to the seventh edition of ECIL faced many challenges. The ongoing COVID-19 pandemic forced us to postpone the conference back in 2020; however, we managed to put together another great conference full of relevant and timely contributions in 2021. While saddened that we were not able to meet in real life in the wonderful city of Bamberg, the spirit of ECIL was continued in the digital arena as an online conference.

The main theme of seventh conference was “Information Literacy in a Post-Truth Era”. Contributions came from 36 different countries (Australia, Austria, Belgium, Brazil, Bulgaria, China, Croatia, the Czech Republic, Estonia, Finland, France, Germany, Guyana, Hong Kong, Iceland, India, Italy, Japan, Latvia, Lebanon, Lithuania, Mexico, the Netherlands, Norway, Poland, Portugal, Singapore, Slovakia, Slovenia, South Africa, Sweden, Switzerland, Turkey, the United Arab Emirates, the UK, and the USA). All submissions were subjected to a double-blind review process. This book consists of a total of 61 selected papers out of 192 contributions (an acceptance rate of 32 percent) which address a range of issues around the main theme.

We are grateful to many organizations and people for their support. We would like to express our deep gratitude to the organizing institutions. Our special thanks go to conference keynote speakers Olof Sundin, Markus Behmer, and Stephan Lewandowsky; invited speaker Alexandra Becker; authors and presenters of papers, best practices, PechaKuchas, posters, and workshops; and session chairs. We would like to thank and acknowledge the hard work of the members of the Standing and Program Committees who invested their time generously to make this event happen.

We would like to express our deep gratitude to the language editors Esther Grassian, Diane Mizרחי, and Loriene Roy. Special thanks for their hard work and valuable contributions. Our editorial team Sonja Špiranec, Yurdagül Ünal, Joumana Boustany, and Denis Kos should also be acknowledged here.

Last but not least, we would like to thank our participants. The success of a conference rests upon the commitment of not only its organizers and community of authors and committees but also its participants. A big thank you to all!

December 2021

Serap Kurbanoglu
On behalf of the Organizing Committee

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The European Conference on Information Literacy (ECIL) 2021 was co-organized by the Department of Information Management of Hacettepe University, the Department of Information and Communication Sciences of Zagreb University, and the Information Literacy Association (InLitAs).

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Information Literacy in a Post-Truth Era and News Literacy



Teaching Information Documentation in a “Post-truth” World: A Challenge for a Critical Education

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Abstract. Protest movements or more recently the first post-truth pandemic Covid-19 have brought to the fore, in a context of information profusion, the issues of misinformation, alternative facts and fake news. At a time when people have less confidence in the media and institutions, when there is easy access to all kinds of content and a strong emphasis on storytelling and emotions, teaching information-documentation is a challenge for teachers and teacher librarians concerned with these issues. Therefore, information culture needs to be reconsidered in a broader and stronger sense. How do teacher librarians and teachers deal with Information and Media Education in a so-called post-truth world? We present the context of our study, and define information disorder and fake news, and then question how a critical education can be implemented, its potential and limitations. We rely on data collected over time (2018–20) in two middle and two high schools, in France.

Keywords: Information culture · Fake news · Information disorder · Post-truth world · Critical information education · Informed citizen

1 Introduction

Protest movements (Yellow Vests (*gilets jaunes*), climate change, pension reform and subsequent transport strikes...) or more recently the first post-truth pandemic Covid-19 have brought to the fore, in a context of information profusion linked to new dynamics in information circulation, the issues of misinformation, alternative facts, and so-called fake news, a “welcome” but simplifying concept according to Vanbremeersch [1, p. 16]. These phenomena, generating rumors and lies, are not new. But, at a time when people have less confidence in the media and institutions, they are the focus of attention, and at the heart of debates in the society, highlighting the difficulty in determining the credibility and reliability of information (and news). When there is easy access to all kinds of content, and a strong emphasis on storytelling and emotions, this calls for reconsidering the concept – and approach – of information culture, in a broader and strong sense, in the vein of Hollis [2] or Brisola and Doyle [3]. Teaching information-documentation is

then a challenge for teachers and teacher librarians concerned with these issues. Critical thinking cannot be decreed, cannot be injected, cannot be given on prescription, it has to be developed, and following this idea the effort of the school system in France “still deserves to be thought” argued Froissart [4, p. 36].

This paper investigates what does it mean, in a so-called post-truth world, to be critically educated about information, documents, and media, which is essential to being an informed citizen; and how teacher librarians and teachers deal with Information and Media Education (IME) in this perspective.

We rely on an ongoing research (part 2, qualitative)¹ whose objective is to study current changes in IME in today’s digital world, in the French school context; and for this paper, on data collected over time during info-documentary training sessions in a few schools of the *Académies* of Lille and Paris, selected according to their answers to the initial questionnaire (2016–2017), due to the implication of the teaching staff in IME (*2 Collèges* and *2 Lycées*).

First, we present the context of our research, defining the concepts of fake news, information disorder and post-truth, and considering Information and Media Education and its approach in the French context; then we explore the modalities of implementation of this critical education, and question in particular its potential and limits.

2 Critical Information Culture in a Post-truth World: Context, Theoretical Insights, Methodological Progress and Questions

2.1 Theoretical Insights: Information Disorders, Fake News, and Regimes of Truth

The concept of fake news poorly embraces the reality, which has become very complex, of our relationship to information and knowledge, and of the new circuits, which are in the process of being redefined, for the construction of opinion, noted Vanbremeersch [1, p. 16]. According to him, fake news is a simplifying concept that “suits” those who lament the entry into an era of post-truth, and subsequently, avoids an in-depth analysis of the transformations underway and of the responses, complex by nature, that should be brought to them. This is a question of primary importance for researchers and professionals concerned with information documentation and critical culture in a training context.

Analyzed through the prism of post-truth (declared international word of the year in 2016 by the Oxford Dictionary), information pollution, by its scope today, exceeds the definition of fake news as “false information”, “fallacious information” or “infox”, proposed as equivalent in France by the Commission d’enrichissement de la langue française: “misleading or deliberately biased information, spread for example to favour

¹ “*L’éducation à l’information et aux médias (EIM), à l’heure du web 2.0 et des réseaux: Mise en cohérence des savoirs et recompositions curriculaires*”. With three INSPÉ, Higher Schools for Professorship and Education (Lille, Lorraine, Paris) and two laboratories (GERiiCO, LISEC).

one political party over another, to tarnish the reputation of a personality or a company, or to contradict an established scientific truth”² (free translation).

The many papers by researchers who studied the phenomenon and its potential sources revealed a much more complex reality, pointing to various “information disorders” that create mistrust and confusion: not only the manipulation of news, rumors or propaganda, but also the distortion of facts, designating as fake what is true information. These disorders have a strong social impact insofar as they contribute to pollute and thus weaken the processes of information and communication, as noted by Georgiadou, Rahanu, Siakas *et al.* [5, p. 3–5]. We will retain here the distinction made by Wardle and Derakhshan in their *Information Disorder Report*. They refrained from using the term “fake news” which is a politicized term according to them, and inadequate to render the complexity of the phenomenon of information pollution and its disorders. Referring to the dimensions of harm and falseness, they identified three types of information disorder, namely mis-, dis- and mal-information:

- mis-information when false information is shared, but no harm is meant;
- dis-information when false information is knowingly shared to cause harm;
- and mal-information when genuine information is shared to cause harm, often by moving information designed to stay private into the public sphere [6, p. 5].

In this sense, information pollution refers less to “news” (false news, false stories about current events, provided by media) than to “information” (and its disorders), considered in its various dimensions (including actuality, document, data), and to the different stages of the communication process (production, circulation, reception...). “Media” is an evanescent, elusive object, a buzzword difficult to define as we pointed out, following Cotte [7, pp. 35–37, 8]; it does not seem very appropriate for the complexity of the phenomenon. “The reality is that everyone has become media, failing to become journalists, and that this mediation is no longer the work of professionals” insisted for his part Vanbremeersch [1, p. 16]. Approached in this way, “fake news” is only a part of a vast informational ecosystem that is multidimensional, including:

- inaccurate information created or shared by mistake or misdirection;
- distorted information that has the potential to fool (satire, parody, partial information with cover-up, decontextualized contents, biased or directional reports...);
- and information, fabricated (reinformation, deepfakes, alternative facts, conspiracy theories...) or not (hacking, leaks...), deliberately disseminated to deceive, influence opinion, and/or obscure or manipulate the truth (summoning, among others, the registers of belief or emotion).

We can thus situate these information disorders, which are a threat to the informational ecosystem and to democratic societies, according to their degree of toxicity, on a continuum between soft mal-information and hard dis-information. It is an invitation to try

² Commission d’enrichissement de la langue française. Recommandation sur les équivalents français à donner à l’expression fake news. *Bulletin officiel de l’éducation nationale*, 41 (2018) <https://www.education.gouv.fr/bo/18/Hebdo41/CTNR1826048K.htm>.

to understand the “regimes of truth”, a useful concept, according to Lorenzini, for its critical force as a methodological and analytical tool [9, p. 5, 10]: in order to learn to distinguish truth from falsehood, at different levels (personal, political, societal), especially when the truth is not linked to expertise, authority, or/and reality of facts, but to representations, emotion, interpretation; but also to be aware of the mechanisms and strategies of these “infoxes” (information pollution) which are amplified in the context of networks and web 2.0 (via ranking, influence, algorithms, virality, peer-to-peer messaging, click-baiting...) [11, pp. 3–9].

2.2 Key Elements for a Renewed and Critical Information Education: The French School Context

Information Education is seen as the main answer to fake news and alternative facts, as reflected by the title of a paper of Jones-Jang, Mortensen and Liu: “*Does Media Literacy Help Identification of Fake News? Information Literacy Helps, but Other Literacies Don’t*” [12]. At a time when concerns about information disorders generate a renewed interest in a critical education, the results of their empirical and comparative study are explicit and encouraging. They reveal that “information literacy”, using a variety of strategies -but not other (media, digital, news) literacies – increases significantly the probability of identifying fake news stories.

In France, Information Education received also renewed interest, following the terrorist attacks of 2015, the first and most deadly of which, in early January, targeted the satirical newspaper *Charlie Hebdo*. Introduced from 2013 as a “unified” Education (including information and media dimensions) by the Law “pour la refondation de l’école de la République” (No. 2013–595, July 8, 2013), Media and Information Education (IME) became a priority for School in 2015; it was regarded from then on as a necessity to “teach students to develop their critical thinking and to form an opinion, competencies that are essential for becoming a responsible citizen in a democracy”. The concerns about the information disorders that occurred from 2016–2017 with the fake news phenomenon further reinforced the importance of this education. In this perspective, recent official documents (*Collège* since 2016, *Lycée* 2019) introduced “interdisciplinary practical teachings”, focusing on digital learning, and linking information-communication and citizenship; they encouraged the creation of media (web TV, Web radio, newspaper...) in each *Collège* and *Lycée*. IME was thus included in the “Citizen Pathway” in support of the Moral and Civic Teaching (EMC), designed to enable students to develop citizen media practices. It appeared also in the new subject “Digital Sciences and Technologies” created in 2019 (*Lycée, Seconde*) which aims to promote a thoughtful and reasoned use of digital technologies.

As for the teacher librarians in this context, according to the new circular (updated in March 2017³), they are “teachers”, called upon to “teach information documentation to all students”, and to “contribute” to their training in media and information education (like other teachers); they are also in charge of supervising “the acquisition by all students of an information and media culture”. The text represents a step forward (compared to the

³ Circulaire n° 2017–051 du 28 mars 2017. *Bulletin Officiel de l’Éducation nationale*, 30 mars 2017. http://www.education.gouv.fr/pid285/bulletin_officiel.html?cid_bo=114733.

previous circular of 1986), in that ‘information documentation’ is thus consecrated as the specific domain (subject?) of the teacher librarian, and clearly referred to the information and communication sciences [13, p. 7–8]. However, regarding the implementation of this teaching, the text remains ambiguous. The interest in diversifying “resources, methods and tools” is emphasised, as is the need to take into account the evolution of students’ information practices, with the declared objective of “developing a critical thinking approach to sources of knowledge and information”. But while the text invites the teacher librarians to consider the dynamics of knowledge, it remains silent on the new knowledge to be constructed: “hot” knowledge, related to socially acute issues, object of debate in society; knowledge which, as such, is part of a more political register and can activate conflicts of values [13, p. 13].

The “Advice” issued in 2019 by the Economic, Social and Environmental Council (3rd assembly of the Republic)⁴ which has no prescriptive value is more up-to-date in its recommendations. It makes IME an issue of democracy and citizenship in response to the emergence of information phenomena such as conspiracy, infox, radicalization, remarked Mahmoudi in a critical note. And it positions IME at the convergence of the three educations (information, media, digital), calling upon numerous knowledge, between the media sphere (the most numerous) and the information-documentation sphere, between confirmed knowledge and emerging issues: relationships to information, media mutation, information flow, credibility and relevance, alternative facts, disinformation, pluralism, ethics, information economy and law... [14, pp. 9–10]. It thus covers a wide field of knowledge, which differs according to the researchers interviewed, even if several of them insisted, as did Patrick Eveno, a specialist in media history, on “information” dimension: “when we hear media, we also hear entertainment”[...] “the important thing is information [...] this requires information education more than media education “ [14, p. 9].

2.3 Research Questions and Methodological Progress

In this evolving context (with IME addressed in a fragmented way, on a pragmatic mode), our idea was to go closely to the actors, immerse ourselves in the few selected schools to observe teacher librarians and teachers’ practices, over time: and specially how, within these changing configurations, they “do with” the students, the information, the media, the digital... Do the activities supporting this education enable the development of a “critical culture of information and media”, strongly promoted by the texts, among the students? On what springs do they operate? What are the key elements? What do they say about the knowledge thus constructed? And what are their strengths and weaknesses in the fight against misinformation and fake news?

Our approach is qualitative and comprehensive, attentive to the ordinary, the banal, as well as to unexpected dimensions, and also to the contexts, approached in terms of “latent possibilities” in order to identify emergences, which helps to deconstruct essentialist conceptions of culture. Ethnographic observations are our main mode of data collection,

⁴ *Les défis de l'éducation aux médias et à l'information*/ Marie-Pierre Gariel. CESE, 2019. https://www.lecese.fr/sites/default/files/pdf/Avis/2019/2019_30_defi_education_medias_information.pdf.

crossed with the actors' words, collected all along the process, through informal conversations, and/or in a more focused way through questionnaires and interviews. At the beginning of the research, we opted for rich, long-term observations; but in practice, due to the pandemic, several interruptions occurred, which gave them a fragmented character. For this paper, we rely on significant anecdotes, focusing on extracts from sessions, provisionally called "exempla", in the sense of Foucault; they constitute strong moments of the training sessions. And this corresponds to the way in which the issue of 'truth' is approached, in small touches.

3 Findings

While the phenomena of fake news and misinformation have received a lot of public attention since the 2016 US presidential election, and in France, in the context of the terrorist attacks, the place given to these issues in *Collège* and *Lycée* remains modest; the way in which teachers engaged with them is relatively constrained by the official reference texts. Addressed in a fragmented way, relying on various teachings, IME is thought in an operative mode, depending on opportunities: that can be an obstacle to (the development of) a critical and reasoned approach to information and media; and that is a challenge for teacher librarians. Nevertheless, an impulse is given in response to institutional orientations for a renewed education.

3.1 A Patchwork Approach, but a Step Forward Traditional Information Education: An Opening up to the World's Problems

Information education has for a long time focused on information retrieval supported by competencies frameworks, with a strong emphasis on information evaluation. Helping students to navigate the digital information environment is always at the heart of the training sessions: crosschecking information, reflecting on its quality and relevance remain central. But when emotions, desires, beliefs come into play, new needs are emerging, pointing towards critical analysis and strategies, less dependent on media frameworks and representations [15], and not limited to thinking techniques. It questions preconceptions, stereotypes, relation to texts, with attention to the regimes of truth, taking into account the contexts, according the idea that information is socially constructed. In other words, and from the perspective of Information Science, this critical approach can be understood, following Brisola and Doyle, as a state of permanent alertness, vigilant in dealing with information and constantly questioning it [3, pp. 283–284]. Beyond the development of a set of behaviors related to the use of information (information search, evaluation skills), it is then a question of acquiring a critical posture, avoiding ready-made answers, and oriented towards argumentation and decision-making (as much as rationality and logic). Information is then used as a tool for constructing significations, in action, while the student opens up to the world's problems, operating a displacement from the student to the social actor.

The topics are thus chosen by the teachers both for their mediating function in knowledge construction and for their capacity to engage students in a reasoned and ethical use of information, and possibly in a position to resist misinformation and fake news. The

initiatives encourage students to become engaged learners through what Freire called a “problem posing” method as an alternative to a banking approach (information transfer) [16, p. 89, 17, pp. 16–20]. What they have in common is that they address contemporary issues and offer students complex experiences that link non-formal and formal practices, providing opportunities for an emancipatory process, and using information as a key element in the formation of critical and responsible individuals/citizens:

- ordinary sessions, known as “initiation” in the beginning grades (*6ème, Seconde*), organized according to a progression by the teacher librarians, alone or in collaboration with other teachers;
- heroic projects, ambitious in their objectives, operating on a one-shot basis, or on a long-term basis with the support of partnerships (journalist, police officer...);
- creation of media (web TV, web radio), in a ‘dynamic inversion’, via “video, radio, or multimedia experiences” lived “from within”, in the words of Gonnet [18, p. 93];
- sessions with debates organized as part of teachings (Yellow Vests movement, men-women equality, during Moral and Civic Teaching) or “education for” (climate change, sustainable development, genetic manipulations...). These are levers for active practices around “hot”, unstable knowledge, subject to controversies and/or multiple interpretations, and involving societal choices, referring to human becoming. They are a fertile ground for enabling students to develop a critical thinking towards contradictory or pluralistic information and to form their own opinion through interactions and debate, an opinion that can itself be enriched and revised.

In this process, the work on press and current news is the poor relative compared to internet and social networks, especially Facebook, WhatsApp, Snapchat, which are very present in the students’ cultural universe. And the work on images plays an important role, when it comes to manipulated information, as we will see now.

3.2 From Fake News Checklist to Partnerships for a Critical Information Education: On Some Initiatives

Whether modest or more ambitious, the activities proposed to the students in this context aim to position them as social actors, aware of the issues that are moving the world. They lead them to go beyond a naive reception of information to develop an epistemological curiosity, and a “critical consciousness” of world’s -and information – problems, preparing them to resist fake news and fight disinformation.

Checklist against Fake News. With the checklists given to students as a support for their work in *Seconde* (Paris, *Lycée*), it is less a matter of acquiring instrumental skills than learning to question and decode images. The teacher librarian speaks of an “investigative approach” (an active enquiry process): “we do OSINT (Open-source intelligence)” “Is this image true or not?” The students are invited to identify: sources, author (photographer’s name), date, conditions of production, composition, interest... and then to decide if the image is manipulated or not; and if so, what kind of manipulation it is: with what intention (for fun? to deceive?) and how (fake image, misused, displaced in space or in time, anachronistic). This is an opportunity to identify clues and discover a controlled vocabulary and some checking tools (Décodex, CheckNews, Google Images Reverse).

The selected images and videos are sometimes humorous (village painted yellow to fight against the rise in fuel prices; children wearing a yellow vest placed in custody), often emotional, referring to major causes (migrants picnicking in a cemetery in Calais, sitting on graves; forests burning as a result of climate change; animals in danger...). But while the teacher librarian asks the students to argue their answer based on the checklist, some of them use shortcuts “the image is true, we didn’t find the site in Decodex” (*Le Monde*, to verify reliability), they don’t explain their answers further. And when arguments are given, they can be clumsy, if not naïve: thus about children in custody “children of this age do not have the right to go to prison, it’s nonsense”. Intellectual laziness or lack of analytical thinking? For our part, observations show that some of them, by distraction, get lost during their investigations, from image to image, from site to site, seduced by attractive formats that “speak to them”, or carried away by emotion in front of the images; or that they branch off towards parody sites to take a break and have a bit of fun (“Gray: he found his stolen wife on “le bon coin”, false dispatch, *L’écho de la boucle*⁵). However, if most of them play the game, “it’s only a drop in an ocean of disinformation” noted the teacher librarian.

Infox Production, Bricolage and Critical Consciousness. Producing infoxes for the school newspaper, as we observed in *Collège*, is part of the “dynamic inversion” [18] that puts the students in position of writing articles, mixing serious and fanciful content, that their fellows will have to spot/unravel (*Quatrième Media Class, Collège 1, Lille*). The close reading of an article from *Le Gorafi* (French parody website) about “18 dead in a traditional tomato can fight”⁶, likely of interest to them, is an introduction to the process of information production and communication. Using the critical questions of the support document, the students analyse the construction of the article, the place of image(s), the tricks used to make people smile and sustain attention, create buzz and attract clicks... “I lost an eye but it was really worth it!”, the formula is politically incorrect, offbeat, but it makes them laugh.

The special issue of the school newspaper dedicated to their town, “between history and renewal”, offers them the opportunity of an authentic experience to practice and express themselves; they “scenarize” their city. The city is undergoing renovation. The articles look back at its history and open up to a plurality of thoughts, from the past to the present; well documented, they built on a foundation of truth, some of them including what the students call “lies”. “Info or intox? It’s up to you to find out what’s true and what’s false”, warns a headline on the front page.

The false information remains wise in its scope, the proposals are inventive: between humour (metro station, revamped in apple green) and documentary register, requiring verification (metro line, one of the longest in the world) or field investigations (inscriptions to be checked on the war memorial). The approach is documentary rather than journalistic, it is not about training junior journalists. The students get engaged in an investigative process, verifying sources, putting things into perspective; they learn the value of a visual identity and the power of words; and they can thus, in action, measure

⁵ <https://lechodelaboucle.fr/2014/08/15/gray-il-retrouve-sa-femme-volee-sur-le-bon-coin>.

⁶ <http://www.legorafi.fr/2019/12/18/espagne-18-morts-dans-la-traditionnelle-bataille-de-boites-de-conserves-de-tomate/>, 18 décembre 2019.

the limits to the freedom of expression. For them (budding redactors and, by extension, their readers), it is less a question of resisting than of using information in a creative, ethical and reasoned way, to build and share knowledge; and so doing, to develop a critical posture as effective and responsible learners and social actors involved in the school life and the becoming of their city.

Socially Acute Issues, Narratives, Relativity of Truth. Yellow Vests movement, men-women equality, climate change... These socially acute issues, which question the tensions running through society and as such are subject to controversies and misinformation, are a fertile support for debate, during civic and moral education as we have seen in *Lycée (Première, Lille)*. In a context of social transformations and of mistrust to science, to information and to politics, the objective, ideally, is to build the “civic culture of students” through a reflection on the belonging to a democratic society, with attention to the foundations and fragilities of the social link. In this perspective, the choice made by the teachers (history-geography and teacher librarian) was to study the *gilets jaunes* movement “through the prism of the French Revolution” (similarities, differences), in preparation for a debate on *Radio Turbo* (the *Lycée* webradio). That constrains the exercise and reduces its scope, focusing the search for information on the arguments that will fuel the debate: origins of the movements; major figures and sociology; demands; forms of mobilization (including press and social networks); vision of the movements from abroad...

The *gilets jaunes* movement has given rise to numerous “narratives” (a hypernarrativity), from the media, the politicians, and the protesters themselves, with much emotion, expressing diverse visions of the phenomenon, sometimes contrasting, if not distorted. In this process, when a strong competition exists for attention, information and media play an important role, as evidenced by the search for arguments. Working on a recent event in this way (in light of history, with a problem-posing approach) helps to give it some perspective; and it positions students as historical and social beings engaged in a process of inquiry, immersed in the world of information. So they are attentive to how the movement forms and coordinates, spontaneously, and horizontally through media networks and platforms (fuel tax petition, protesters’ Facebook pages); how it discusses its demands and actions, and the principles that guide them, with transparency to the public; and how when the media coverage becomes negative, pointing out the violence mainly attributed to the protestors (neglecting other actions like traffic circles occupations), the movement feels disqualified and elaborates counter-narratives with videos and testimonies, in an attempt to re-establish (its?) “truth” about the violence [19]. At the same time, the public approval remains relatively stable, which is often seen as the sign of a “culture of protest” in French history, of which the French Revolution is precisely an eloquent example. However this historical reading shows its limits, with the question arising for the students: how to identify relevant arguments in a flow of information, marked by horizontality and hypernarrativity, which creates a “brouillage”, while truth is no longer considered a cardinal value, based on consensus and rationality [20, pp. 164–165]? The limited time and the disciplinary lens conjugate, the “making society” and the civic dimension prevail, which are not conducive to an in-depth reflection upstream on the construction and circulation of information, noted the teacher librarian, unlike the communication process during the debate (shaping of ideas, turns of

speech...). Documenting the movement, its origin, putting in resonance the narratives and the games of influence, considering the underlying assumptions, values and belief systems, to construct an informed knowledge of it, constitute the poor relative in this context.

Digital Citizenship, Ethical Issues, Communication Skills, with Partnerships as Levers. By opening the school to the outside world, partnerships with professionals mark a break with more conventional formats; they allow, through the contribution of specialists, an awareness of the complexity of the world's problems, by stimulating the curiosity of the students and awakening their critical awareness of its major issues and challenges. While the work with a journalist (a *parrain*) offers an immersion in the world of media and an accompaniment of info-media productions (*Collège 1*, Lille), the interventions of a policeman (a *brigadier référent*) consist rather in preventive actions, oriented towards a "safe internet" (*Collège 2*, Lille). These combine civic education and protective approach, like a "vaccine" (pre-bunking) against misinformation and risk behavior. The aim is to stimulate a critical understanding of the dangers of information sharing, and to empower the students by helping them to develop skills that will enable them to cope with the associated safety issues.

By starting from where the students are, from their use of social networks, the objective is to solicit a free (but guided) expression to initiate a reflection: questioning their relationship to information, relying on a methodical doubt, turned towards the understanding of cyber phenomena and the ethical challenges to be met. "The call to purge" by a teenager on SnapChat⁷, inspired by the movie *American Nightmare*, serves as an introductory case study. "There are limits to the freedom of expression", commented the *brigadier* "saying it's a joke is not a good defence [...] some people will seek notoriety to get as many followers as possible, to be more popular than others [...] [others] put themselves forward, with the most beautiful photo". In court, such a joke carries the risk of 5 years in prison and a 45,000 euros fine. The discourse focuses on the rights and duties, including sanctions for not respecting the law, but it is part of a wider, more global perspective, which aims to build the conditions for a "living together", as opposed to any (cyber)violence. "Violence is a failure [...] you can all be actors of prevention". The exchanges are animated, sometimes lively: for example when, twice, a student proposes to talk about the dark web and the tools that allow people to hide, and twice, the subject is postponed to later. However it is not only a question of preventing or dealing with information disorders, or acquiring a civic culture. It is also a question of engaging, on a projective mode, in a long-term critical reflection on the processes of information-communication: the power of words and images, the boundaries between private and public spheres, the risks of storytelling and self-disclosure, the relationships transparency-opacity, freedom-surveillance... In doing so, these issues, which invite to explore the underside of the cards, the information within the information, awakening an epistemological curiosity, only come second.

⁷ https://www.huffingtonpost.fr/2018/10/31/lauteur-du-premier-appel-a-la-purge-juge-le-28-novembre-un-autre-ado-interpelle_a_23576533/ After a "call" (October 2018) announcing that everything is allowed on Halloween night, creating panic, the author tries quickly to calm the game, explaining that it was a huge joke, and an invention of his own.

4 Concluding Remarks: Weak or Strong Sense of Critical Information Education?

By opening up to the problems of the world, linking formal and non-formal practices, the renewed forms of IME that are developing, by small touches, take a communicational approach to information-documentation: going beyond the school context to consider students as social actors, citizens of the world. In an hyperconnected and complex world, where the definition of (digital) citizenship became itself more complex, the degree of toxicity of disinformation seems to be, in the post-attacks context, a marker for deciding which training sessions to put in place: with the concern of preventing hard disinformation, the security problems and the risks of marginalisation it generates. Information is thus considered at the different stages of the communication process (production, circulation, reception), which requires a good mastery of the tools and knowledge necessary for an ethical and responsible approach. In this process, the objective is to bring students to a less naive, more informed and critical use of information (including media and digital).

Our recent observations show that the sessions are not limited to procedural apprenticeships (a weak sense of critical thinking, as Hollis insisted); they adopt a global and reflective approach, attached to the comprehension of the phenomenon of misinformation in its various facets: analyzing and understanding it in order to foster critical thinking, rather than criticizing the spread of fake news, via clueless condemnations. However, even if a step forward has been made, the patchwork approach and the lack of time for this education, already underlined, constrain the process. The recent PISA report points out the mixed results of the French students concerning fake news [21, pp. 2–6].

It thus appears that certain knowledge – emerging but essential to the point of not being left to chance – is only addressed in a furtive manner, in dotted lines. Platformization, hypernarrativity, storytelling, regime of truth, algorithmic culture and its ethics, are among the “missing knowledge”, quickly mentioned, which is part of an epistemological awareness, and as such deserves an in-depth study. For even if critical thinking and IME are declared “a great ambition for the School”, the reforms remain “surface reforms”, initiated under the blow of emotion, in response to events. Failing to be thought as a coherent whole, organized as an epistemological unit, linked to the founding questions of information-documentation, information education as it is declined today, intellectually fragmented, without a long-term progression, is constrained in its ambitions, which in turn is an incentive to creativity and inventiveness for the actors.

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News Consumption and Sharing Behaviors of Individuals in the Post-truth Era

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Abstract. In the post-truth era, where ambiguous information proliferates and social media facilitates its speedy dissemination, manipulation through mis/disinformation becomes widespread. A functioning democracy relies on well-informed citizens who are equipped with critical thinking, information literacy as well as news literacy skills which are necessary to sort true information/news from false. Preparation of an adequate news literacy training programme, on the other hand, requires an understanding of news consumption behaviour as well as the gaps in the skills of the target group. This study aims to investigate news consumption and sharing behaviour of university students in Turkey. Findings seem to be in line with global news consumption behaviours of young people and indicate a need for a well planned training programme which specifically addresses news verification techniques and methods.

Keywords: Post-truth · News literacy · Fake news · Critical thinking · News consumption · News behavior

1 Introduction

We now live in a post-truth era, one of the most salient features of which is the proliferation of ambiguous information. Mis/disinformation has always existed, however, in today's increasingly complex information landscape, not only are the amount and dissemination speed of ambiguous information increasing at an alarming rate [1], but also, individuals increasingly believe information that appeals to their emotions and beliefs, instead of information that is factual and objective [2].

A functioning democracy relies on well-informed citizens. Today, while the media and the internet provide vast quantities of information, they place the onus on the individual to sort out true from false. Individuals may have limited time, cognitive resources, or motivation to understand complex topics, which contributes to a rise in the sharing of false information, whether intentional or not [3]. As a result, misconceptions are commonplace. Moreover, once inaccurate beliefs are formed, they are difficult to eradicate [4, p. 570]. The ramifications can be serious. If a majority believes in something that is factually not correct, the mis/disinformation may form the basis for political and societal decisions (in areas as disparate as education, health, and the economy) that run counter to a society's best interest; if individuals are misinformed, they may likewise make decisions that are not in their own best interest [5, p. 107].

Thus, mis/disinformation is seen as a serious threat to democracies [6] and the well-being of both societies and individuals. In order to prevent people from being fooled by falsehoods, what is needed most is training to develop their critical thinking and news literacy skills. Understanding the attitudes, habits, and behaviour of news audiences helps in choosing the most effective means of combating mis/disinformation, as well as developing the most appropriate content, addressing vulnerable points, in order to improve news literacy curricula.

The main aim of this study is to investigate news consumption and sharing behaviour of young individuals, to find out about the general patterns of news use and delivery, as well as training needs and gaps in their critical approach to news. Empirical research in this field seems to be increasing, and current available data indicate that cultural differences, country specific conditions, and demographics such as education level and age might have an impact on an individual's news behaviour [see 7–10]. In this regard, more empirical data is needed from different countries, education levels, and age groups to reach sound conclusions. The findings of this study, which explores the news behaviour of university students in Turkey, contributes to the existing literature.

2 Global News Behaviour Patterns

The Reuters Institute for the Study of Journalism at the University of Oxford has been publishing annual reports since 2012 on how news is consumed in a range of countries. These reports, the most comprehensive study which compares news consumption in the world, are prepared based on surveys of thousands of individuals in dozens of countries from different continents (e.g., about 50,000 people from 26 countries in 2016, more than 74,000 people from 37 countries in 2018, and more than 80,000 people from 40 countries in 2020).

2.1 Sources of News

Most countries exhibit a consistent pattern with some generational differences regarding the sources used for news between 2012 and 2017. Television (about 70% in 2016) and online sites (about 75% in 2016) are the most frequently used news sources. News accessed via social media sites notably increased [11, p. 8, 12, p. 10]. Across all countries, while younger people prefer using social media and online platforms as their main source of news, older people prefer using television [12, p. 7]. The evaluation of the last nine years of Reuters' data, on the other hand, has shown online news overtaking television as the most frequently used source of news in many of the countries [13, p. 11]. The use of social media for news started to fall in a number of countries after years of continuous growth [14, pp. 9–10]. In 2019 the use of messaging apps rose [15, p. 9]. Reuters' survey findings indicate a correlation between the use of messaging apps such as WhatsApp and concern about the safety of posting political messages [14, pp. 12–13].

The vast majority of Reuters' 2018 survey respondents (65%) preferred to access news through interfaces, such as search engines, social media, or news aggregators, that use ranking algorithms. Behind the averages, however, significant country differences were revealed [14, pp. 13–14]. While aggregators are preferred for speed of update as well

as convenience in bringing multiple sources to one place, and social networks are preferred for interactivity, respondents express some concerns about the use of algorithms, such as the fear that challenging viewpoints might be lost in an algorithmically-driven filter bubble [11, pp. 11–12].

2.2 News Avoidance

News avoidance and news overload are additional problems the news industry is facing today. Reuters' data from 2019 reveal that almost a third (32%) of participants actively avoid the news and a third (28%) agree that there is too much news these days. Constant updates and conflicting versions of the same story cause confusion [15, pp. 10–26].

2.3 Sharing News

Social networks encourage not only the discovery, but also the discussion and sharing of news. Around a quarter of internet news users (24%) share news via social media during the average week [11, p. 10].

2.4 Trust in News Media

Across all countries, although variations are seen, fewer than half of the Reuters' 2018 survey participants (44%) say they trust the media most of the time. Only a third of the sample say they trust the news they find in search engines (34%), while almost a quarter see news in social media as less reliable (23%) [14, p. 16].

2.5 Concerns About Mis/Disinformation

More than half of Reuters' 2018 global survey sample (54%) express concern or strong concern about fake news. Although there are significant country variations [14, p. 18], global concerns about mis/disinformation remained high in the following years (56% in 2020) [13, p. 17]. The biggest source of concern about misinformation (40%) is seen as social media, well ahead of news sites (20%), messaging apps (e.g., WhatsApp) (14%), and search engines (10%) [13, p. 19].

2.6 Opinions About News Media

Data from the Reuter's 2019 survey reveal that the news media are seen as doing a better job at breaking news than explaining it [15, p. 26]. There seems to be a problem with the tone taken by the news media. About four out of ten (39%) think that tone of the news media is too negative [15, p. 27].

3 Methodology

In this study a quantitative research method was used. Data was collected through a survey instrument. University students (655 undergraduate level students) were reached based on the quota sampling method. A quota sampling matrix was created based on the status (state and private) and foundation year (before 2000 and 2000+ after) of the universities in Turkey (190 in total in 2018). A representative sample was chosen for each subgroup (see Table 1).

Table 1. Population and sample size

Foundation year	Before 2000		2000 and after		Total
Status	State	Private	State	Private	
Number of universities	53	19	73	45	190
Number of students	1,401,992	177,198	567,852	201,493	2,348,535
Sample size	398	51	162	44	655

Research questions are determined as the following: What are the news behaviour patterns among university students? Are they consistent with global news behaviour patterns? What do students think about news media? What are the skills gap and training needs regarding news literacy?

4 Findings

4.1 Study Population

The survey was conducted from June to July, 2020. A total of 655 undergraduate students from 92¹ universities and various disciplines/departments participated in the survey. In total 85% of the study population were from state universities and 15% were from private universities; 61% were female; around a quarter of the respondents claimed having some sort of training on news literacy, media literacy and information literacy (18%, 24% and 26% respectively).

4.2 News Avoidance

Survey data reveal that a majority of participants (93%) actively follow the news while only about 7% avoid it. Students say they avoid the news because it has a negative effect on their mood (4%), they do not trust the accuracy of news (3%), they are simply not interested in the news (2%), they cannot distinguish real news from fake news (2%) or they do not have time for the news (1%).

¹ The majority of the responses (63.4%) came from students at 14 different universities.

4.3 Frequency of Following News

A majority of participants, about 90%, follow the news at least once a day (60% several times a day, 29% once a day). Three-fourths (75%) claim that there has been an increase in the frequency of following news after the coronavirus (COVID-19) epidemic.

4.4 Subject of News

Politics (71%) is the most popular news subject among the participants. More than half are closely interested in subjects like education (68%), health and medicine (68%), science (61%), technology (55%), business and the economy (54%). Arts and culture (48%), sports (37%), local issues (35%), entertainment and celebrities (17%) are among the relatively less interesting subjects (see Fig. 1).

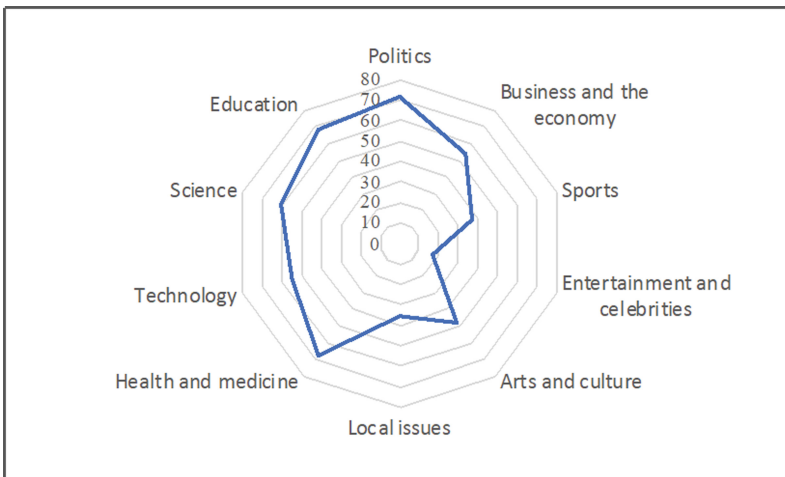


Fig. 1. Subject of news

4.5 Sources of News

Data indicate that Twitter (29%) is the most preferred main source of news for university students, slightly more than online news sites and newspapers (28%). Television is among the critical source of news for about a quarter (26%). Social circle is a preferred source for just 6% while 3% prefer YouTube. Printed newspapers, Facebook, blogs, radio and closed messaging apps are among the least preferred news sources (less than 1% each).

4.6 Trust in News Media

Fewer than 10% of the survey participants say they never suspect (they trust) the accuracy of news they come across through online news sites and newspapers, social media, closed

messaging apps and social circles (family, friends, etc.). The ratio is 10% for TV and slightly more than that for printed newspapers and radio (12% and 15% respectively). By contrast, at least half of the participants suspect the accuracy of news either sometimes, often or always, no matter which source it comes from. Social media is the least trusted source among all (82% suspect the accuracy of news either sometimes, often or always) (see Fig. 2).

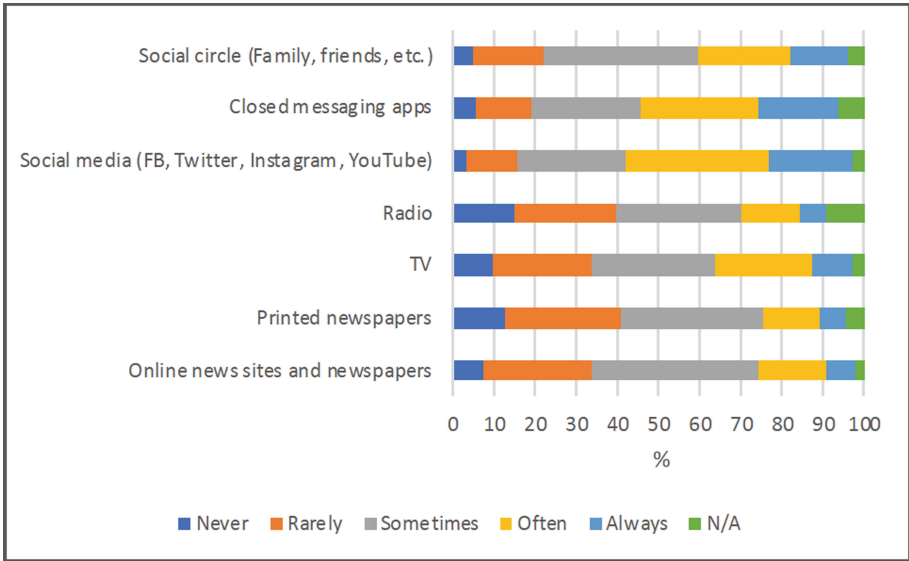


Fig. 2. Trust in news media

4.7 Trustworthiness of Information/News Sources

Survey data reveal that subject experts (persons or institutions) are the most (81%) trustworthy sources for information/news for participants. Government officials are second, however, trusted only by about one-third (34%) of participants. While well-known journalists are seen as trustworthy only by one-fourth of the participants, political party representatives (6%) and social media influencers are indicated as the least (1%) trustworthy sources for news.

4.8 Concerns About Mis/Disinformation

About half of the survey sample (49%) express concern or strong concern about ‘fake news’ and say that fake news has made them distrust the credibility of any news at all. 71% express trust issues when they do not know the source (origin) of the news. Only 35% say (agree + strongly agree) they can determine whether a news article is fake or not.

72% judge the accuracy of news based on factual evidence while 10% make their judgement based on their instincts, the rest are neutral.

4.9 Verifying News

A majority of the participants (83%), say that they either sometimes, or often, or always verify the news they come across (43%, 33%, 7% respectively), while 3% never verify the news at all, and only 14% do it rarely. The most widely used method for verification is checking the same news through other platforms (73%). More than half of the participants check who published/shared it, and where (platform/source) it appeared (60%). About a quarter check international news sources/channels (26%) and consult with their family/friends (24%). One-fifth (20%) check whether the same news appeared in the past, and only 16% refer to fact-checking platforms (see Fig. 3).

Although at a low level, statistically significant correlations were detected between *checking the platform/source in which the news appeared* and *media literacy training* ($\chi^2_{(1)} = 7.636$; $p = 0.006$), *news literacy training* ($\chi^2_{(1)} = 4.895$; $p = 0.027$) and *information literacy training* ($\chi^2_{(1)} = 7.411$; $p = 0.006$). About 70% of those who received any of these trainings say that they use this verification method.

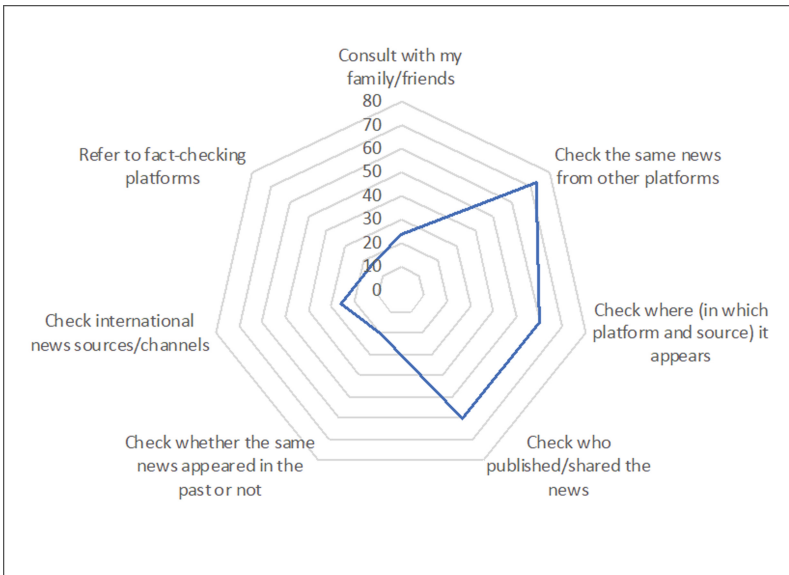


Fig. 3. Verifying news

Data reveal that 43% of participants do not know how to verify a news image which looks suspicious to them. Google Images is the most widely used (37%) platform/tool for image verification, which is followed by Google Earth (12%). Only a few participants (about 4%) say they use *TinEye* and *Foto Forensics*.

A majority (69%) of the participants claimed that they do not follow any fact-checking platforms. Data reveal that *Evrım Ağacı*² (18%) and *Teyit.org*³ (16%) are the most widely followed fact-checking platforms.

² <https://evrimagaci.org/>.

³ <https://en.teyit.org/>.

4.10 Sharing News

About half of the participants share news on Social Media. The main motivation behind sharing news on social media seems to be letting friends/followers know about something they think their friends/followers should know (38%). About one quarter think that what is interesting to them could be of interest to others (26%) and sharing news gives them a way to have a voice about the related subject (24%). About 10% think sharing news provides an opportunity to change the views of friends/followers (see Fig. 4).



Fig. 4. Motivation for sharing news

More than a quarter of participants (28%) share news via social media during an average week. About half like a news story (50%), talk with friends and colleagues about a news story face-to-face (53%) or online (48%), and share a news story on closed messaging apps such as WhatsApp, Facebook Messenger (47%). About one-fifth (19%) comment on a news story on a social network (e.g., Facebook, Twitter) during an average week (see Fig. 5).

Before sharing 'breaking news' on social media, more than one-third (35%) check how current the information is. About a quarter check the accuracy of the news item by using a different source (23%), read the comments about the news post, if there are any, (23%), read or view the entire news story from start to finish, and then decide to share (23%), check to see who posted or tweeted the news item (22%). Less often performed actions before sharing breaking news on social media include checking to see what the hashtag (#) is, if there is one (17%), checking the URL, if there is one, to see where the source originated (15%), taking a screenshot and asking friends what they think (10%),

seeing how many times the news item was shared/retweeted (6%), seeing how many times the news item was ‘liked’ (5%), going with a gut feeling to decide whether a news item is accurate or not (4%).

Three-fourths (75%) of participants claim that they do not share any news without verifying its accuracy (agree + strongly agree). 43% share the news on social media if it comes from trustworthy sources, while 45% express concern about sharing political news on social media (agree + strongly agree).

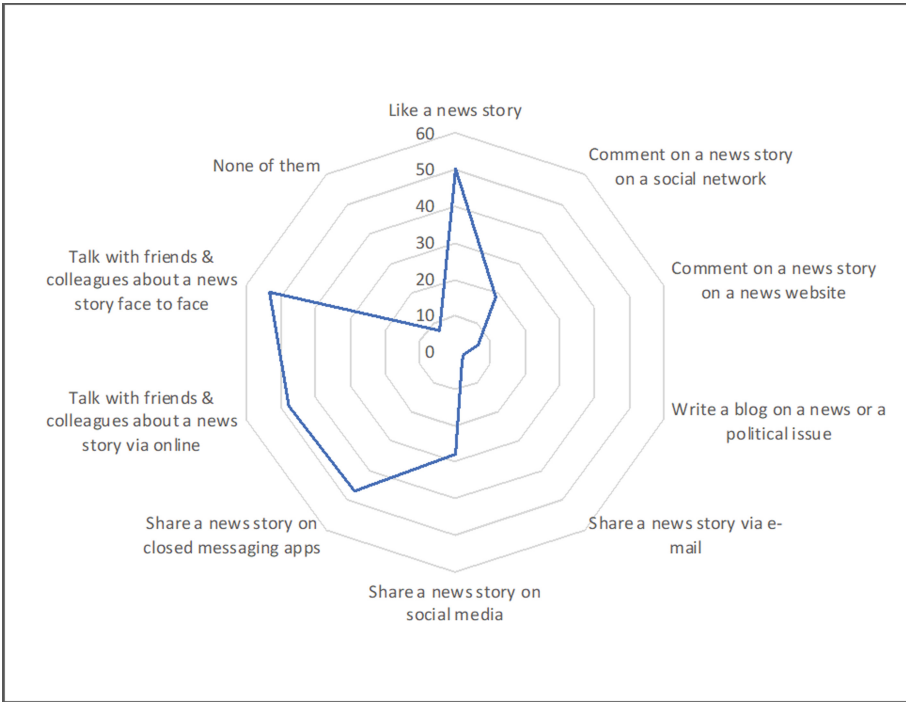


Fig. 5. Sharing news

4.11 Opinions About News Landscapes

About three-fourths of participants (72%) agree or strongly agree that mass media has the power to shape public opinion. Two-thirds (66%) agree that news is necessary for democracy. About half (51%) think following the news is a civic responsibility (see Fig. 6).

31% say the sheer amount of news on any given day is overwhelming, and tiring to follow. 38% claim that news media provide more reliable information than social media platforms where content is potentially produced by users. Only 30% think that the news is objectively reported facts, while half (50%) think that journalists reflect their own bias in news stories. Only 11% believe that fact-checking platforms are totally impartial (see Fig. 6).

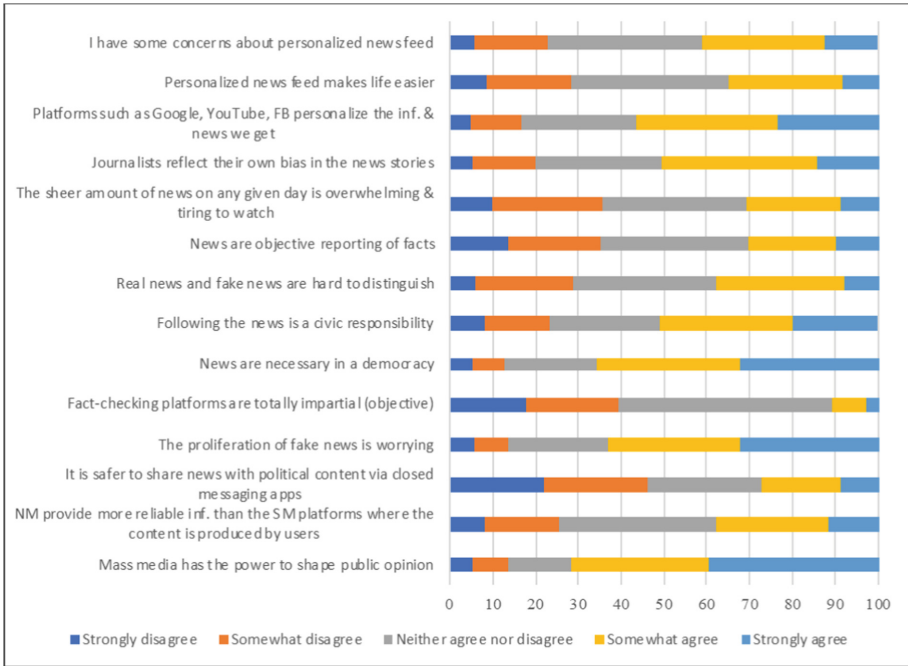


Fig. 6. Opinions about news landscapes

63% have concerns about the proliferation of fake news. 38% find it hard to distinguish real news from fake news. 27% think it is safer to share news with political content via closed messaging apps.

A bit more than half (57%) are aware that platforms such as Google, YouTube, and Facebook personalize the information and news they receive. While 35% think that a personalized news feed makes life easier, 41% have some concerns about it.

4.12 Opinions About News Media in Turkey

Even though only 5% of the participants believe (agree + strongly agree) that news media in Turkey are impartial, 42% think news media keep them up to date about what is happening, and 44% think it helps them to understand the news of the day. 37% say news media keep important events on the agenda, while only 18% think they follow up on injustice and inequity, and 17% think they try to uncover the truth (see Fig. 7).

About one-third think that news media include opinions from subject experts (33%), often focus on negative events (33%), and focus more on entertainment and celebrities (36%) (see Fig. 7).

5 Conclusions and Recommendations

We live in an increasingly complex information landscape and the line between producers and consumers of news is blurred. While ambiguous information proliferates, social media facilitates its speedy dissemination. Additionally, the number of people who use social media to get access to the news is increasing. As a result, news consumers today need to be competent, knowledgeable, active, and intelligent users. In other words, they need to be news literate.

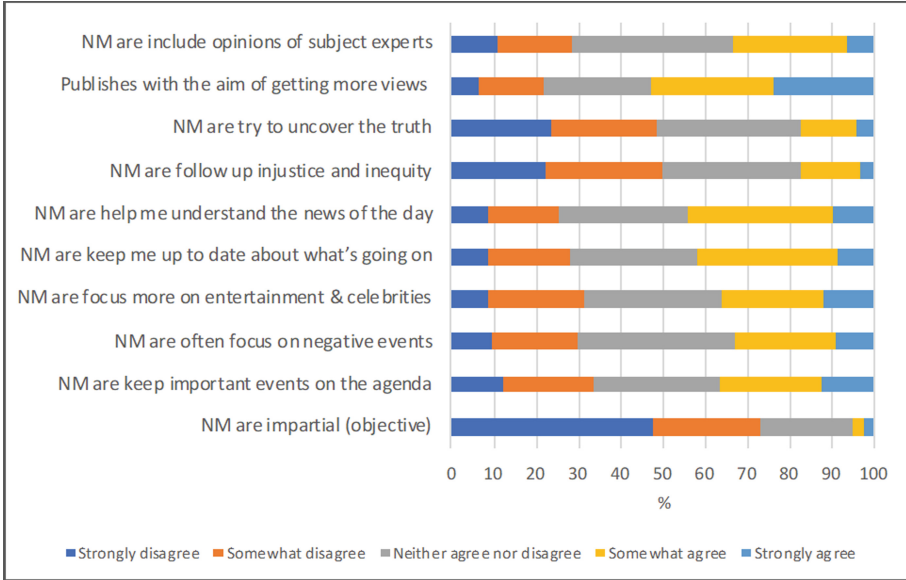


Fig. 7. Opinions about news media in Turkey

In a post-truth era, where individuals increasingly believe information that appeals to their emotions and beliefs, manipulation through misinformation becomes widespread. In order to maintain democracy it is crucial that each and every member of the society be equipped with news literacy skills. Preparation of adequate news literacy training requires an understanding of news consumption behaviour, as well as the gaps in the skills of the target group. This study aimed to investigate the news consumption and sharing behaviour of university students in Turkey. Survey data reveal that a majority of participants actively follow the news at least once a day. About half think following the news is a civic responsibility, and more than half agree that news is necessary for democracy. A majority agree that the mass media has the power to shape public opinion.

Politics is the most popular news subject among the participants. Twitter, online news sites/newspapers, and television are the main source for news. While social media (mainly Twitter) is the most preferred source for news, by contrast, it is the least trusted among all. About half of the participants suspect the accuracy of news at least sometimes, and express concern about 'fake news'. A majority verify the news they come across at

least sometimes. Fewer than half do not know how to verify a news image which looks suspicious to them, while about half share news on social media. Three-fourths claim that they do not share any news without verifying its accuracy, however, although methods used for verification vary, complex techniques are not used widely. Most of the findings seem to be in line with the global news consumption trends of young people such as the preferred sources for news and the least trusted platforms. However, Turkish students seem to be more skeptical than their counterparts. Although it seems as though Turkish university students approach the news critically most of the time, gaps are detected in the skills they possess in certain fields, such as verification methods and techniques. Findings indicate a need for structured and well planned news literacy training.

News literacy can be regarded as part of everyday information literacy which goes beyond academic subjects/sources/methods and should be considered as an essential component of information literacy instruction, at least for the general public. Public libraries can play a leading role in equipping individuals with news literacy skills. Since news is a subject of interest for the majority, it might help in attracting larger audiences to instruction sessions in all types of libraries. It could be useful for teaching critical thinking skills. Including news literacy related topics in information literacy curricula might require some additional knowledge and skills for instruction librarians. In service training programmes and LIS (Library and Information Science) curricula can be revised and updated accordingly. Collaboration with other stakeholders such as media professionals and fact-checking platforms should also be considered.

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Creating News: An Activating Approach to Make Children News Literate

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Abstract. The purpose of this research is to find evidence for the assumption that allowing children to create their own news messages is an effective approach to teach them how to distinguish between reliable news and fake news. Three students of the primary teacher training programme of The Hague University of Applied Sciences developed five lessons concerning fake news and five Kahoot! quizzes for each of those lessons. They taught the lessons they developed under the supervision of a primary school teacher and one of their lecturers from the university.

A Friedman test on the scores of the Kahoot! quizzes indicate that the children made progress over the course of the study. In addition, it appears that the children appreciated the lessons and that they have learned how news is created and how fake news can be recognised. The outcomes of this study have prompted a larger, international Erasmus + project. Schools and libraries in three countries will investigate similar innovative blended-learning approaches for pupils between ages 12 to 15.

Keywords: Media literacy · News literacy · Fake news · Primary education

1 Introduction

Children grow up with an abundance of information mainly from the internet and social media. In December 2016, it was reported that 80% of 11-year-old children growing up in the Netherlands had a mobile phone with internet access [1]. We do not have more recent statistics for this age group, but we know that from the age of 12 – the age that children enter secondary education – almost all youngsters have access to a mobile phone with internet [2]. WhatsApp, Snapchat and TikTok have immense popularity among young adolescents; however, not all texts, films and photos created and read on these platforms are considered reliable information.

The phenomenon of fake news is an important topic, especially since the 2016 American presidential election, President Donald Trump’s public speeches and his supporters’ rush on the U.S. Capitol in January 2021. Although the residents of the Netherlands

are regarded as relatively resistant to misinformation and disinformation [3], the Dutch administration has nonetheless formulated a policy to prevent the country's democracy from being threatened. The main goal of that policy is to make citizens resistant to fake news and help them recognise information that is unreliable [4]. Their decision is prudent since we know that the media literacy skills of a variety of groups of Dutch people, especially adolescents, often have shortcomings [5].

Teaching children how to recognise fake news messages is therefore relevant, even in the Dutch context. A former literature review [6] concluded that it is an effective pedagogical approach to have children create their own news messages if you want them to learn how to recognise 'false news messages' [see for example 7]. Activating learning methodologies such as this not only helps children understand how news is created, but also how they can become permanently engaged with news and the news industry.

With that assumption in mind, we asked three students from The Hague University of Applied Sciences Teacher Training Institute to design and execute a series of five lessons to teach children in their two last school years of elementary education (11- and 12-year-olds). The lessons were designed to teach the children what fake news is, how and why it is created, and how it can be distinguished from reliable news messages. The university students also created five Kahoot! quizzes, to be given at the end of each class, to examine whether the children were able to recognise the difference between fake news and reliable news items. Under the supervision of one of the children's regular teachers, the classes were given in a combined group of the last two years of elementary education (groups 7 and 8) at Kindcentrum Snijders. Kindcentrum Snijders is a primary school in Rijswijk, a suburb of The Hague, where children use an iPad that is provided and managed by the school from group 2 to group 8. The children who were involved with this research project were already familiar with digital devices and media. Due to the COVID-19 pandemic in May and June 2020, the first two class meetings were organised into smaller, in-person groups and each was taught twice. During meetings 3, 4 and 5 the classes were no longer broken up into smaller groups.

2 Research Questions

The main question for the research was: To what extent is letting children create their own news messages an effective approach to teaching them how to distinguish between reliable news and fake news? This educational approach is regarded as effective when children appear to make progress throughout the quantitative measurements (the quizzes) but also go through a positive learning *process*. To achieve the latter facet, it is important that the children are engaged in the learning activities, that they enjoy the class, and that they feel they have learned a lot. The research questions asked for both facets, namely the quantitative and qualitative aspects of effective learning.

The research questions were:

- RQ1: To what extent did the children make progress in the recognition of fake news?
- RQ2: What and how have the children learned according to their self-assessment?
- RQ3: What and how have the children learned according to their primary school teacher who coached the students?

3 Methodology

Under the supervision of the primary school teacher, the students at the Teacher Training Institute developed four products for each class (all in Dutch):

- A ‘didactic route form’ with a description of the course content, learning objectives, starting situation, teacher actions and the learning activities of the pupils.
- A Microsoft PowerPoint presentation to be used during the class.
- A Kahoot! quiz to be used as a closing activity for each class.
- An explanation of the answers of the Kahoot! quizzes.

The learning content was distributed over five classes, one class per week, as follows:

1. Media theory: recognition of fake news using a checklist [8].
2. Checking news messages using critical source investigation via the internet.
3. Creating fake photos with Adobe Photoshop Mix (photo editing app for iPad).
4. Creating news stories with ‘wild headlines’.
5. Creating a video about the story in class 4 with iMovie (video editing app for iPad).

Each Kahoot! quiz consisted of ten true or false questions. The examples used in the quiz were downloaded from mainstream news media sites, satirical internet sites, clickbait sites with edited pictures and junk news sites. The university students chose the Kahoot! platform for their quizzes because they had experience with the program and because they knew that these competitive quizzes are very popular among primary school pupils.

Figure 1 gives an example of a true-false question from quiz number 4. The story is from a satirical internet site (Nieuwspaal.nl) and explains that there was an enormous line of people waiting to enter a small face mask shop because ‘no one wanted to be infected by COVID-19’. The statement in the Kahoot! quiz was: This message on the website Nieuwspaal is true.

03-05-2020 | Hans Wolterdijk | ★★ ★ **EXCLUSIEF**

ENORME RIJ BIJ MONDKAPJESWINKEL: “NIEMAND WIL BESMET WORDEN”

De tijdelijke mondkapjeswinkel in Den Haag kan de drukte nauwelijks aan. Honderden mensen stonden zondagmiddag opeengepakt in de rij. Allemaal probeerden ze een paar mondkapjes te bemachtigen.

Ondernemer Pim Timmerman opende dit weekend een tijdelijke mondkapjeswinkel in een leegstaand pand. “Het is een gekkenhuis”, vertelt hij. “Ik wist wel dat dit een gouden handelkje is, maar op zó veel belangstelling had ik niet gerekend. Mensen staan te dringen voor de kassa. Vanmiddag stonden er wel tweehonderd mensen in mijn kleine winkelje. Logisch, want niemand wil besmet worden.”



Fig. 1. Enormous line of people waiting to enter the face mask shop: “No one wants to be infected” (Source: Nieuwspaal.nl)

To answer RQ1 (‘To what extent did the children make progress in the recognition of fake news?’), the mean total score and the median score for each quiz was calculated.

A Friedman test was carried out to determine the differences between the five quizzes and a Dunn-Bonferroni post hoc test was done for pairwise comparison.

RQ2 was answered using the results from a survey among the children after the fifth lesson and RQ3 was answered using the input during weekly meetings on Microsoft Teams with the researcher, the primary school teacher, the student coach and the students themselves. Because of the COVID-19 pandemic in spring 2020 these meetings could not be organised physically.

The primary school teacher informed all the children's parents by e-mail about the project and every parent consented to their child's participation.

4 Results

RQ1: Progress in the recognition of fake news (based on the results of the quizzes).

The children that participated in the project were from a combined group (groups 7 and 8) of 28 children. Table 1 gives the mean score and the median for each quiz that was taken.

Table 1. Mean score and median for five Kahoot! quizzes (scale 0–10)

	N =	Mean	Median
Quiz 1	21	6.2	6
Quiz 2	25	7.5	7
Quiz 3	26	5.5	5
Quiz 4	25	7.0	7
Quiz 5	24	7.9	8

Children who missed a class meeting varied each meeting. For this reason, only 16 children participated in all 5 quizzes. Table 2 gives the mean and median score for all five quizzes for these 16 children.

Table 2. Mean score and median for five Kahoot! quizzes (scale 0–10) for children who participated in all quizzes

	N =	Mean	Median
Quiz 1	16	6.5	7
Quiz 2	16	7.6	7
Quiz 3	16	5.8	5,5
Quiz 4	16	7.3	7
Quiz 5	16	7.8	8

From Tables 1 and 2, it is clear that quiz number 3 yielded the lowest scores. The students from the Teacher Training Institute, who composed the quizzes, previously indicated that quiz number 3 differed from the other quizzes. This quiz focused explicitly on the manipulation of photos, the subject of the class meeting number 3. In the questions of quiz number 3, there was no information regarding the source of a photo, something that was available in the other four quizzes. Therefore, quiz number 3 is not included in the remainder of the analysis. The other four quizzes were comparable in format and also in difficulty.

To analyse the differences in the scores for quizzes number 1, 2, 4 and 5, a Friedman test ($N = 16$) was performed. The results revealed that the scores for the four quizzes differed ($X^2(3) = 10.815, p = .013$). The results for the additional Dunn-Bonferroni post hoc tests indicated that the difference between quiz number 1 and quiz number 5 was significant ($p < 0,05$). There were differences between the other pairs (1–2, 1–4, 2–4, 2–5 and 4–5) but those differences were not significant.

RQ 2: What and how have the children learned according to their self-assessment?

From the survey taken after the last class meeting, it appeared that twelve children out of 28 most enjoyed the meeting where they worked on photo editing and manipulation. For thirteen children the video editing class was the most pleasurable. This does not mean that those classes were the ones that held the most informative learning experiences for them. When they were asked which subject meeting they *learned* the most from, their answers were evenly distributed across all subjects (Table 3).

Table 3. Answers for the single select multiple choice question ‘During which class meeting did you learn the most?’

Class meeting	Subject of the class	Number of responses
1	Recognition of fake news using a check list	5
2	Critical source investigation on the internet	5
3	Creating fake photos	8
4	Creating news with ‘wild headlines’	5
5	Creating videos	4

To the follow-up question (What did you learn during this meeting?), they answered that they learned “that it is easy to see whether something is real or fake” (class meeting 2) and “how to immerse yourself in news and how to investigate what is happening in reality” (class meeting 4), among other things. Almost all children who indicated that they learned the most in class meeting 3 (photo editing) also explained that they learned how to work with the app Photoshop Mix. In response to an open question about how the children *appreciated* the classes about fake news, 19 of them reacted completely positive while 7 children gave a more moderately positive response (for instance “quite nice but I don’t need more” and “a little nice”). Two children did not answer this question at all.

RQ 3: What and how the children learned according to the primary school teacher who coached the students.

The fact that the children appreciated the series of meetings about fake news was not only apparent from the survey that was taken afterwards. This was also apparent when children from a parallel group asked the primary school teacher to install the Photoshop Mix app on their iPads as well. Also, during the meetings with the group that was involved with the experiment, it was also clear that the children were enthusiastic about the subject matter. The Kahoot! quizzes challenged them to do their best but, according to the primary school teacher, and the children were also really stimulated to think about the subject of fake news on the internet.

In meeting number 2, the children verified the sources of news stories on the internet. The teacher remarked that from that moment onwards, the children changed their behaviour while answering the quiz items in Kahoots! More than during the first quiz, they tried to check the sources of a message. But they still tried to find the answer quickly. The primary school teacher during the evaluation of the project said, “I saw the children using ‘split screen’ on their iPads with the Kahoot! on one side of their device and the Safari browser on the other side. They were absolutely focussed on finding the right answer and then pressing the correct answer as fast as possible”. To make children active users of the internet and investigate the reliability of the sources of those news messages was one of the learning goals of the project. The university students succeeded in stimulating the children to acquire this habit, even while they also try to answer as quickly as possible.

The primary school teacher also remarked that the topic of meeting number 3 was quite different from that of the other meetings (less emphasis on the verification of information sources) but the meeting itself and the subject of it (photo manipulation), were well chosen. Children worked with the Adobe Photoshop Mix app and some of them created wonderful artifacts (Figs. 2 and 3). Problematic in the educational design was the lack of time for meeting number 5. In the meeting, the children were supposed to create a script and film then edit their assignment as a group. To complete all these tasks the children needed more time the following week. It should be noted that some of the products in week 5 (the films based on the stories from week 4) were of expectational quality. Due to privacy concerns, we cannot provide links to the films that were created in meeting 5 but Fig. 4 gives an example of a story that was created in meeting 4.



Fig. 2. Artifacts that children created with the Adobe Photomix app



Fig. 3. Artifacts that children created with the Adobe Photomix app



Fig. 4. News story created by one of the groups. The headline says: ‘Child jumps off roof because of an alien’

All materials the university students created for their classes (didactic route forms, PowerPoint presentations, Kahoot! quizzes) are in the Dutch language. They are stored in the Dutch universities of Applied Sciences Repository (HBO Kennisbank) and can be downloaded for later use by, for instance, primary school teachers and educational staff from other organisations, e.g., public libraries.

5 Conclusion

The main question that we intended to answer in this research project was whether allowing children to create their own news messages is an effective approach to teach them how to distinguish between reliable news and fake news. To find an answer to this question, we used five Kahoot! quizzes with true or false questions as part of a series of five lessons where children created fake photos, news stories and videos.

Although it is hard to claim there is causality between the learning activities and the scores on the quizzes, we did find indications that the children became better at recognising fake news during the lesson’s series, particularly in recognising satiric news stories and fake photos. The scores for quiz number 5 were statistically higher than those for quiz number 1. An explanation for the higher scores from quiz number 2 onwards is that children used the internet to verify the source of a story or a photo. But the children indicated that they also learned how fake news is invented and how it can be recognised. According to the primary school teacher, the educational approach to make children create their own fake news motivated the children to participate in the learning activities and aroused their interest in ‘news’. The use of iPad apps in the classes helped the children to enjoy the lessons. The Kahoot! quizzes also motivated the children to do their best to distinguish reliable news sources from fake news.

6 Discussion

The total number of children that participated in this research was 28. The sample size is not sufficient to presume that the conclusions from this research project can be transferred to other groups of children or different circumstances. Many differing variables, for instance how experienced the children are in the use of digital media and the personality of the teacher, or as in our project that of the students from the Teacher Training Institute, are significant factors that influenced the results of this research project. However, the assumption that an activating educational approach like making children create their own news stories, stimulates children to understand the phenomena of fake news has become, at least for this group, very plausible. This conclusion is also based on observations by the primary school teacher and comments provided by the children. Furthermore, there were indications that the Kahoot! quizzes not only functioned as instruments to measure the progress of the children (as they were designed to in the research proposal), but they also were a catalyst to make the children learn about fake news. This last function of the quizzes is in line with results from the research literature about Classroom Response Systems. Chaiyo and Nokham found indications that the use of these interactive technologies creates strong learning experiences for children [9].

For the professional practice of primary education this research resulted in five-course designs, PowerPoint presentations and Kahoot! quizzes that functioned well, at least in this case. All these materials can be downloaded from the Dutch Universities of Applied Sciences Repository (HBO Kennisbank) and can be adapted for use in someone's own educational situation (CC BY).

The use of competitive Kahoot! quizzes whose scores were partly determined by the speed of answers prompted the question of whether the element of time could have influenced the number of correct answers. Another student project developed an individual quiz in Google Forms but the students from the Teacher Training Institute did not prefer this alternative because it was more boring than the other options. The speed of recognising fakes news is also a factor in everyday life. This is because people do not always have the opportunity to check all messages in real life. Intuition will always play a role in quickly recognising disinformation. The usage of the time factor as a competitive element is therefore logical.

In an era when fake news is a growing phenomenon, we must promote digital educational readiness in a way that is meaningful to young people. Recently, a follow-up Erasmus + project with participation of our research group has been granted in which schools and libraries in three countries will investigate similar innovative blended learning approaches for pupils aged 12 to 15.

Acknowledgements. The organisation Nationaal Regieorgaan Praktijkgericht Onderzoek SIA – an institute of the Dutch Research Council NWO - provided a KIEM-hbo grant to facilitate this project on the effectiveness of educational approaches to combat fake news.

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Health Literacy



Perceived Hindrances to Health Information

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Abstract. The paper examines perceived hindrances to information about healthy living and how it relates to education, age, and sex. Data was collected by a survey, using a random sample of 1,800 people aged 18 years and older. The response rate was 39%. In addition to background questions, information hindrances were measured by a total of 15 questions, which are all in the form of statements. For six of the 15 statements presented in the study, half or more of participants in all socio-demographic groups agreed that they describe hindrances. The participants' experience of the hindrances varied though. Findings about socio-demographic differences mainly related to age and education, although differences by sex were also found for some of the hindrances.

Keywords: Age · Education · Health information · Information barriers · Lifelong learning · Media and information literacy · Sex

1 Introduction

People's potential for lifelong learning and informed decisions-making about their health is a crucial issue. The enhancement of media and information literacy is important in this regard [1]. It has been generally recognized as a significant factor for lifelong learning about health. Yet, there are still a number of unanswered questions about the hindrances to health information that people experience, which may have impact on their health behaviour as well as their possibilities to improve their media and information literacy.

Information behaviour hindrances can be imagined or real and may include a range of issues. This can for example be hindrances in relation to attitudes, beliefs, and values at an individual or collective level [2].

It has been suggested that the employment of devices and programs using digital technology will create increasing opportunities for people to practice health care management [3, 4]. However, several challenges in using them have also been identified and it has been stressed how important it is that technology is not complicated and difficult to use. There are, for example, indications that health apps need to be simple and intuitive to use, with an easy input of health data, as well as possessing features that save time over current methods [5].

Studies that have explored how socio-demographic factors relate to the use of digital health information have continually demonstrated that certain groups within society are more at a disadvantage than others. Education has been found to be a strong predictor,

with those who have a higher level of education being more likely to seek digital health information than those with less education [6–8]. In addition, younger people and women have been reported to seek digital health information more than those who are older, and men [6, 8, 9]. The older people are, the more likely they are to need help with using new technology [10].

Although hindrances related to digital information is an important group of studies, other types of barriers have been identified in connection with various social groups. Restrictions in access to information, which can be caused by a variety of reasons, has been identified [2, 11–13], even when it is believed that the information exists [14]. Finding an information source, as well as knowing what kind of information is to be found in it, can be problematic [11, 15]. It further seems that not having an overview of where specific information can be found may be a problem [15, 16]. In addition, it has been pointed out that health information can be complex and difficult to understand [2, 12, 14]. Furthermore, the significance of the quality of information has been pointed out. This relates not only to the content of the information, that must be relevant to the needs of end user, but also to the quantity of it, which should not be overwhelming [17].

The possibilities for people to improve their knowledge, in order to make informed choices that promote health and wellness, is a crucial issue which may have impact on the wider prospects for sustainable health and wellbeing. Yet, there are still a number of unanswered questions about the information challenges that they may experience. By identifying these hindrances, the health professionals who are responsible for health promotion will have the opportunity to diminish, or preferably, eliminate them. Subsequently, people's possibilities to access health information, and their capacity to use it effectively to improve their way of living, can be enhanced.

The aim of the current study is to examine the perceived hindrances to information about healthy living among people 18 years and older in Iceland. The paper will seek answers to the following question: 1) What barriers do people experience in relation to information about healthy living? 2) How do the perceived barriers relate to their education, age, and sex?

2 Methods

2.1 Data Collection

This is a quantitative study. Data were gathered from November 2018 to January 2019, from two random samples using an internet and a telephone survey. The total sample for the survey consisted of 1,800 people, 18 years and older, from the whole country. The telephone survey utilized a sample of 300 people aged 60 years and older from the whole country, randomly selected from the National Register of Persons in Iceland. The internet survey utilized a random sample of 1,500 people aged 18 to 59 years, from the Social Science Research Institute at the University of Iceland net panel. The net panel consists of people aged 18 years or older from the whole country. The choice of participants in the net panel follows strict methodological rules to avoid convenience sampling. The net panel is updated regularly to ensure that it corresponds with the distribution in the population, regarding sex, age, and residence. Both datasets were merged, allowing answers from all individuals belonging to each set of data. The total response rate was 39% (N = 698).

Because of the response rate, the data were weighed by gender, age, place of residence and education, so that it corresponds with the distribution in the population.

2.2 Measurements and Data Analysis

The measurement consisted of socio-demographic variables as well as variables that measure information barriers:

1. Socio-demographic information included the background variables of education, sex, and age.
2. Information hindrances were measured through a total of 15 questions, which are all in the form of statements, categorized into four groups: Three of the statements refer to obstacles that people face in relation to the situation that they live in, that is hindrances in relation to time and finances and difficulties in getting away from home to seek information. The other 12 statements refer to challenges in relation to people's attitudes and cognitive aspects. Five statements refer to beliefs about the availability of information, five to capabilities of selecting and interpreting information, and two statements refer to possibilities of using information and communication technology. Each statement had a 5-point response scale (Strongly disagree – Disagree – Neither agree nor disagree – Agree – Strongly agree).

All analysis is based on weighed data. Differences across sex, education, and age were examined by using chi-square test.

3 Results

This chapter begins by introducing results about hindrances in relation to educational and age differences. After that, results about differences related to sex will be presented. Only results about significant differences across the socio-demographic groups will be presented.

As can be seen in Fig. 1, the older people are, the more likely they were to experience difficulties in leaving their home to seek information ($p < .001$), as well as barriers in being able to afford information ($p < .001$), and to find time to seek information ($p < .001$). Results about education show that people with university education were most likely, and people with secondary education least likely, to find it difficult to leave their home to seek information ($p < .001$), and to be able to afford it ($p < .01$).

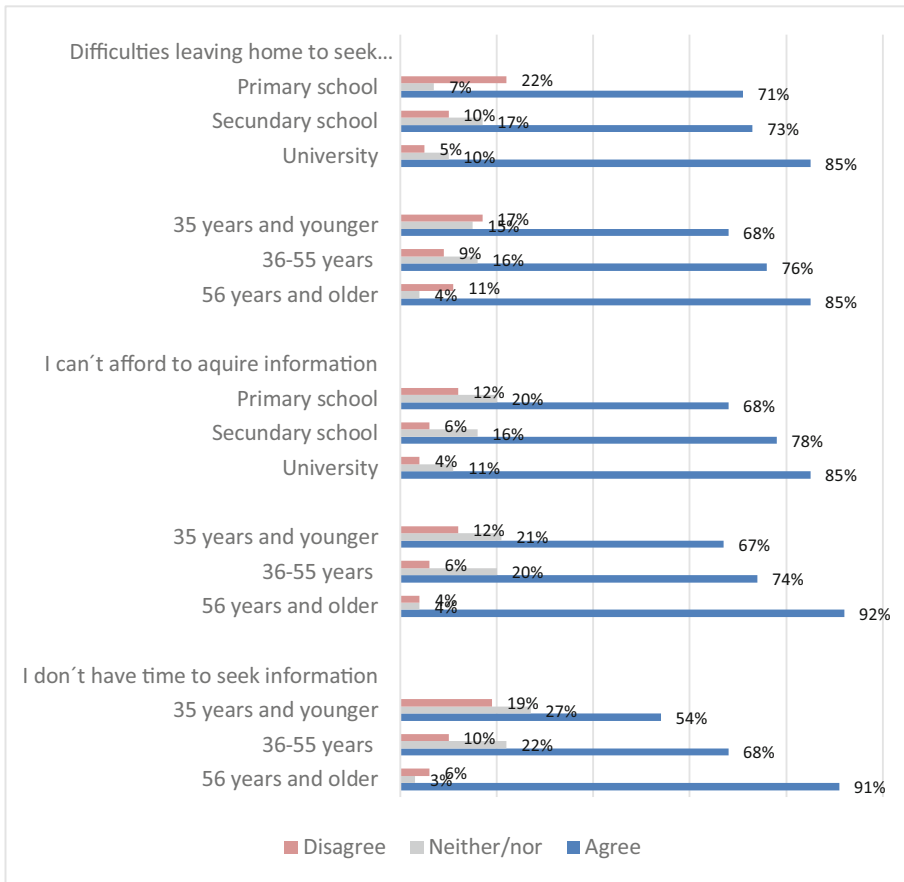


Fig. 1. Hindrances related to the situation that people live in

Figure 2 shows that the participants were most likely to agree with three of the statements. Participants with university education and those who belong to the oldest age group, respectively, were most likely to agree with the statements: “Information that I need don’t exist” ($p < .05$; $p < .001$), “I don’t know where to seek information” ($p < .001$; $p < .001$), and, “It’s difficult to find information with useful advice about health protection” ($p < .01$; $p < .001$). The participants were, however, less likely to agree with the other two statements. Nevertheless, participants with university education, and those who are 56 years or older were, respectively, more likely to agree with the statements: “The information exist but I don’t have access to it” ($p < 0,01$; $p < 0,001$), and “When information about specific items regarding health care is needed, it can be difficult to find” ($p < 0,01$; $p < 0,001$) (Fig. 2).

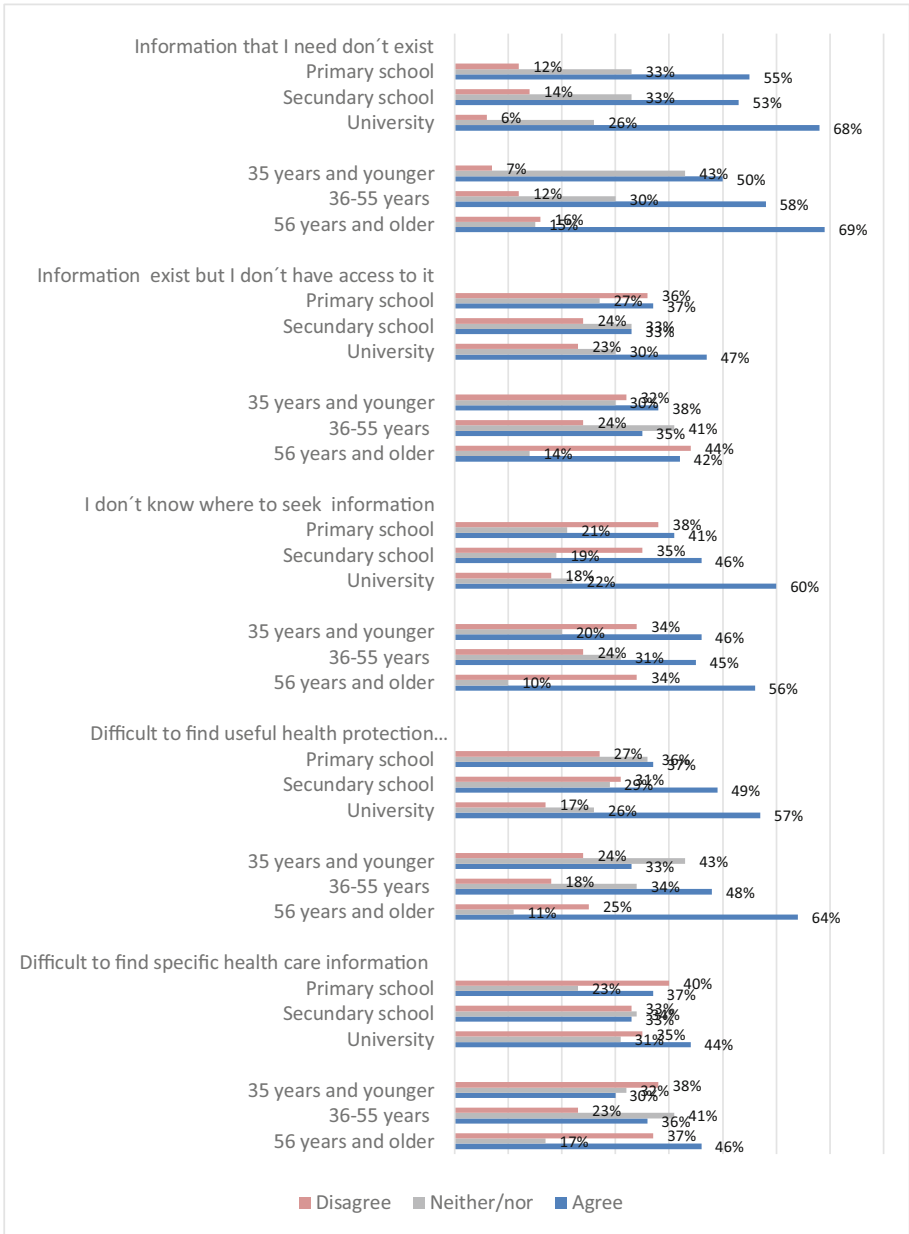


Fig. 2. Hindrances related to access to information

As Fig. 3 shows, the participants were likely to agree with two of the statements. The more educated the participants are ($p < .05$), and the older they are ($p < .001$), the more likely it is that they agreed with the statement “There is not enough information in Icelandic”. For the statement “Information are often complicated and difficult to

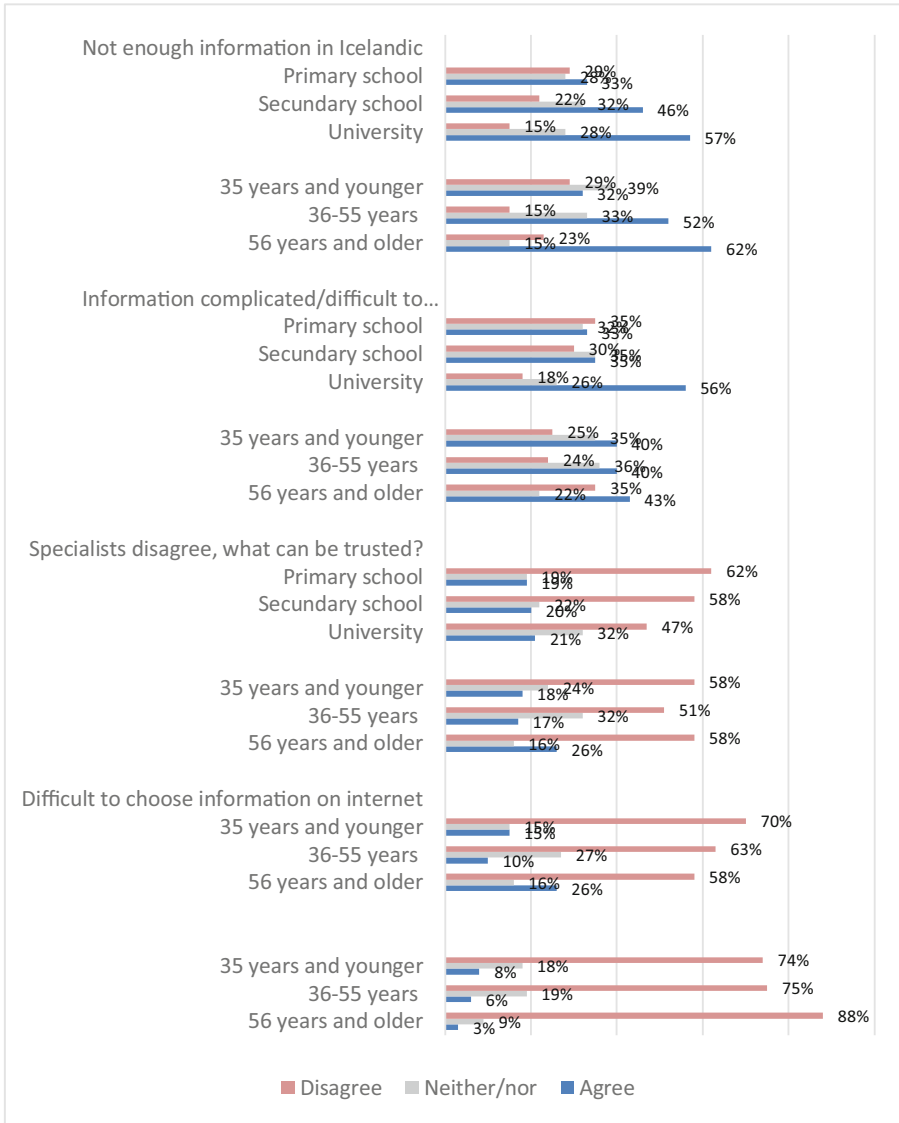


Fig. 3. Hindrances related to the selection and interpretation of information

understand”, participants with university degree stand out, as the majority of them agreed with it ($p < .001$). Furthermore, the rate of those who agreed with the statement is higher in all age groups than those who disagreed with it ($p < .05$).

The participants were, on the other hand, likely to disagree with the other three statements. The less educated participants are ($p < .05$) the more likely they were to disagree with the statement “Specialist’s don’t always agree on how to protect health, therefore I don’t know what information can be trusted”, and those who are 56 years

and older were more likely to agree with this ($p < .01$). The younger people are the more likely they were to disagree with the statement “The amount of information on the internet makes it difficult to choose from” ($p < .001$). Those who are 56 years and older ($p < .01$), were more likely than participants who were younger, to disagree with the statement “The media often publishes information from people whose qualifications I don’t know, therefore it’s difficult to know what is reliable and quality information” (Fig. 3).

The results in Fig. 4 show that the more educated ($p < .01$) and younger ($p < .001$) the participants are, the more likely it is that they found it difficult to begin to use new information and communication technology. In addition, the majority of participants disagreed that it is easy for them to get help in using information and communication technology. The more educated they are, the more likely they were to disagree with

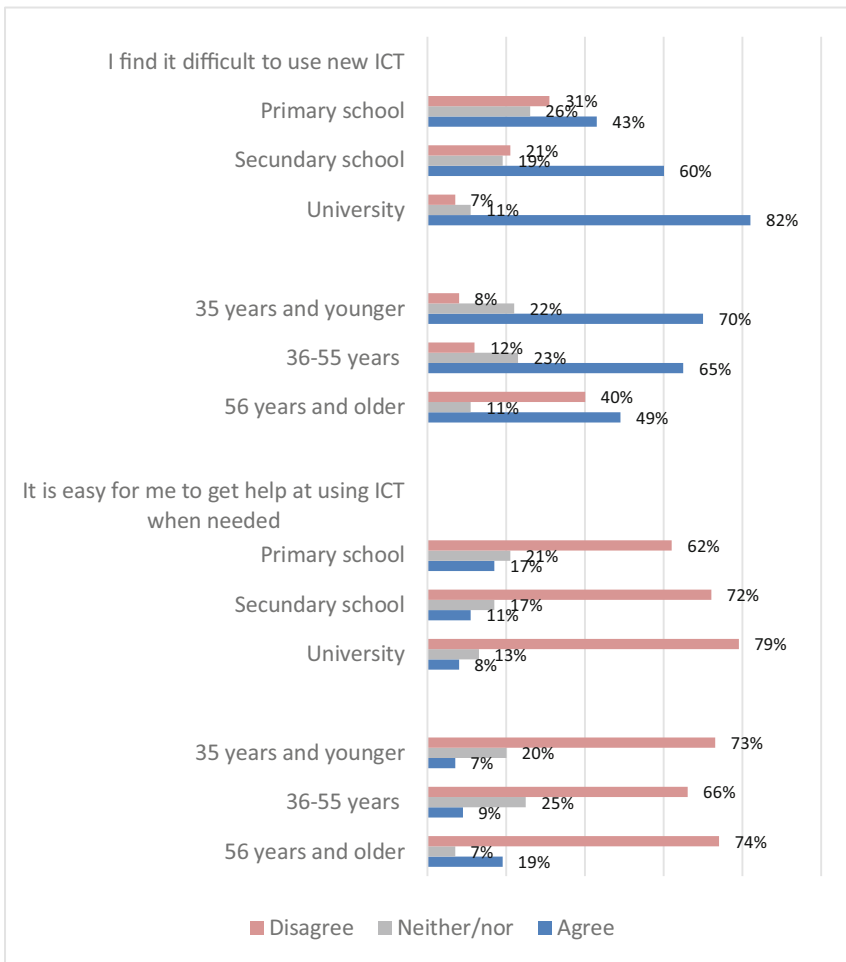


Fig. 4. Hindrances related to technology

this ($p < .01$). The results about age groups varies, although participants in all groups disagreed with the statement. Those who are 35–65 years old were less likely to disagree than those who belong to the other two age groups. In addition, those who are 56 years and older were more slightly more likely to agree that it was easy to get help than those who are 35 years and younger ($p < .001$).

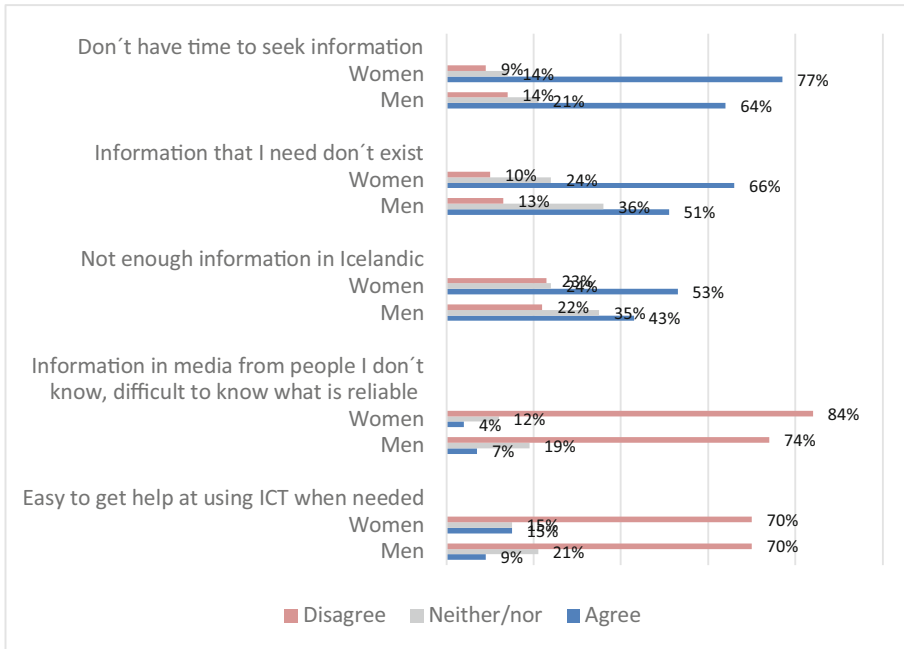


Fig. 5. Perceived hindrances - Sex

Figure 5 shows that women were more likely to experience difficulties at finding time to seek information than men ($p < .01$), and that they were more likely to agree that there is a lack of information in Icelandic than men ($p < .01$), as well as that information that they need does not exist ($p < .01$). On the other hand, women were more likely than men to disagree with the statement “The media often publishes information from people whose qualifications I don't know, therefore it's difficult to know what is reliable and quality information” ($p < .05$). Furthermore, although the majority of both men and women disagreed that it is easy to get help at using information and communication technology, women were somewhat more likely to find this easy than men ($p < .05$).

4 Discussion

It is crucial to enable all groups within society to acquire the information and understanding that is necessary to maintain, and preferably to improve their knowledge of healthy behaviour. By presenting findings about how people who are 18 years and older

experience hindrances to information, the study sought to contribute to current research of people's possibilities for healthy living, and sustainable health and wellbeing.

The study results provide some insight to the hindrances that people are confronted with. For six of the 15 statements presented in the study, half or more of participants in all socio-demographic groups agreed that they describe hindrances. This included obstacles that people face in relation to the situation that they live in (limitations regarding time and finances, and difficulties leaving their home), the belief that information that they need do not exist, the ability to start using new information and communication technology, as well as possibilities of getting help in using it.

Furthermore, 40% or more of all participants agreed that they do not know where to seek information. In addition, except for the youngest group and those who have primary school education, they considered it difficult to find useful information and found that there was not enough information in Icelandic.

On the other hand, a majority of participants in all groups, that is 60% or more, did not agree that three of the statements represented a hindrance. This included difficulties at knowing what information can be trusted, because specialists do not always agree what is best for health protection, and that information in media often comes from individuals whose background is not known, as well as that the amount of information on the internet made it difficult to choose from.

The participants' experience of the hindrances varied though. Findings about socio-demographic differences were mainly related to age and education, although differences related to sex were also found for some of the hindrances.

Regarding hindrances that people experience in relation to the situation that they live in, the study found that the older people are, the more likely it was for them to agree with all three statements about this, people with university education were most likely to experience hindrances in relation to the cost of information and having to leave home to seek it, and women experience more difficulties at finding time to seek information than men.

Prior studies have demonstrated that various hindrances exist in relation to finding and getting access to information [11–16]. The current study supports this. In particular, for the oldest group (56 years and older) and those with university education, it was challenging to know where to seek health information, and to find information with useful health advice. They were also most likely to believe that needed information does not exist. In addition, women were more likely than men to believe that information that they needed does not exist.

Furthermore, the older and more educated people are, the more likely it is that they find that there is not enough information in Icelandic, women were also more likely to consider this a problem than men. Those with a university education were most likely to consider information to be complicated and difficult to understand. The latter has also previously been reported to be a hindrance [2, 12, 14].

As for information and communication technology, the more educated and younger people are, the more likely it is that they consider it difficult to begin to use new technology. In addition, although a majority of all participants found it difficult to get help with using information and communication technology, those who had a university education considered it more difficult than other educational groups. This is in contrast with prior

study [10] which reported that the older people are, the more likely they are to need help at using new technology.

The finding that more educated people are likely to experience more hindrances than those who are less educated is surprising. It seems logical that those who have more education consider their possibilities to be better than those who are less educated. Competency theory, however, may offer some explanation to this. The theory argues that people with low skills or knowledge also lack the ability to recognize it, therefore they tend to overestimate their capabilities. Highly qualified people, on the other hand, are inclined to underestimate their abilities. Even though they have fairly good judgement of their absolute performance, they tend to overestimate how well others are doing. As a result, their evaluation of how well they perform compared to others is biased [18]. It is interesting to compare the study results with the theory, however, it needs to be considered that it was not tested in the study. But these results are interesting and give reasons to study further people's perceptions of their hindrances to health information and how they can be supported.

The overall study is limited by a total response rate of 39%. Although this may be considered satisfactory in a survey, it raises the question of whether or not those who answered the survey are giving a biased picture of those who did not respond. In order to compensate for this bias the data were weighed by gender, age, place of residence and education, so that it corresponds with the distribution in the population. The findings may, therefore, provide valuable information about the hindrances that people experience in relation to health information.

Acknowledgements. The study was supported by the University of Iceland Research Fund.

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Critical Health Literacy and Critical Information Literacy: Bridging Research Discourses from Different Domains

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Abstract. The purpose of this paper was to carve out “critical dimensions” in the concepts of health literacy and information literacy and contribute to the conceptualization of critical health information literacy, by analyzing and bridging standpoints of two research domains - health literacy and information literacy. The current context of a public health crisis accompanied by information overload additionally underlines the need to enhance our understanding of the critical health information literacy construct. Participatory information environments have made a fundamental change in the conceptual understanding of critical health information literacy and shifted the approach from one-dimensional, functional, individual skills to multidimensional, collective and distributed approach that takes into account the social, cultural, economic and political context.

Keywords: Critical health literacy · Critical information literacy · Health information literacy · Health information appraisal · Online health information

1 Introduction

The rapidly expanding digital information environment is challenging our view on literacy and what it means to be literate in the 21st century. The current infectious disease crisis has profoundly disrupted the daily lives of individuals across the world, with information about coronavirus disease (COVID-19) dominating all media channels. This overwhelming supply of information has created even more pressure on individuals to critically appraise health information, differentiate between misinformation and credible and reliable information, and adapt their behavior accordingly. Health information literacy is required to combat this “infodemic” and to enable individuals to make informed decisions about their health based on reliable and trustworthy information.

Given that research to date has not reached a consensus on how to build user confidence in online health information, information credibility assessment remains the most widely reported challenge among online health information consumers and health information literacy researchers [1, 2].

When addressing the problem of credibility of online health information, then one of the subdomains of health literacy becomes the focus of investigation, namely “critical health literacy”. Similar assertion can be made for the field of information literacy, where the concept of “critical information literacy” can contribute to conceptualizations of critical health literacy due to its focus on critical appraisal, empowerment and social or economic determinants. Current healthcare crisis accompanied by information overload additionally underlines the need to enhance our understanding of the “critical health information literacy” construct.

1.1 Objectives

The objective of this research was to carve out critical dimensions in the concepts of health literacy and information literacy and to conceptualize “critical health information literacy”, by analyzing and bridging standpoints of two research domains - health literacy and information literacy.

2 Methodology

A thematic analysis was performed of papers dealing with “critical” dimensions in health literacy and information literacy in order to find shared attributes that could be used for conceptualizing “critical health information literacy”. Scientific articles dealing with concept analysis of health literacy and information literacy were searched in three databases: for the query (“critical health literacy CHL” OR “critical information literacy CIL”) and (concept* analysis) we have identified records in different databases: Scopus (for CHL N = 161; for CIL N = 194), Web of Science (for CHL N = 148; for CIL N = 219 and Google Scholar (for CHL N = 417; for CIL N = 23). We found an article to be eligible for inclusion if: a) the record was a scientific article; b) the article was in English; c) the full-text was available; and d) the article mentioned the queried terms at least once in the article title, abstract text or in the key-words. When submitted to these eligibility criteria and removing the duplicates, 63 articles remained which we thoroughly analysed for this review.

3 History and Origin of Health/Information Literacy Concepts

In the past decades, there has been a growing interest in the area of health literacy among researchers, practitioners and policy-makers across various disciplines including medicine, nursing, psychology, education, library and information sciences, communication and sociology. This has not only been reflected in the number of published scientific papers on health literacy but also in the number of issued documents such as national strategic plans, action plans, white papers, policies, declarations by government and non-government organisations [3].

However, with the proliferation of health literacy research and the growing body of health literacy knowledge, it has become clear that there is no universally accepted definition of the health literacy concept, though the majority of available definitions predominantly overlap [4].

The terms health literacy and information literacy both appeared in 1974, in very different contexts. Health literacy was first cited by Simonds with regards to health education in schools [5], and since then has been used mostly in health sciences and health communication. The term “information literacy” was first coined by Paul Zurkowski in a report to the National Commission for Libraries and Information Sciences. He defined information literacy as “...having learned techniques and skills for utilizing the wide range of information tools as well as primary sources in molding information solutions to one’s problems.” [6, p.6].

The Medical Library Association (MLA) has incorporated the concept of information literacy into the health context by defining health information literacy as “...the set of abilities needed to: recognize a health information need; identify likely information sources and use them to retrieve relevant information; assess the quality of the information and its applicability to a specific situation; and analyze, understand, and use the information to make good health decisions” [7].

In the last two decades, the conceptual approach to health literacy has shifted from a one-dimensional, individual functional approach, focusing on one’s skills such as reading, writing, numeracy and knowledge in a medical and healthcare context, towards a multidimensional and complex construct that takes into account the social, cultural, economic and political context [8].

Bridging this gap between individual and societal approach, the European Health Literacy Consortium proposed an all-inclusive definition that entails “...people’s knowledge, motivation and competencies to access, understand, appraise and apply health information in order to make judgements and take decisions in everyday life concerning healthcare, disease prevention and health promotion to maintain and improve quality of life during the life course” [4, p.80].

4 Critical Health Literacy

Critical health literacy is a subdomain of health literacy that, until now, has been least well defined and researched. This is, according to Sykes & Wills “because it takes us away from the association of health literacy with health education and forms of communication towards political action” [9, p.168].

The most cited and widely accepted theoretical model developed by Nutbeam distinguishes between three levels of health literacy: functional, communicative (interactive) and critical. While functional health literacy refers to “basic skills in reading and writing needed to function effectively in everyday situations”, communicative or interactive health literacy refers to “more advanced cognitive and literacy skills, which, together with social skills, can be used to actively participate in everyday situations, allow a person to extract information and derive meaning from different forms of communication and to apply new information to changing circumstances”. Nutbeam also adds that “progression between categories is not only dependent upon cognitive development, but also exposure to different forms of communication and message content” [10, p.2075].

In his paper on health literacy seen as a public health goal for the 21st century, Nutbeam describes critical health literacy as “having more advanced cognitive skills which, together with social skills, can be applied to critically analyze information, and

to use this information to exert greater control over life events and situations” [11, p.264]. Nutbeam further highlights that critical health literacy involves skills “which investigate the political feasibility and organizational possibility of various forms of action to address social, economic and environmental determinants of health” and that critical health literacy is “linked to population benefit, alongside benefits to the individual” [11, p.265]. Nutbeam also argues that critical health literacy has to do with raising awareness of the social, economic and environmental determinants of health, supporting individual and collective, community actions that call for interaction, participation and critical analysis, which is very similar to the style of education for “critical consciousness” advocated and popularized by the Brazilian educator, Paulo Freire [12, 13].

In a concept analysis of critical health literacy, Sykes et al. defined key figures of critical health literacy as “advanced personal skills, health knowledge, information skills, effective interaction between service providers and users, informed decision making and empowerment including political action” [14, p.150]. The authors also stress that critical health literacy should be the driver for political and social change. According to Sykes et al., the most commonly used strategies for building critical health literacy include “informal and participatory learning, supported and independent assessment of the problem, appraising information, familiarization of the health systems and services and social support” [15, p.50].

Rask et al. suggest the three existing levels (basic, communicative and critical) do not fully describe the depth of health literacy and propose a fourth level called “*holistic health literacy*” that includes “tolerance, understanding culture as wide and multidimensional phenomena, environmental consciousness, and analysis of the state of the world from various points of view” [16, p.58].

In her view on the political ecosystem of health literacy, de Leew argues that we are on the brink of a “*third generation of health literacy development*” that could be defined as “the skills, capacities and knowledge required to access, understand and interact with social and political determinants of health and their social discourse” [17, p.2]. Chinn identified “critical appraisal of information, understanding the social determinants of health and collective action” as constituent domains of critical health literacy [18, p.64].

With the increasingly large amount of health information available online, it has become evident that information appraisal is one of the core components of health information literacy. An approach to critical health literacy defined in terms of information appraisal has been practiced by several researchers [19–21]. In an attempt to systematically operationalize the concept of health information appraisal competence, Diviani et al. synthesized six interrelated but distinct core competences of health information appraisal that include “basic competence, predisposition, identification, critical evaluation, selection, and application competence” [1].

While some researchers relate the concept of critical health literacy with understanding the social determinants of health (income, education, social exclusion, and social organization) and their impact on health [12, 18, 22], others extend the definition of critical health literacy to the skills and competences that facilitate collective action, also alternatively called “civic” or “citizen” health literacy. This construct can be observed through the concept of “psychological empowerment” developed by Zimmerman et al. and observed as integrating “perceptions of personal control, a proactive approach to life,

and a critical understanding of the sociopolitical environment and an active engagement in it” [23].

Although there is no universally established measure of critical health literacy, there is an enormous proliferation of health literacy measures and tools, covering particular aspects, areas or target groups related to health literacy. A most comprehensive online database of freely available tools associated with screening or measuring health literacy is available at the “Health Literacy Tool Shed” web site, a resource created by Michael Paasche-Orlowe of Boston University in the US [24], that currently includes 205 tools that measure different domains of health literacy (application, information appraisal, comprehension, etc.) or specific context (diabetes, HIV, mental health, etc.), or validated versions in different languages.

However, the majority of these tools focus on functional literacy of individuals in the clinical setting through word recognition or reading comprehension appraisal, and provide little assistance for assessing critical health literacy or in a population context [25–27]. More sophisticated and complex tools are emerging that assess the individual’s capacity to demonstrate the confidence (self-efficacy) to use relevant health information in making decisions and taking actions to benefit health [28–36]. The need for a specific tool to measure all aspects of critical health literacy still remains.

5 Critical Information Literacy

Ever since Zurkowski formulated “information literacy” as “an effective use of information in the context of problem solving” [6] the term has been often observed through functional domain associated with skills needed to access, evaluate and use information. However, such concept has been criticized for limiting information literacy only to a set of decontextualized skills that can hardly be applied in real-life situations [37]. According to Pilerot and Lindberg, information literacy should rather be seen “as the capacity to understand and be familiar with how information is created, sought, used, and valued in a certain social practice” [38, p.345]. According to Špiranec et al., radically changing information environments are causing anomalies in the information literacy paradigm, and the authors call for the introduction of a sub-concept of information literacy, namely Information Literacy 2.0. [39].

The conceptual foundation of information literacy was made by the American Library Association (ALA) in a statement that “in order to have information literacy, a person needs to be aware of the information necessity, to be able to locate it, assess and use it efficiently. People acquainted with information literacy are those who learned how to learn” [7]. During the time period from Paul Zurkowski’s definition until the definition given by the ALA, the concept underwent some changes with regards to the methods of information retrieval and represented the basis of intellectual work techniques [40].

With the changes in the information environment, a shift towards the “critical” component, as noticed in health literacy, can be observed in recent conceptualizations of the information literacy construct. In the light of these shifts in information environments, brought about by web 2.0. and social media, Špiranec et al. stress that “participatory, conversational and constructive information environments are congruent with the core principle and values of critical information literacy and that information literacy cannot be regarded as socially disengaged and non-participatory” [41, p.259].

The new contours of critical information literacy can be observed in the American Library Association “Framework for Information Literacy for Higher Education”, 2015 definition of information literacy as “a set of integrated abilities encompassing the reflective discovery of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning.” [42]. In this definition, the Framework makes a marked turn towards critical information literacy in that information needs to be observed in dynamic and often uncertain information ecosystem where sociocultural complexities of scholarly information and research are explicitly addressed.

6 Discussion

Given the complexities of today’s information environment, how different literacy domains interact and supplement each other, as well as bridging research discourse from different perspectives presents the focus for future research [14, 43–46]. Frisch et al., for example, explored common elements of other literacy domains such as (new) media literacy, information literacy, science/scientific literacy, cultural literacy and civic/political literacy that can be used in definitions of health literacy. The authors have compiled seven distinct dimensions shared by the majority of the explored literacy domains that further research in health literacy can profit from, namely “functional literacy, factual and procedural knowledge, awareness, a critical dimension, an affective dimension and attitudes” [44, p.124].

Higgins and Begoray have used the concepts of health literacy, critical health literacy, media literacy, critical media literacy, media activism, and critical viewing to conceptualize a unique construct of “*critical media health literacy*” defined as “the right of citizenship and empowers individuals and groups, in a risky consumer society, to critically interpret and use media as a means to engage in decision-making processes and dialogues; exert control over their health and everyday events; and make healthy changes for themselves and their communities” [47, p.142].

Levin-Zamir and Bertschi stress the importance of eHealth literacy and media health literacy for empowering people to actively engage in their own health [48], while Hobbs and Jensen, emphasize that new media literacies are needed to be effective in the increasingly social media environment [49].

In a concept comparison of health literacy and information literacy, Lawless et al. have noted that both concepts share many common antecedents and attributes such as “literacy (reading and numeracy), health or information need, comprehension, decision-making and degree of technological competency”. According to authors’ research results, unique to health literacy is an emphasis on interactive communication and unique to information literacy is a focus on search skills, search strategies, and finding information. Both concepts share benefit to the individual and society [50, p.151]. This perspective can be seen highlighted also in the concept of health information literacy.

In his review of the concepts of information and digital literacies, Bawden pointed out that “to deal with the complexities of the current information environment, a complex and broad form of literacy is required. It must subsume all the skill-based literacies, but cannot be restricted to them, nor to any particular technology or set of technologies.

Understanding, meaning and context must be central to it. It is not of importance whether this is called information literacy, digital literacy, or simply literacy for an information age. What is important is that it be actively promoted as a central core of principles and practice of the information sciences.” [37, p.251].

Critical health literacy should be observed from different perspectives and context, not only from health-related concepts, but could benefit from other literacies such as civic literacy, political literacy, science literacy, media literacy, etc.

Participatory information environments have made a fundamental change in the conceptual understanding of *critical health information literacy* and shifted the approach from one-dimensional, functional, individual skills to multidimensional, collective and distributed approach that takes into account the social, cultural, economic and political context.

Digital information environments and availability of online health information have turned the focus of attention to higher-level cognitive and social skills that reflect critical understanding of health and its determinants, support critical thinking and informed decision-making. Critical health literacy encompasses the empowerment of people and competences needed for collective social and political action regarding determinants of health and well-being [4].

7 Conclusion

The current context of a healthcare crisis accompanied by information overload additionally underlines the need to enhance our understanding of the critical health information literacy construct.

The aim of this paper was to analyze the critical health literacy construct by mapping out common attributes and themes arising in a different research domain, namely the domain of critical information literacy. The main themes established in the analysis uncover the way in which two different literacy discourses were structured:

1. Participatory/online information environments are recognized as a driver towards the necessity to introduce critical dimensions in both critical information literacy and critical health literacy
2. Critical health literacy is the domain of health literacy that is least defined and developed, whereas critical information literacy as a concept is well researched and strongly rooted in the information literacy domain
3. Both critical information literacy and critical health literacy are emphasized to be holistically dimensioned/multidimensional in comparison to information literacy/health literacy, and apart from functional dimensions both endorse the idea of promoting social justice and the public good, understanding power relations and power asymmetries as well as reducing social, economic, political and other types of inequalities
4. Attempts to measure both concepts mainly focus on the critical appraisal of information, although indicators of empowerment and political action are becoming increasingly evident.

As our thematic analysis has shown, critical information literacy and critical health literacy have developed within parallel research domains, but key similarities and congruent developments call for stronger interdisciplinary research ties. These could constructively fill out gaps in existing discourses, specifically taking into account recent practical developments and research outcomes in the field of critical information literacy from which critical health literacy could learn. This paper offers only a snapshot of the “critical” dimensions in the concepts of health literacy and information literacy and does not represent a comprehensive literature review. A broader review of the literature on the subject matter as well as identification of a framework for a multidisciplinary concept that would bridge the hereto parallel research domains is needed.

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College Students' Credibility Judgments on Healthy Diet Information on Social Media

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Abstract. The main objective of this study was to investigate how college students judge the credibility of healthy diet information on social media. This mixed-method two-phase sequential study used a survey and individual interview methods to explore how college students judge the credibility of the acquired information, and how their healthy diet behaviour and nutrition literacy are related to the credibility judgment criteria they use. Results show that students value expertise of authors on social media higher than friendliness, but the importance of motivating and friendly interaction is more indicative of students' information use behaviour. Students who exhibit healthy diet behaviour give more value to authors' expertise. Students who have problems in understanding nutrition information rely more on the friendliness and popularity of authors on social media as credibility indicators.

Keywords: Credibility judgements · Healthy diet information · Social media · Nutrition literacy · College students · Adolescents

1 Introduction

As they gradually grow in autonomy, often leaving home and starting an independent life, college students take over the responsibility for making their own decisions including food and dietary choices. Making healthy food choices depends on their nutrition and food literacy competencies [1, 2], which include abilities for making credibility judgments. These abilities enable the differentiation of credible information from those that are not a good basis for making food choices. Moreover, the present information overload and confusing environment lack the traditional information intermediaries, which leave information users without helping mechanisms. An increasing number of people are engaged in creating and mediating content supported by rapidly advancing information and communication technology. The accessible range of information sources is wider than ever before, and so are the challenges of verifying the accuracy, authority, objectivity, and currency of information. The young people's abilities to judge the credibility of information may have a serious impact on attitudes and behaviours, and in the context of dietary decisions, on healthy food-related choices. The importance of these issues resulted in calls for research focused on the new millennium information literacy, and issues of credibility judgment and evaluation criteria that are applicable in the information and media-saturated environment [3].

Four literacies in health contexts are important for the development of informed decisions for all involved in health-related context [4]. These four literacies are: health literacy, food literacy, nutrition literacy, and health-promotion literacy. Healthy dietary decisions depend on nutrition and food literacy competencies of individuals [1]. Nutrition literacy is mainly described as the knowledge necessary to obtain and understand nutrition information, while food literacy includes nutrition literacy and further encompasses behaviours that are essential to a healthy diet [1, 2]. In a delphi study by Thomas et al. [2], a framework was formed according to which *food literacy includes interconnected attributes organized into the categories of food and nutrition knowledge; food skills; self-efficacy and confidence; food decisions; and ecologic (external) factors*. Food decisions or dietary behaviours are the central part of the framework. The nutrition literacy attributes are included in the self-efficacy and confidence category. A subset of critical nutrition literacy competencies specifically relates to credibility judgements *to be able to distinguish between credible and false nutrition information*. Flanagan and Metzger [5] argue that understanding credibility in a new digital media environment is particularly complex for youth. The notion of credibility refers to people's judgments about trustworthiness of information, based on their own expertise and knowledge [6]. As the acquisition of information is an integral part of daily activities, people need to assess whether the obtained information is accurate and good for enhancing their knowledge and meeting the desired objectives. Credibility judgment is a usual and recurring activity of information evaluation and is an ongoing process, rather than a set of discrete events [6, 7]. The concept of credibility involves two main components: competence and trustworthiness. Competence or expertise refers to perceived knowledge, skill, experience, and ability to report accurately within the borders of an area providing accurate and valid information, while trustworthiness includes perceived goodness, honesty and morality, and unwillingness to deceive [6, 8]. However, the two main components do not necessarily come together: a competent expert may be untrustworthy or biased, and a trustworthy person may not be competent. Credibility has also been defined with other concepts such as believability [9], fairness, factuality, completeness, freedom from bias, objectivity, and informativeness, hence many agree that the concept is multifaceted and that credibility judgments involve simultaneous evaluation of diverse dimensions. Even so, it is generally accepted that the most credible information comes from sources that are perceived as highly trustworthy and competent. Credibility does not reside in information object or source, although their features may serve as the bases for judging credibility, because people are those who eventually make their own credibility judgments, using their own experience, knowledge, and beliefs, and making the process highly subjective [6].

College students' credibility judgments in seeking everyday life information proved important [10]. Health information remains more important than ever, as it is one of the most important subjects that the Internet users research online [11]. It has been noted that the issues of trust and credibility judgments are especially important in the domain of health literacy and information [3]. The growing variety of youth information behaviour across platforms on social media and mobile Web [12] implies that they interact with dietary information provided by sources of diverse authority, from nutritionists and other professionals to bloggers and influencers. As the credibility of such information sources

and the quality of information they provide varies considerably, it is necessary to make an effort to better understand how college students judge the credibility of healthy diet information.

2 Literature Review

A substantial body of research tackles the issue of youth interacting with health and diet information, evidencing an increase of the interest. It shows that one of the reasons young people are using online health information is also to help them eat healthier and stay fit [13]. An important step in healthy food choices is the provision of quality information that supports informed food-related choices, which is recognized in the research community [14, 15]. Emerging social computing technologies created new possibilities for greater reliance by individuals on more social means of online information processing and evaluation [16]. However, the quality of online health information remains questionable, hence there is a need to fill the gap in the research literature to understand the relevant criteria for evaluation of such quality [17]. In the times of information overload, information quality is more important than ever, especially regarding the use of specific information sources. It is also essential to examine young people's perceptions of online information and judgments of credibility in different information-use contexts [10]. According to Lee and Choo [18], credibility proved significant in participants' intention to continue using fitness/diet app. Such similar findings are also found in previous studies, where the importance of credibility proved important, especially finding trustworthy information [10], which especially increased when tweens could make connections in the forms of words that are often associated with credibility in health-related contexts [19]. Source preferences proved important in the process of credibility assessments [20, 21], although expertise and trustworthiness are difficult to determine [22]. Online sources, family and friends are the most popular information source for seeking nutrition information [23] and healthcare professionals are perceived to be the most reliable source [14, 24, 25]. Among the Internet sources, social media platforms in general [13, 26], and image-based platforms such as Instagram, proved as an access choice for nutrition-relevant information [27]. Social tools today prove more important as ever in judging the credibility of online information. Young people assess credibility of social media regarding social metrics, such as likes, dislikes, and user generated content [28], put the emphasis on checking the background of the person sharing the story, as they have a need for health information to be trustworthy and reliable [29]. At the same time, it has been found that for help with making choices, young people turn to information sources that are not only informative, but also motivating and friendly [30].

3 Methodology

The main objective of this study was to investigate how college students judge the credibility of healthy diet information on social media.

The research questions were:

1. How often do students use social media for healthy diet information, and what is the level of trust they attach to this source?
2. What criteria do students use when assessing the credibility of authors on social media and what is the criteria importance?
3. What problems do students encounter when evaluating healthy diet information?
4. Are credibility judgements about the importance of expertise and friendly interaction correlated with frequency of use and trust in advice from authors on social media?
5. Are students' credibility judgements related to their nutrition literacy and healthy diet behaviour?

This research adopted a mixed-method approach and a sequential two-phase research strategy.

A brief pre-survey was used to reach the college students who would be interested in participating in the first research phase. To introduce them to the topic and identify the participants, the students ($N = 24$) were asked to what extent they took care of their diet, how they recognized whether the acquired information was good, useful, and provided by experts, and whether they were willing to take part in an interview on diet issues via Skype. This pre-survey was administrated via Google Forms among the members of a Facebook group of students from the Department of Information Sciences at the University of Zadar. Those who showed an interest were invited for interviews, according to their availability.

The first research phase employed semi-structured individual interviews conducted via Skype and combined with a think-aloud method to examine (1) what sources college students use in their search for healthy diet-related information, (2) what information sources they trusted most, (3) how they judge the credibility of the acquired information, and (3) what is the most challenging task when judging the credibility. The sample was convenient and purposive and included six female students ($N = 6$). The interviews were conducted until the point of saturation was reached, both regarding the earlier interviews and the selected past credibility research. They were recorded and transcribed immediately after the sessions, and the transcripts were subjected to qualitative data analysis [31] using the MAXQDA software. The analyzed data were interpreted and used for the development of the instrument applied in the second research phase. The second phase used a survey to test the results on a wider sample. The instrument was developed from the interview results and from a review of the relevant body of research. The first set of questions (1) resulted from an adjustment of the EHIL survey [32] of health literacy into the context of nutrition and food literacy. For example, EHIL item "I know where to seek health information" was adjusted to "I know where to seek healthy diet information". Additional questions were developed by summarizing and contextually adjusting the food literacy scale used in a study by Cupar and Juric [33]. For example, item "Since I have been a member of the Facebook group, I have been preparing more healthy meals for my children" is adjusted to "I use healthy ingredients to prepare food". The second group of questions was about (2) the frequency of using advice from social media, and the level of trust in these sources. The third (3) group of questions investigated the importance of certain criteria used in judgments on the credibility of authors on social media. The survey used a 5-point scale for most of the items. The survey data was analysed using the "TIBCO Statistica™" program for statistical analysis. The

survey was administrated via social media, by posting the SurveyMonkey link on the Facebook page and Instagram profile of the Department of information sciences, and in the Facebook group of students at the University of Zadar, as well as by e-mailing the students of several departments at the same university. The research was carried out among the students of the University of Zadar, Croatia, from December 2020 (Pre-Survey and Interviews) to April 2021 (Survey). The sample was convenient and purposive ($N = 138$) and included students with different levels of healthy diet habits. The majority of the surveyed students was female (82%). Only 41% of students stated their study field, and among them every second student was from the Department of information sciences.

4 Results

To identify reliable measurement scales, survey data were first prepared using principal components analyses and reliability analyses. Four scales were created (Table 1). The first two address Food literacy attributes: Nutrition literacy and Healthy diet behaviour. Self-efficacy in information seeking and evaluating competencies are two main topics included in the scale of Nutrition literacy. Healthy diet behaviour scale includes items about using healthy groceries, evaluating, checking, comparing, and applying information about healthy nutrition, following expert recommendations, and being informed from multiple sources. Healthy diet behaviour scale has more precise items about students' actual behaviours. In a study by Thomas et al. [2], the nutrition literacy attributes were included in the self-efficacy and confidence category of food literacy, while the Food decisions or dietary behaviours were the central part of the framework of food literacy.

Table 1. Measurement scales properties.

	Eigen	n_i	α	Mean	SD
Nutrition literacy	3.68	9	.82	3.69	0.59
Healthy diet behaviour	3.69	8	.82	3.69	0.66
Author expertise importance (on SM*)	2.11	4	.64	4.05	0.71
Motivating and friendly author importance (on SM*)	3.92	7	.86	3.73	0.81

SM - social media; n_i - number of items; α - Cronbach α ; SD - Standard Deviation

Another two factors were identified based on the importance of criteria when judging the credibility of authors on social media: Motivating and friendly author importance, and Author expertise importance (Table 1). Motivating and friendly author importance scale is mostly about the importance of encouragement, friendly communication, trustworthiness and reliability, and good intentions. This scale also includes items about authors' experience, lifestyle and physical appearance, and popularity among social media users. Author expertise importance scale is about the importance of authors' education, the citing of verified information sources, affiliation with a credible institution, and impartiality.

4.1 Use of Advice from Authors on Social Media and Trust in Their Credibility

The data collected in the interviews showed that the participants acquired healthy diet information from a wide range of sources. In the case of social media, they reported appreciating friendly interaction and quick response to the followers' questions. The participants reported trusting to information sources that were perceived as educated, experienced and experts (i.e., health professionals, nutritionists), and those whose accomplishments and physical appearance indicated that diet information they provided was of a good quality (i.e., athletes, fitness influencers). Authors on social media and social media in general were used as information sources occasionally ($M = 3.0$). Regarding the total number of students who used a particular social media at least seldom, most of them used YouTube (77%), followed by Instagram (66%) and Facebook (54%), while a smaller number of students used some other platform (22%) and TikTok (20%). Levels of average trust in authors on social media were moderate ($M = 3.2$), while the average trust in social media in general was even lower ($M = 2.7$). Majority (67%) of students followed an author on social media who published information about healthy diet.

4.2 Criteria that Students Use and Importance of Certain Credibility Indicators

The credibility considerations centred around the perceived credibility of the platforms and the authors who provided the information. The interview results showed that the authors who published dietary information via Instagram were held as credible for being perceived as trustworthy, educated and experienced, as experts and professionals. They were also perceived as credible for providing detailed and verified information, being creative in offering diverse ideas, and for being reputable and popular in the user community. Moreover, the perception of credibility was influenced by the overall perception of familiarity and a kind of closeness which seemed to stem from a friendly interaction and communication with users, acting relaxed and from the ability to motivate. One participant noted that the perceived kindness and small details such as putting smiley faces in the comments made her feel somehow connected to the Instagram influencer who she followed. Even so, some of the respondents expressed a level of criticism toward social media as sources that could not be completely trusted for provision of credible information.

The survey results on the importance of certain indicators of the author's credibility on social media showed that not all criteria were equally important, ANOVA $F(11, 127) = 48.2$, $p = 0.001$. The results (post hoc HSD tests) showed that the most important criteria were: providing verified information ($M = 4.5$), expertise ($M = 4.5$) and experience of the author ($M = 4.4$). The next group of criteria that were moderately important included the impression of trustworthiness ($M = 4.1$), being well-meant ($M = 4.0$), encouragement (4.0), and impartial advice ($M = 3.9$). Slightly less, but still relatively important, were the criteria of physical appearance and lifestyle of the author ($M = 3.6$), friendliness ($M = 3.4$) and belonging to a credible institution ($M = 3.4$). The least important criteria were the popularity of the author ($M = 2.8$) and personal acquaintance with the author ($M = 3.1$). Generally, on the level of two latent variables, Author expertise was perceived to be more important than Motivating and friendly author (Table 1), $t = 4.8$, $df = 130$, $p < 0.01$.

Furthermore, the students generally agreed with the statement that they evaluated information using the criteria of consistency of information from multiple sources ($M = 3.6$, $SD = 1.1$). Such a check of the consistency of information was mostly or completely applied by the largest number of respondents (66%). The use of authors' expertise as a credibility criterion was reflected in the students' answers to the question whether they followed recommendations of experts ($M = 3.1$, $SD = 1.0$). Almost 40% of the students stated that they mostly or completely followed the recommendations of experts.

4.3 Problems When Evaluating Information

Most of the interview participants named the assessment of whether a piece of acquired information matches their specific dietary needs as the greatest difficulty they encountered when evaluating information. On average, most of the surveyed students did not have problems with the assessment of which nutritional information was useful to them ($M = 2.2$, $SD = 1.0$). Only 11% of the participants reported having or mostly having such problems. Problems and difficulties with seeking and judging information reflected in the participants' answers to survey questions about their nutrition literacy. On average ($M = 3.69$, Table 1), the students stated that they mostly did not have difficulties when seeking and evaluating nutrition information.

4.4 Interrelations of Credibility Judgements with Frequency of Use and Trust in Advice from Authors on Social Media

The correlations of the frequency of use of advice from authors from social media and social media in general, with the assessments of the importance of credibility criteria showed that friendly interaction, rather than expertise, was the reason that an author was actively followed as an information source. The importance of expertise was not significantly correlated with the frequency of using social media and authors on that platform as information sources (Table 2). The importance of seeing an author as motivating, friendly, experienced, popular, and attractive was correlated (Table 2) with the frequency of following advice from those authors (Motivating and friendly author importance scale).

Table 2. Correlations of credibility criteria importance with use and trust in social media.

	Author expertise importance	Motivating and friendly author importance
Use of social media	0.17	0.45
Use of SM Authors' advice	0.15	0.36
Trust in social media	0.26	0.50
Trust in SM Authors' advice	0.18	0.42

SM – social media; all $r > 0.17$ are significant, $p < 0.05$

The general level of trust in social media and in individual authors was associated with perceived importance of expertise of the author, and with the perceived importance of

motivating and friendly style of the author. However, the correlations with the Motivating and friendly author importance were higher than correlations with Author expertise importance (Table 2).

4.5 Interrelations of Credibility Judgements with Students' Nutrition Literacy and Healthy Diet Behaviour

Nutrition literacy or self-efficacy in search and evaluation of nutrition information was negatively correlated with the assessment of the importance of the author's popularity in the community of social media users ($r = -0.23$). In other words, the students who perceived themselves as effective in seeking and critically evaluating nutrition information were less appreciative of the author's popularity as an indicator of credibility. On the other hand, the students who found it difficult to find and evaluate nutrition information attached more importance to the popularity of the author on the social media. Therefore, it may be concluded that popularity is a less valuable criterion, i.e., it can even be indicative of low nutrition literacy if a person attaches great importance to it. Accordingly, popularity is among the least important criteria ($M = 2.8$).

Results on the Motivating and friendly author importance scale were not significantly correlated with the results on the Nutrition literacy scale ($r = -0.14$, $df = 129$, $p > 0.05$). However, the overall results on the Motivating and friendly author importance scale were correlated with two items from the Nutrition literacy scale: difficulty in understanding terminology ($r = 0.19$) and understanding nutrition information ($r = -0.21$). More precisely, the importance of friendliness and popularity was related to difficulties in understanding the terminology and nutrition information. This may indicate that some students who have problems in understanding nutrition information rely on friendliness and popularity of authors on social media as credibility indicators. The conclusion is less reliable since it is based on correlations between individual items, and not the entire scales.

Healthy diet behaviour was correlated to the trust in the accuracy of information from certain authors on social media ($r = 0.24$), as well as with the frequency of using advice from authors on social media ($r = 0.39$). Healthy diet behaviour was expressed among the students who valued Author expertise ($r = 0.22$), more precisely among those who valued education and impartiality. Also, healthy behaviours were correlated with the value given to the importance of author's experience and being well-meant. To sum up, students who valued the importance of authors' education, experience, impartiality, and being well-meant as credibility criteria expressed slightly higher level of healthy diet behaviours.

5 Discussion

The overall objective of this study was to investigate how college students judged the credibility of healthy diet information, while the focus was on the criteria used for judging the credibility of authors on social media. The college students' subjective judgements were analysed in relation to elements of their Food literacy, and trust and use of social media.

Research question 1 (RQ1). Students meet their nutrition needs by seeking information from a variety of information sources, including social media. Previous research has also shown that social media [13, 26], and image-based platforms such as Instagram, are an accessible choice for nutrition-relevant information [27]. In line with earlier studies, the study has showed that social media are popular information sources for seeking nutrition information [13, 23, 26, 27]. The majority of the surveyed students followed specific authors on social media regarding healthy diet topics. Interviewed students reported appreciating authors' friendly interaction and trusting information sources perceived as educated, experienced, and experts (health professionals, nutritionists), as well as sources whose sports achievements and physical appearance, prove their knowledge and the quality of information they provided (athletes, fitness influencers). The survey results echo the previous studies confirming that the students value authors expertise [14, 24, 25], and showing that they moderately trust authors on social media [24]. Moreover, it shows that YouTube and Instagram are the most often used platforms for the purpose of obtaining information on healthy diet.

RQ2. Students' judgments on the credibility of information provided by authors on social media, reported in the interviews, centred around the characteristics of information sources which made them believable. The characteristics, the judgment criteria the students used, were education, expertise, experience, trustworthiness, reputation and popularity in the users' community. The ability to provide detailed and verified information also proved important, as well as motivating and friendly interaction. The use of socially generated cues such as users' comments and like to dislike ratio were proved important in youth's interaction with information [28, 34]. This phenomenon was also recognized as a bandwagon heuristic [20], which is defined as a mental shortcut for effortless assessment of believability of information if others believe it too. The survey results repeated some of the interview results and echoed previous studies showing that the most important credibility judgment criteria were author's expertise [14, 24], experience [29], and ability to provide verified information. Trustworthiness, reliability [35], expertise, and experience [30] were proved as factors of information source choice that were important to young people who sought information for their choices and problematic situations. The perception of impartiality, trustworthiness, being well-meant, and ability to motivate were proved moderately important credibility judgment criteria, while physical appearance, lifestyle, friendliness of author, and belonging to a credible institution were less, but still relatively important. The author's popularity and knowing the author in person proved to be the least important to the majority of the surveyed students. Moreover, the interviews indicated, and the survey confirmed the results that are in line with some earlier studies, that is, college students sought to verify information obtained on the Internet by additional research on other websites, applying the criteria of matching of information from different sources [10, 36, 37]. Criticism toward the Internet and social media as sources that cannot be completely trusted for providing credible information, expressed by some of the participants, correspond with findings from studies of credibility in other contexts [28, 38].

RQ3. Although the interviews indicated that the greatest difficulty that the participants faced was to assess whether or not the obtained information matched their individual nutrition needs, the surveyed students reported not having problems with such

assessments. Perhaps this may be attributed to a greater awareness about the assessment process prompted by looking at specific information sources during interview sessions. On average, students reported that they mostly did not have difficulties with seeking and evaluating information, as reflected in their higher level of nutrition literacy self-efficacy. Eysenbach [23] argues that traditional credibility evaluation criteria such as accuracy and completeness are problematic in the cases of health information as they are difficult to measure objectively in the medicine domain. Rather, credibility evaluations in health context primarily depend on user needs and expectations. Although digital media provides opportunities to acquire health information rather independently and autonomously, young people need to reach a degree of cognitive ability, knowledge, self-efficacy, and autonomy [23] to evaluate and effectively use the information for making good dietary choices. Moreover, it has been found that the youth tend to overestimate their capacities to evaluate information and that experience is critical in credibility perceptions and evaluation practices [39]. In this light, we may question whether the confidence in evaluating healthy diet information reflects the survey respondents' true abilities to perform such a complex and challenging process.

RQ4. Moreover, the survey aimed at testing a hypothesis developed from the interview results and based on some previous credibility studies in other contexts [39, 40], which suggest that the quality of the relationship with interpersonal information source can be more important than author's expertise in seeking information from specific information source. The results showed that on average, author expertise was perceived to be more important than motivating and friendly interaction of authors on social media. The students were aware of the importance of the author's expertise while assessing credibility, which was reflected in the correlations between the level of trust in the author and the importance of the author's expertise. However, the students' behaviours were not entirely consistent with this statement. Expertise was important to almost everyone, while friendly interaction was more important to those students who used social media more frequently to obtain healthy diet information. More precisely, the importance of authors being motivating, friendly, experienced, popular, and attractive was correlated with the frequency of following advice from those authors, while the authors' expertise was not. It may be concluded that the key reason why an individual author was followed as an information source on social media was the author's friendly interaction, rather than his/her expertise. The reason for that could be that expertise is important to almost everyone, while friendly interaction is the key to attract more active followers on social media. This is in line with the conclusion from the study by Mackenzie [40] that the "relationship, more than knowledge, is the reason that an individual is sought as an information source". Kolarić found that young people might be prone to mistake the quality of relationship with interpersonal sources with credibility of the information sources, appreciating sources that are well-meaning, familiar, supportive and caring [41]. Young people's affinity toward information sources that are not only informative, but also motivating and friendly, echoes the work by Julien who has found that young people need and seek help from friendly information sources which provide emotional help, motivation and support [30]. This might be a matter of concern because credible information is provided only by sources that are both competent and trustworthy. Basing food choices on information provided by sources that are friendly, motivating and

supportive, but not knowledgeable and competent, may result in unhealthy behaviour and negative consequences.

RQ5. Students who valued the importance of authors' education, experience, impartiality and being well-meant as credibility criteria expressed slightly higher level of healthy diet behaviour. Healthy diet behaviour was positively correlated to the level of trust and the frequency of using advice from authors on social media. Students who found it difficult to find and evaluate nutrition information attached more importance to the popularity of the author on the social media. Furthermore, some students who had problems in understanding nutrition information relied on friendliness and popularity of authors on social media as credibility indicators. Such behaviours of some students fit into the description of the bandwagon effect [20]. Due to uncertainty in their own knowledge of a certain topic, some of the surveyed students relied more on the popularity of authors as an indicator of their credibility. Most of the surveyed students considered popularity irrelevant, but friendliness was considered moderately relevant. In future research, it is necessary to further verify whether there is a sufficient basis for defining friendliness as a credibility heuristic cue.

6 Conclusion

College students judge the credibility of healthy diet information based on specific source credibility indicators. The majority of students check the consistency of information from multiple sources, but the focus in this research was on criteria in judging credibility of authors on social media. Students claim to value author's expertise higher than friendly interaction, but friendly interaction is more indicative of their information use behaviour. A motivating and friendly interaction is important to students who use social media more frequently to obtain healthy diet information. Students who exhibit healthy diet behaviour give more value to authors' expertise, while students who have problems in understanding nutrition information rely more on the friendliness and popularity of authors on social media as credibility indicators. These findings might serve as guidelines for the development of health-related literacy instructions that would educate young people on making credibility judgments by using both the criteria of competence and trustworthiness of information sources. Popularity and perceived friendliness of sources that offer information on social media must not be mistaken for credibility in providing healthy diet information.

7 Limitations

The generalizability of average values was not the purpose of this study; rather, the results present attitudes of the college students at the University of Zadar who participated in the research process. The main contribution of this research are relations between key concepts, specifically between user behaviours and cognitive credibility judgements.




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eHealth Engages and Empowers Low-Income HIV+ Patients: Implications for Health Literacy Practitioners

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Abstract. In the U.S., individuals of low-socioeconomic status (low-SES) are more likely to be chronically ill. Low-SES patients are less likely to use e-health resources and engage in doctor-patient communication or decision-making. In other words, despite increased rates of illness, lower-SES individuals typically have very little agency in determining the quality of their health and healthcare. Given this, we argue that data on this topic sometimes undervalues the physical and psychological benefits of e-Health resources for low-income people. Interviews with 25 low-income HIV+ patients reveal that patients use e-health resources when available, and that these resources are influential in shaping doctor-patient interactions, informing treatment options, and enhancing patients' self-efficacy and empowerment. Findings point to opportunities for improving health for chronically ill individuals with e-Health. If it is going to serve those most in need, public health practitioners must grapple with the experiences of chronically ill users living in poverty and factor these experiences to formulate appropriate policies and health literacy strategies.

Keywords: Health information seeking · HIV+ e-health literacy · Health literacy digital divide · Health self-efficacy

1 Introduction

Today, the Internet has become an important source of health information for those with chronic conditions [1], where self-education and self-care have become an important part of the disease management process [2]. However, the ability to use the Internet for health depends to a significant extent on income, education, and access. In the United States, the ability to access the Internet is significantly correlated with socio-economic status, race, and educational levels. Those who are White, have higher income, and are more educated, are more likely to access and use the Internet for various purposes including health [3, 4]. In terms of the chronically ill, people in the U.S. with chronic disease conditions are significantly more likely to be older, African American, less educated, and living in a lower-income household. Research also further suggests that those who

have one or more chronic conditions are less likely to have access to the Internet and therefore less likely to use the Internet for health when compared to those who are healthy [5]. However, when access is not an issue, those who have a chronic condition are more likely to use the Internet for health and factor the information they found on the Internet into their discussion with their doctors [1].

Furthermore, research also shows that poorer, and less educated individuals are less likely to be engaged in the medical decision-making process [6, 7], and they typically receive less information from doctors [7–9]. Given that access to eHealth information has been shown to improve doctor-patient communication [10], and patient confidence [11–13], it is important to understand chronically ill patients' experiences with accessing and using the Internet for health. In this research study, we specifically explore the benefits of eHealth use, by chronically ill HIV+ patients. Findings from our study suggest that, although chronically ill, low-income patients may have more limited access to technology, they benefit substantially from access, both physically and psychologically. Interviews with 25 chronically ill (HIV+) patients revealed that these high-risk subjects actively sought health information to manage their health. Patients exhibited strategies for validating online health information, using the information to make health decisions, and bringing information to their providers. Overall, health information seeking seemed to increase patient agency. Yet we know from previous research that this population has compromised access to the Internet and other digital technologies [14, 15]. Findings from our study point to the need to improve the accessibility of e-health for low-income patients to optimize health and well-being for those who need it most.

2 Literature Review

2.1 The Digital Divide and E-Health

In recent years, digital divide research has evolved dramatically. It is characterized by a shift in its emphasis from a “stratification” perspective, that stressed demographic differences in access and use of the Internet [16–18], to a more nuanced view which focuses on gradations in terms of different types of access (motivational, material, skills, and usage access (i.e. breadth and depth of use) [17], and its impact on the relevant outcomes (third-level digital divide) [19]. Research on e-health and its relevant outcomes mirror similar patterns outlined in the literature on the digital divide. The majority of studies on eHealth use by low-income individuals stress a lack of engagement. For example, several studies using nationally representative samples of respondents indicate that socioeconomic status (SES measured by education, income, or both) is a significant predictor of people's use of the Internet for various health-related activities. Results suggest that, when it comes to searching for health information, those with lower education levels are less likely to seek health information online [4, 20–24]. In addition, those with low education levels also report lower e-health literacy skills for evaluating information compared to their more educated counterparts [25, 26]. When it comes to obtaining health information in general, those from lower-income groups have decreased confidence in their ability to obtain health information and in using the Internet to do so [27, 28]. Those with lower levels of education are significantly less likely to look for information about a health care provider online compared to those with a college degree or more.

Likewise, those with a high school degree or less are also less likely to use email or the Internet to communicate with a doctor, or a doctor's office, or seek information about diet and lifestyle choices [29]. In other words, data on income and education generally underscore the lack of eHealth use by low-SES patients.

Studies on patient-provider communication also suggest that the quality and depth of communication varies by patients' education and income levels [30, 31]. For example, educated patients are not only more expressive and opinionated, but they also ask more questions in their interactions than their less-educated counterparts [32, 33]. These factors in turn increased the likelihood of doctors sharing more information with the patients. In another study, patients of a higher social class received not only more overall communication but also more information from their doctors [8]. Low-SES patients receive significantly less positive socio-emotional utterances from doctors and a more directive and less participatory consulting style, resulting in less involvement in treatment decisions, less control over communication, and less diagnostic and treatment information [31]. In other words, low-SES patients are more likely to be marginalized during doctor-patient interactions. Related to these findings, patients with a high school degree or less are less likely to prefer shared decision-making with providers, and are less likely to be involved in treatment decisions, to exercise control over treatment decisions, and to take responsibility for care than patients with post-graduate college education [34, 35]. As a result of all of this, respondents who had not completed high school were less likely than those with an advanced degree to report having enough information to make the right decision in health contexts [36].

The ability for patients to gather health information from the Internet has transformed the way doctors and patients communicate. There is increasing evidence to suggest that patients are bringing the information they find online to medical appointments [37, 38] and then use it to seek their doctors' advice [39]. Findings report several psychological and emotional benefits for the patients as a result of accessing health information online [11–13]. These include “feeling more confident in the relationship with their physician,” “feeling more confident about the treatment,” and “enhanced social well-being.”

In recent years theories related to Internet use among low-income communities have gradually expanded from a stratification perspective [18], to include a more nuanced technology maintenance perspective, which argues that it is not mere accessibility, but an individual's ability to manage the economic costs associated with accessing the Internet that disrupts or limits their ability to accrue a range of e-health benefits [15]. Furthermore, more recent studies also found that in low-income communities, diversity in modes of access to the Internet enhances the ability to benefit from the Internet, including accruing e-health benefits. In addition, these studies also found that socioeconomic status predicted the wide range of modes of Internet access. However, contrary to the common assumption that socioeconomic variables predict the variety of Internet use, in the context of disadvantaged communities, it is the breadth of access (as measured by access to a wide range of access points), not a socioeconomic status that is positively correlated to the breadth of activities (including e-health) that individuals engage online [40, 41]. More importantly, the findings from this study underscore the problems related to policies and initiatives that assume that people can accrue equal social outcomes through non-equal modes of access [40].

To summarise, eHealth use is associated with enhanced quality in terms of doctor-patient relationship and communication [42], and the ability to better manage chronic conditions [43, 44], and an increase in patient efficacy. Yet the literature is less clear if and how these benefits vary by social status. What is known, however, is that an overwhelming number of studies have found that low-SES patients are less likely to engage in or effectively capitalize on e-health resources [27, 29, 45–47] because of factors such as lack of education, e-skills, access to technological resources, or in some cases all these factors. However, a handful of studies also point out that, when controlling for various barrier and access issues, low-SES individuals are no less likely to use e-health resources [26, 40, 41, 48–51].

Given that low-SES patients are more likely to be chronically ill [5] but less likely to actively engage in doctor-patient interactions and decision-making (e.g., see previous citations), it is possible that providing access to e-health resources would be especially beneficial for enhancing the engagement and empowerment for this population. Although a handful of quantitative studies have looked at the positive psychological effects of e-health for low-SES clients [26, 48, 52], this has not been done with a specific focus on low-income chronically ill HIV+ patients using qualitative data. We aim to fill this important gap in the literature by exploring how chronically ill, low-SES HIV+ patients use the Internet for health, and how these experiences shape their health and well-being.

The following two broad research questions (RQs) guided our research:

RQ1: For what purposes do HIV+ patients use the Internet?

RQ2: How does access to e-health sources influence their ability to manage their health?

3 Methods

3.1 Data Collection and Analysis

A mid-sized Mid-Western town in the United States was the venue for this study. A purposive sampling method was used to recruit HIV+ adults from low-income groups who received healthcare from two community organizations. The first organization (Organization A) provides healthcare and other services to clients who are HIV +. Over 70% of their clients make US\$20,000 a year or less. The second organization (Organization B) provides free health services to those who did not have medical insurance and made less than 200% of the federal poverty level. Recruitment letters were mailed out to all clients of Organization A, and flyers were posted at the front desk of Organization B. In all, N = 25 clients (female n = 19, male n = 6) participated in the study. Client household income ranged from US\$5000– US\$35,000 a year, with the median income range being US\$0–US\$5000 a year. Participants were paid US\$30 for taking part in the study. Data were collected through 1-to 2-h in-depth semi-structured interviews conducted by the authors.

Informants were asked about their experiences using the Internet for health. Specifically, questions focused on issues such as: **Online experiences** (e.g. “Where do you access Internet?,” “Do you use your mobile phone?,” “What was the reason why you were looking for health information?”), **Evaluating information** (e.g. “Where do you look

for health information?,” “How do you decide what is a good or bad information?,” “How do you decide what information is relevant for you?”), **Information use** (e.g. “What did you do with the information?,” “How did it help you to resolve your issue?,” “What did you do with the information you found?,” “Whom did you talk to about the information you found?,” “How did this shape other things you did after this action?”), **Perceived benefits** (e.g. “How did you feel after finding the information you wanted?,” “Did it address your anxiety or fears?,” “How did you feel when they used the information to fix the problem?,” “How did this impact your future courses of action in the long run?”).

The respondents were encouraged to present their experiences from a “patient journey perspective” [53] and were encouraged to provide specific examples of real-life events to support their ideas. The audiotaped interviews were transcribed for analysis. Emerging themes were identified through a thematic coding of the interviews, which was aimed at organizing similar ideas into conceptual categories to eliminate redundancy and identify disconfirming evidence [54, 55]. Each participant was provided a pseudonym to protect the patient’s privacy.

4 Results

4.1 Health Information Seeking

A significant number of informants revealed that they used the Internet for seeking health information in the process of managing their disease condition. Several patients also reported looking for health information on behalf of their friends or loved ones. Topics searched by our participants include, but are not limited to searches for: disease symptoms; medicines and their side effects; the reputation of doctors and hospitals; treatment options; government-related health benefits; alternative medicines; and nutrition. For example, Joan a 35-year old female mother described her experience searching for a disease that many HIV+ patients contract:

“When I was first diagnosed, I searched for the relation between HIV and Neutropenia. I was asking myself whether they had a connection with one another and was it manageable. Does it affect one another? It gave me a better understanding that they individually affect one another. One is with lymphocytes and one is with neutrophils. They target two different areas of my immune functionality. They can both be carried forward in ways, but indirectly they do affect one another. They both in themselves are manageable with proper care. I started to look up natural things like switching to fruits that help to generate better health and heal gastrointestinal problems. I did research about Amish medicines and homeopathic medicines.”

At least three of our informants also described how they visited online forums and benefitted from understanding other patients’ unique personal experiences with the disease, treatment options they chose, and side effects of the medicines they have been prescribed, to make decisions about their own treatment. For example, Marjorie described why she visited online forums:

“[...] to basically see what is going on, and what other people have to say and coping with some of the issues that I have. I find forums really useful when it pertains to your particular situation. It kind of helps you cut through a lot of information, and get from point A to point B. It is more refined as there are people who have the same health issues, the same approach to dealing with them and so basically looking up medications, looking up the current information about the state of HIV or home care and thing like that and to stay informed.”

Apart from being active information seekers, many of the patients exhibited critical information appraisal skills. During their interviews, several respondents described how they only visited what they viewed to be authoritative websites (though the quality of these sites is negotiable; e.g., WebMD), or websites related to health nonprofit organizations, university research centers, and government health institutions. One patient, Glenda, also described how she often looked for an icon on each of the websites she visited which assured her that it was a safe and secure website: *“If it has that little lock on the corner on top then I know it’s a secured site and I know I can sit back and relax a little bit. That helps quite a bit.”*

4.2 Health Information and Doctor-Patient Communication

Disease management is a complex process for patients. Though most patients often reported that they considered their doctors to be experts and let them make many of the important decisions, many also reiterated that it was also their responsibility to make sure that such decisions benefit their health. Respondents identified several instances wherein they relied on online health information to verify or contest the decisions that doctors made, or actively take part in the decision-making process. For instance, Frank told us: *“there is a certain hormone they used to inject and I got that information and printed it out and took it to my doctor. She looked into it and we ended up using it.”*

In another instance, Phyllis explained how her research resulted in a collective decision with her doctor to increase the dosage of her medicine: *“I was taking this Zyprexa [...], I got on the Internet and I found out that actually, I could have more than what I was being prescribed. And so, when I went and talked to my doctor I said hey I looked on the Internet and it said I could have up to this much. And he said hey you’re right, and so he gave me up to that much. So that was very positive.”*

4.3 Coping and Empowerment

One unfortunate outcome of coping with chronic diseases is the emotional toll it takes on the patients. Several patients whom we interviewed revealed that their journey, from initially coming to know about the disease and finding a treatment path has been ridden with fear, uncertainty, and anxiety. In this context seeking health information was not only informative but also empowering. Describing a serious life-threatening incident that occurred in her partner’s life, Delores revealed how finding the right treatment information for her partner based on her own experience not only saved her partner’s life but also enhanced her sense of power and control over the uncertainty posed by the situation:

“When I had PCP pneumonia I had Aerosis treatment for Pentamedine and I did some research to see if they were doing that kind of work treatments in hospitals and they were. My doctor still wanted to do the IV and he said that the hospital didn’t do Aerosis Pentamidine treatment anymore, and then they did the IV, he got pancreatitis. And then we come to find out the hospital did do the Aerosis treatment. So my doctor was like good for you for bringing that out and we switched him over and did the Aerosis treatment. I told the doctor he did a good job; he said ‘no, you did a good job.’”

While the previous example shows an instance of empowerment, Nancy narrated a rather different goal accomplished by her by seeking health information—coping with fear by selectively pursuing health information that assuaged her fears and reassured her. She described her experience in the following words:

“When I was first on medication I was scared because of all the side effects. And I was actually terrified. But with Google, it had some stories you know when you get on Google, a little more terrifying than what you felt and the other ones are comforting. So I was there to find the comforting ones that was going to get me through the process of taking the medications, starting the medications, staying on the medications, and watching for side effects to see if there was anything harming me. And not only myself, my daughter is also on medication and she was scared. So with the internet on my phone, I was able to Google it and let her know that everything was going to be ok and the side effects are not so bad.”

5 Discussion

Previous work on the relationship between online health information seeking and outcomes such as quality of doctor-patient communication or patient self-efficacy tend to emphasize the lack of engagement in healthcare decision making from low-SES patients. The result is an undervaluing of digital resources for this population. The findings from this study reveal the opposite. Our informants’ accounts demonstrated that access to the Internet not only helped them to educate themselves, but also to be able to take charge of their life situations, and take part in health decisions. Most importantly, the findings underscore the role of online health information in facilitating patient engagement, self-efficacy, and empowerment. Health literacy researchers have long explored the relationship between technology use, health literacy, and health outcomes [56, 57], and to a lesser degree has examined the benefits of e-health interventions for low-SES populations in context to health [58, 59] and other areas [60, 61]. The findings from our study refocuses the discussion on issues related to access, and the social aspects of coping and empowerment through the use of technology.

Previous studies indicate that patients reported a number of benefits from accessing health information online, including “being better informed,” “feeling more confident in the relationship with their physician,” “greater ability to understand and interact with their care provider,” “improved ability to manage their health condition,” “feeling more confident about the treatment,” “enhanced self-esteem,” “increased optimism,”

“enhanced social well-being” [11–13], and the ability to manage their chronic conditions [63–66] across SES. The findings from this qualitative study fills a gap in previous research by underscoring these benefits for low-SES patients specifically. The use of online health information for low-income, chronically ill individuals can help to encourage medical decision-making, improve doctor-patient interaction, and increase patient self-confidence and can contribute to their emotional and social wellbeing. Overall, findings from these studies clearly show that basic health literacy interventions can benefit individuals regardless of the demographic strata to which they belong.

Improving health literacy across the population requires different strategies depending on patients’ education-level. Research on technology users in less-wealthy countries has often shown the value of digital health-information, particularly via mobile devices [67], and e-Health scholarship in wealthier countries often assumes widespread and stable digital access for citizens (see [14, 15] for exceptions and discussion). Indeed, it is in these better resourced contexts, especially where health resources are rapidly being transferred online (e.g., doctor’s portals, text-message appointment reminders, etc.) that the widespread digitization of healthcare poses the risk of actually exacerbating digital inequalities, with low-income patients, and the organizations that serve them, slipping through the cracks [68]. Despite that somewhat pessimistic outlook, however, government and institutional policies that support physical access and digital skills training could go a long way to improve individual quality of life and, as a result, yield broader public health benefits.

We argue that this can, in part, be achieved by focusing on the creation of an ecology of access by creating a “system”- a body of resources across a social environment [62] that facilitates access to the Internet and other sources of health information. The novelty of this recommendation foregrounds the efficacy and mental health advantages of access to health knowledge. This may include making computers with Internet access available in local libraries, emergency rooms, urgent care clinics, and other doctors’ waiting rooms that serve the low-income population. Furthermore, a system that translates medical information to a lower-grade level in the same language might be particularly useful for a low-SES population which addresses the intellectual access issue. Most importantly, it also reframes digital health literacy tools as objects that can promote mental health as well as physical health. In other words, those designing applications and interfaces that facilitate online health information seeking would do well to remember the access limitations faced by those most in need. Framing eHealth innovation as a tool for empowering marginalized users – including the poor; people of color; and those with little education—could help reframe design choices, funding streams, and policy levers that drive innovation and public access. Ultimately, we propose that this utility is even more important for the poor and chronically ill/HIV+, as they may be even more likely to face social stigmatization and marginalization by those in the medical profession and elsewhere. As a result, resources that help engage and empower this population in healthcare are critical. Continuing to design systems that improve health literacy for all, but also researching, testing, and implementing design choices and systems that improve access to digital resources for the poor, are essential if the health community wants to make a difference in the lives of people most in need.

Though cross-sectional studies such as this one are useful in demonstrating the importance and benefits of Internet access and e-health literacy interventions for the poor, future studies must adopt longitudinal study designs that can focus on measuring the true benefits of creating an “ecology of Internet access,” and combining it with e-health education, to see their long-term impact on the community. Furthermore, merely creating interventions is not enough. Researchers must also focus on unearthing some of the structural challenges that continue to effect the daily lives of those living in low resource environments, which limits the effectiveness of many such interventions, and address these challenges, so that the real benefits of such interventions accrue to the intended beneficiaries.

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Quality of Health Information: How Does Age, Sex and Education Associate with the Assessment of the Reliability and Usefulness of Health Information

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Abstract. The enhancement of media and information literacy has been generally recognized as a crucial factor for lifelong learning about health, with the ability to evaluate the quality of health information at the core of it. The present study explored how people evaluate the quality of health information within a broad network of sources and channels, as well as investigating how it relates to their background. This is a quantitative study using a random sample of 1,800 people aged 18 years and older. The response rate was 39% (N = 698). In addition to background questions, the measurement instrument consisted of questions about the evaluation of the reliability and usefulness of information in a total of 25 information sources. The study revealed differences by socio-demographic groups. The findings provide important knowledge about how people can be reached with knowledge and support that is likely to enhance their abilities to adopt healthier lifestyles.

Keywords: Age · Education · Evaluation of health information · Health information · Lifelong learning · Media and information literacy · Sex

1 Introduction

Access to quality health information, appropriate to people's needs regarding content and which can be sought through their preferred information channels, is of significance for them to improve their knowledge about healthy living. The importance of making the right behavioural choices for maintaining health has been described as a joint responsibility of individuals and society [1, 2]. The society has an obligation to provide people with the means to obtain quality health information and individuals need to respond by taking advantage of it. The enhancement of media and information literacy [3] is important in this regard, as it has been generally recognized as a crucial factor for lifelong learning about health. The ability to evaluate the quality of health information is the core of it, and a prerequisite for people to be able to benefit from it.

Today's information environment is constantly changing as information and communication technology has rapidly transformed the possibilities to disseminate and access

information, progress that can be expected to continue in the coming years. People have multiple options when they choose where to seek health information whether it is online or offline. As a result, they need to be able to distinguish between information that can be trusted from misinformation. Hence the resources required to be able to evaluate the trustworthiness of information becomes increasingly more important.

Studies that have explored the association of socio-demographic factors and health information seeking and use have mainly done so by examining how they relate to internet access and the frequency of seeking digital health information, while less attention has been paid to how people judge information quality. Hence, there is need for more knowledge about how health information quality is being judged by different socio-demographic groups. Previous studies have continually demonstrated that certain groups within society are more at a disadvantage than others when it comes to information seeking. Education has been found to be a strong predictor, with those who have a higher level of education being more likely to seek digital health information than those with less education [4–6]. Furthermore, younger people and women have been reported to seek digital health information more than those who are older and men [4, 6, 7]. However, it is necessary to bear in mind that although information is being sought more frequently in a certain source or a channel, it does not necessarily mean that this is because the quality of it is considered higher than what can be found elsewhere. Previous results have, for example, revealed that, although senior citizens sought health information on the internet more frequently in 2012 than they did in 2007, they had at the same time also become more critical of the information and considered it both less useful and less reliable [8]. Thus, there can be several reasons why an information source or a channel is being preferred, for example, convenience or habit.

The younger generations are often described as being technology-wise in comparison with the older generations. Research has indeed shown that the youngest generation absorbs information in a different way from those who are older. However, it has also been shown that they may lack more critical thinking and ability to judge information quality [9–11].

The significance of the quality of information has been emphasized and that the content of it must be relevant to the needs of end users [12]. Information can be judged on the basis of various criteria, however, Saracevic [13] has put forward a classification model for relevance criteria that consists of five manifestations, two of them which refer to usefulness and reliability as key factors of relevance. Cognitive relevance stands for the relation between information and the person's knowledge state and the cognitive information need, suggesting cognitive correspondence, informativeness, information novelty and quality as criteria [13]. Reliability, therefore, is related to and overlaps with several concepts such as trustworthiness, believability, credibility, and quality of information [14]. The other manifestation by Saracevic [13] is situational relevance or utility, referring to how well the information relates to the problem dealt with, suggesting criteria such as the usefulness and the appropriateness of information. Usefulness has been identified as criteria which people use at the later stages of the information behaviour process, after having modified the need for information [15].

The information environment has become more complex, particularly as knowledge about health is increasingly being disseminated through various digital sources. The

present study, however, is not confined to digital sources. It aims at gaining a more comprehensive picture by exploring how people evaluate the quality of health information within a broad network of sources and channels, as well as investigating how it relates to their background. In doing so, the study concentrates on two criteria of quality evaluation, that is the usefulness and the reliability of information.

The following two research questions will be addressed:

- 1) What is the association between participants' background, that is, sex, education, and age, and how they assess the usefulness of information in different health information sources?
- 2) What is the association between participants' background, that is, sex, education, and age, and how they assess the reliability of information in different health information sources?

2 Methods

2.1 Data Collection

This is a quantitative study. Data were gathered from November 2018 to January 2019, from two random samples using an internet and a telephone survey. The total sample for the survey consisted of 1,800 people, 18 years and older, from the whole of Iceland.

For the telephone survey, a sample of 300 people aged 60 years and older from the whole country, randomly selected from the National Register of Persons in Iceland, was used. For the internet survey a random sample of 1,500 people at the age of 18 to 59 years, from the Social Science Research Institute at the University of Iceland net panel, was used. The net panel consists of people aged 18 years or older from the whole country. The choice of participants in the net panel follows strict methodological rules to avoid convenience sampling. The net panel is updated regularly to ensure that it corresponds with the distribution in the population, regarding sex, age and residence.

Both datasets were merged, allowing answers from all individuals belonging to each set of data. The total response rate was 39% ($N = 698$). Because of the response rate, the data were weighed by gender, age, place of residence and education, so that it corresponds with the distribution in the population.

2.2 Measurements and Data Analysis

In addition to the socio-demographic information, which included the background variables education, sex, and age, consisted of the measurements of two sets of questions:

- 1) Evaluation of the usefulness of information was examined by asking the participants how useful or useless they find health and lifestyle information in the following sources to be. A list of 25 sources was presented and people were asked to provide answers about each source. The list included sources in various forms (print, audio, video, web) in newspapers/journals, radio and television, as well as sources produced by health professionals. A four-point response scale was used (4: Very useful – 1: Very useless).

- 2) Evaluation of the reliability of information was examined by asking how reliable or unreliable they find health and lifestyle information in the following sources to be. The same list of 25 sources as for the question above was presented and people were asked to provide answers about each source. A four-point response scale was used (4: Very reliable – 1: Very unreliable).

Factor analysis is a useful tool to shrink a big data set to a smaller set that is more manageable and more understandable. It is a way to find hidden patterns in the data set and show how those patterns overlap and is also useful to create a set of variables for similar items in the set [16].

In this study, it was expected that some of the items on the list of information sources presented were measuring the same factor or different aspects of the same factor, and that a scale could be used to measure each factor. Therefore it was decided to use factor analysis to extract latent factors on the questions about the evaluation of the usefulness and evaluation of the reliability of information. The Principal Component Factoring method of extraction was employed to examine the factor structure of each question. In all cases, the criteria for factor loadings were set above 0.4, and oblique rotation (Oblimin) was adopted in all the analyses. For all the analyses, multiple criteria, based on eigenvalue > 1.00 , a scree test and conceptual interpretability of the factor structure, suggested that extracting two factors, which together contained 25 information sources, would be adequate. The factors were named: Media and Health specialists.

Health specialists contains information in print or digital form from health specialists, educational programs with them in television or radio, as well as discussions with health specialists. Media contains information in print, digital information, and broadcasted information, that is not provided by health specialists.

For the question about usefulness of information the factors explained 60.14% of the total variance in the data. The scales were checked for internal reliability. Cronbach's alpha for Media was 0.95 and 0.84 for Health specialists. For the question about reliability of information the factors explained 62.75% of the total variance in the data. Cronbach's alpha was 0.96 for Media and 0.86 for Health specialists. Internal reliability, which reflects the precision of the measure (Cronbach 1951), of 0.70 is considered adequate [17].

All analysis is based on weighed data.

Differences across sex, education, and age were examined by using t-test and Anova, and Tukey test was used to examine whether the differences were statistically significant.

3 Results

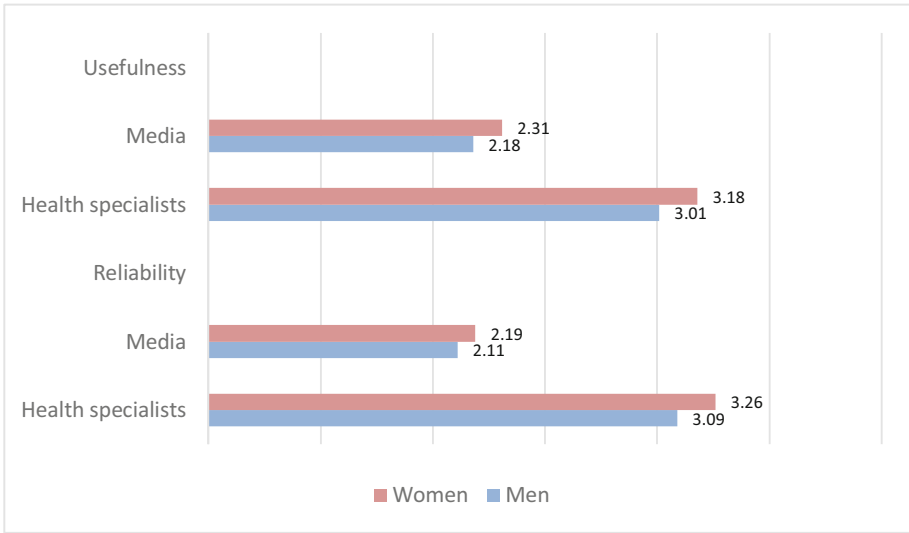


Fig. 1. Evaluation of usefulness and reliability of information – Differences by sex

Figure 1 shows that women found information in the media ($p < .01$) and by health specialists ($p < .000$) more useful than men did. In addition, women found information by health specialists ($p < .000$) more reliable than men. Results about reliability of information in media were not significant ($p = .152$).

The results in Fig. 2 revealed that participants with primary school education found information in media significantly more useful than those with secondary education ($p < .001$) and university education ($p < .000$). Difference across participants with secondary and university education was not significant ($p = .331$). Furthermore, no significant difference was found across educational groups for evaluation of the usefulness of information by health specialists ($p = .553$). In addition, the results revealed that participants with primary school education considered information in media to be more reliable than those with secondary education ($p < .001$) and university education ($p < .000$), while there was not a significant difference across participant with secondary and university education ($p = .330$). No significant difference was found across the educational groups for evaluation of the reliability of information by health specialists ($p = .925$).

As Fig. 3 shows, the participants differed somewhat in their evaluation of the usefulness and reliability of information. However, the difference across the age groups was small and, in most cases, not significant. Results about evaluation of the usefulness of information in media revealed that those who are 68 years and older considered it to be significantly more useful than participants who belong to the age groups 30–39 years old ($p < .01$), 40–49 ($p < .01$) and 50–59 years old ($p < .01$). In addition, participants who are 50–59 years old valued the usefulness of information from health specialists significantly lower than those who are 60–67 years old ($p < .01$) and 68 years or older

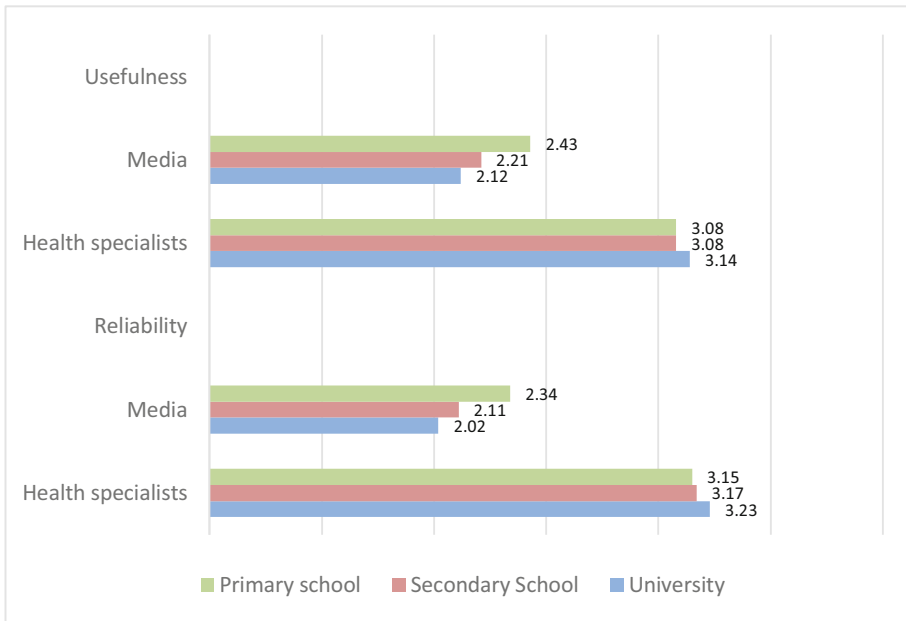


Fig. 2. Evaluation of usefulness and reliability of information – Differences by education

($p < .01$). As for results about the reliability of information by health specialists, the only significant difference was across those who are 18–29 years old and 50–59 years old, with the younger participants finding the information to be more reliable than those who belong to the older group ($p < .01$). No significant difference was found across the age groups for evaluation of the reliability of information in media ($p = .052$).

4 Discussion

An overview of how people evaluate the quality of information, within a broad network of information sources, is essential for the design of better education procedures, which are built on realistic goals and expectations. Because previous studies have mainly focused on the connection between socio-demographic factors and health information seeking, the findings may provide important knowledge about how people can be reached with health information and provided with knowledge and support that is likely to enhance their abilities to adopting healthier lifestyles.

The study revealed that all socio-demographic groups considered information by health specialists to be considerably more reliable and more useful than information in media. This is in line with the results in a study by Lee et al. [18], who found indications that people prefer to get assistance from health professionals to identify reliable health information. Nevertheless, there were some differences by age groups, as people who are 50–59 years old seem to be more skeptical about information from health specialist than other age groups. They found the information to be less useful than those who are

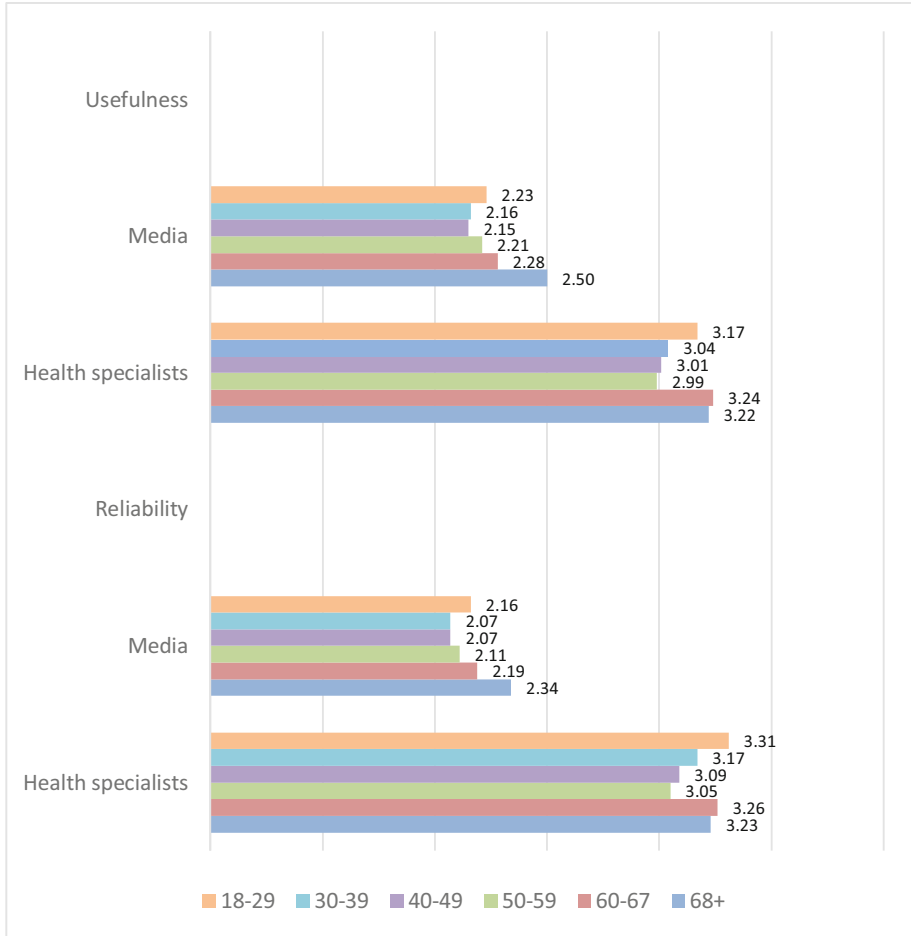


Fig. 3. Evaluation of usefulness and reliability of information – Differences by age

older (60 years and older), and in addition they considered it to be less reliable than the youngest age group (18–29 years old).

Women have been reported to seek digital health information more than men [4, 6, 7]. The study results also show that women rated the value of information higher than men do. Women considered information, in both media and by health specialists, to be more useful than men do, and they also considered information by health specialists to be more reliable than men do.

As for evaluation of the quality of information in media in this study, people with primary school education and the oldest age group distinguished themselves from the other educational groups and younger people. Previous studies have found a relation between health information seeking and education, with those who have a higher level of education being more at an advantage than those with lower level [4–6]. The study findings revealed that those with primary school education rated both the reliability and

the usefulness of information in media higher than people with secondary education and university education, who seem to be more skeptical of it. Furthermore, the oldest group (68 years and older) considered information in media to be both more useful and reliable than those who are younger.

The overall study is limited by a total response rate of 39%. Although this may be considered satisfactory in a survey it raises the question whether or not those who answered the survey are giving a biased picture of those who did not respond. In order to compensate for this bias the data were weighed by gender, age, place of residence and education, so that it corresponds with the distribution in the population. Thus, the findings may provide valuable information about the evaluation of the usefulness and reliability of health information.

It is the responsibility of all participants in society to strengthen media and information literacy. The study sought to contribute to this by examining the evaluation of health and lifestyle information by socio-demographic groups. Knowledge about how various groups in society evaluate information about healthy living is important. It opens the possibility of interventions that aim at improving media and information literacy where needed. It, furthermore, allows the health authorities to react by focusing their health promotional efforts specifically on the groups most in need of quality information.

Acknowledgements. The study was supported by the University of Iceland Research Fund.

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Data Literacy



Perception, Awareness, Presentation: Using Meditation Techniques to Teach Data Visualisation Literacy – A Case Study

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Abstract. Inspired by the ideas of Gestalt and the practice of meditation, this paper describes an approach to bring together the corresponding techniques to teach data visualisation, a subfield of information literacy whose importance will considerably grow within the years to come. The course can be subsumed under the motto that data, (i.e., everything that is given), is the basis of meditation and that data visualisation in its essence is a meditative process. The paper should be seen as a return-of-experience based on a case study that shows how both techniques intertwine almost naturally and can mutually benefit from each other.

Keywords: Data literacy · Data visualisation · Meditation techniques · Awareness · Perception · Cognition

1 Introduction

The idea for the course on data visualisation presented in this paper arose from a mixture of necessity and chance: first the need to design a course on data visualisation in a relatively short time, followed by the decision to organise the course as a series of workshops. The topic of Gestalt was to be given special importance right from the start, as this aspect of visualisation is always considered important (by experts and novices) but is usually only mentioned shortly at the beginning. These two basic ideas then led to the logical consequence of dedicating the first workshop solely to the topic of Gestalt and the coincidental insight, based on the personal experience of the course leader, that meditation as bodywork is closely connected to the topic of Gestalt and that visualisations (inner and outer) play a decisive role in both areas, Gestalt and meditation.

This coincidence then led to the question of how far it would be possible to combine each workshop with a meditation and to look for parallels between the main themes of the workshops and meditation techniques. This question, as well as the resulting answers presented in this paper, proved to be motivating and possibly worth to continue in similar or different contexts, at least worth to share the experience with a larger scientific community. This decision also led to the consequence that technical tools, which are usually considered of playing a major role in visualisation courses would play a subordinate role.

Another framework condition, which consisted of the fact that the course was to be designed for a comparatively small number of eight students, made it possible to engage further in this rather unorthodox approach, at least unorthodox in the domain of information science. Fortunately, the participants showed quite a high level of acceptance from the beginning, leading to a significant momentum so that in the end the meditation techniques were even enlarged and varied according to the students' suggestion. Thus, yoga exercises were performed in two workshops, which in turn allowed the lecturer to gain further insights into the connection between meditation and data visualisation.

The paper is intended as a return-of-experience or outline of a case study that aims to draw general conclusions about the use of meditation techniques in the field of data visualisation in particular and information literacy in general. For this purpose, after an introduction to the general context and references to relevant literature throughout the paper, the course will be presented with its exact framework, structure and concrete contents. The paper concludes with personal reflections, conclusions and general recommendations.

2 General Context

Due to the vast amount of primary sources and referencing secondary literature that exist for both (data) visualisation and meditation - starting with prehistoric images of tally sticks [1] for data visualisation and the Mohenjo Daro Seal 420 [2] for meditation - an attempt will first be made to narrow down the range of topics and to work out the three main foci of the paper: these are a) meditation and its main characteristics b) data and its visualisation c) hypothetical assumptions about their fusion.

2.1 The Technique of Meditation

In order to describe or define the nature of meditation, it is advisable to first distinguish – for the sake of a better understanding – between the *goal* of meditation and the concrete *practice*.

The ultimate goal of meditation is probably best described by the second verse of Patanjali's Yogasutras [3] (which are to be understood as instructions for the practice of meditation, and not as a book of exercises for physical yoga postures): योगः चित्त-वृत्ति-निरोधः – to be read in its transliteration as 'yogaś citta-vṛtti-nirodhaḥ'; to be understood in its translation as 'yoga, i.e. union, is the coming to rest of the movements of the thinking mind'. The goal of meditation is thus a state of mind or better said the quietness of the mind.

The achievement of this goal while practicing, in terms of scope, is a vast and diverse field, often described as a (laborious and long winding) path, usually involving one or a variety of techniques, more precisely cultural techniques. (The latter is underlined by the fact that meditation techniques exist in almost all major cultural areas, but on the other hand differ from culture to culture in their concrete practice).

These are mainly techniques of directed or undirected observation or the mindful performance of simple or arbitrarily complex exercises, which are usually learned under guidance. (One is inclined to say that meditation also requires literacy.) Often

the concepts of mindfulness [4] and awareness are seen as central to the practice of meditation.

Meditation as a technique can thus be understood as an orientation towards external and internal phenomena, that is, towards the input and throughput of cognitive perception: Perceptions of space and light, sounds, bodily sensations, thoughts and emotional states. It usually also focuses on the breath to (for example, in the case of Vipassana meditation [5]) sharpen the mind; in some cases, especially guided meditation, it involves evoking inner images, sometimes as components of stories describing imaginative stories.

2.2 The Technique of (Data-)Visualisation

Visualisations have always been an eminently important instrument of information transfer in the history of mankind and will more and more gain importance through the ongoing digitization of our societies. They play an important role insofar as they preceded and created the most important instrument of communication, that is, language, namely through transfer of knowledge through linear alphabets (especially in the rebuses of the hieroglyphic scripts of the Maya, Egyptians, Sumerians and Chinese).

Furthermore, they are and have been used again and again to interrupt the linear course of the scripts in order to illustrate them with the means of two-dimensionality. In this process, various elements, including again textual elements with other components (colours, icons, geometric figures, etc.) are combined according to certain principles (arrangement, proportioning, structuring, etc.).

The visualisation of *data* plays an eminent role in, whereby it is always necessary to clarify what is meant by data. In our context, the question is not to be clarified in terms of definition, but - with regard to the course on data visualisation to be explained - methodically, by the process of designing and creating data. A brief look at the history of data [6] (as a scientific term starting from Euclid's *Dedomena* [7]) shows that the term and its practical data depend very much on the ideas, discourses and scientific possibilities of the respective epoch [8] and, as a consequence, are subject to frequent changes.

Looking more closely at the contemporary use of data, the concepts and methods of Big Data and - even more important in the scientific context - Data Science come to the fore, both giving strong emphasis on quantitative, technical and machine-based aspects. At the same time, there are voices to be heard postulating a transition from data-driven design to design-driven data [9] for which - without disregarding observation-based quantification [10] - aesthetic-humanistic aspects are coming to the foreground. Postulations that were already applied to the principles and laws derived from the concept of Gestalt [11].

2.3 Assumptions

What has been said so far allows us to compile conjectures about the connections between meditation, data and their visualisation, which can form the basis for a theoretical framework that is yet to be established in more detail. So far, they take the form of a list of ten interrelated lemmata, beginning with an admittedly radical and certainly immodest and

pretentious statement, which is at the same time to be understood as a reference to and reverence for Wittgenstein's dictum of the world [12].

1. The world is everything that is given.
2. What is given is data.
3. What is given is perceived and processed cognitively by the individual.
4. Meditation is the mindful awareness of this cognitive process.
5. Mindful awareness supports the cognitive processes of discernment.
6. Visual perception is a primary, often dominant component of what is given and perceived.
7. Visual perception and processing do not end when the eyes are closed.
8. It remains an integral part of the inner part of the continuous stream of consciousness.
9. Mindful awareness of this process can enhance the production of visualisations for others.
10. The process of producing data visualisations can itself be a meditative process.

The following course description is intended as a first attempt to verify these assumptions.

3 Course Description

3.1 Curricular Setting and Frame

The course 'Data Visualisation' is a compulsory course in the third semester of the actual Bachelor of Science programme in Information Science at the University of Applied Sciences Geneva. It was offered in German for the first time in the autumn semester 2020 for students of the bilingual programme option in French and German.

Due to the specificity of the content and the linguistic situation of all those involved in teaching, parts of the course were also taught in French and English, which proved to create no problem for all participants. A total of three lecturers (one professor and two assistants) and eight students (seven female, one male; five of them full-time and three part-time) took part in the course.

For a more detailed understanding of the approach, it is necessary to point out that the course was taught in the autumn semester of 2020/2021, more precisely in the period from 17 September 2020 to 03 December 2020 in the canton of Geneva, Switzerland, during a phase referred to as the second wave of the Corona pandemic and in a location that had at that time the second highest incidence of infection in Europe.

The course therefore began as face-to-face teaching, which was replaced from 02 November 2020 by a phase of so-called hybrid teaching, in which students could decide on their own responsibility whether they wanted to follow the course online at home or on site while respecting the hygiene rules (keeping distance, disinfection and wearing masks). The particular size of the room and the small number of participants meant that the majority of students (six out of eight) followed the course on site. A single workshop (on tools) was conducted entirely online during the changeover period at the beginning of November.

3.2 Organizational and Didactical Structure

Based on the instructor's experience as well as purely practical considerations, it was decided before designing the content of the course to run it as a series of seven four-hour modules in a relatively short sequence. The seventh module was a priori reserved to be the closing module, which would allow students to a) present their work in individual presentations and b) give personal feedback to the group and the lecturers.

Each module was set under a single thematic focus for which - in addition to meditative introductions - short, maximum 20-min, theoretical lectures were designed. The largest part of each module, however, was to be made up of practical exercises.

3.3 Content

The premises described under 2.3 led to the conceptualization and compilation of seven workshops: I. Gestalt, II. Data, III. Poster Design, IV. Observe, Collect, Draw, V. Tools, VI. Data stories, and VII. Final Presentation (Synthesis), which will be presented below with its learning objectives, meditations, theoretical guidelines and, above all, the corresponding practical exercises.

Framework In order to give the course a continuity, so to speak a common thread, all the practical visualisation exercises were done on the theme of CEVA (i.e., Cornavin, Eaux-Vives, Annemasse) [13], a major project of the Swiss Federal Railways to build the first metro line in Geneva, connecting the city with neighbouring cantons and surrounding France. The train line was opened barely a year before the course after a long period of planning and construction. All practical work in the course had to be related to the theme of the workshop and applied to the CEVA project or metro line. As a rule, this task was set in the course, giving the students the opportunity to start the practice being coached and finishing them as homework (individually or in the group) before presenting the result to all participants at the beginning of the following course after the introductory meditation.

Workshop I: Gestalt

Objectives: Understanding the connection between visualisation and Gestalt.

Meditation: In a first meditation, after directing the concentration to the external circumstances of the room (light, sounds) and the external and internal sensations of the body, the eyes were closed and the attention was continuously directed to the (invisible) external contours of the body. Subsequently, the eyes were opened again in order to establish a comparison between the inner and outer image of the body.

In a final meditation at the end of the course, attention was drawn to the fact that when the eyes were closed, the outlines of the body or its gestalt (!) blurs and an energetic field comes to the fore, whereas immediately after opening the eyes, the outlines of the body and its shape or gestalt emerge again.

Theory: The rest of the course included an introduction to the basic principles of data visualisation and the terminological distinction between infography and presentation on the one hand, and visualisation and exploration on the other, with the aim of illustrating

the connection between pre-attentive properties, active vision and perception, as well as their consequences for a successful conception, taking into account the principles and laws of Gestalt theory.

Practice / Homework: The practical work consisted of an application of Gestalt principles to facts and contexts of the CEVA railway line as a result of an independently exercised information research on the web.

Workshop II: Data

Objectives: a) Overview of the terminology, nature and typology of data, b) underline of the relationships between data and metadata, c) description and collection of data in data papers and repositories, c) first compilation of individual and aggregated data.

Meditation: The meditation started from the simple principle explained at the beginning of this paper that data in the sense of the original meaning of the word is everything that is given, such as sounds and noises, light, the external and internal sensations of the body, thoughts and feelings, and finally the breath as an anchor to which one can always return and was realized as a walkthrough these phenomena.

Theory: The theoretical input was limited to two short presentations on the history of the concept of data (from Euclid to Data Science) and the basic components of information graphics as outlined in [14].

Practice / Homework: These presentations were interspersed with short exercises in which students were playfully introduced to different types of data, their metadata as well as their description in data papers and storage in repositories step by step with the help of specially created cards. Finally, the students were tasked with aggregating individual data on the CEVA project and compiling it in an information graphic.

Workshop III: Poster Design

Objectives: a) Collation and pictorial representation of separated data on a two-dimensional surface, b) application of the basic principles of information visualisation.

Meditation: After a meditative attunement, which was linked to the previous objects of meditation (space, light, sounds, external and internal sensations), the 31-point technique [15], developed in yoga nidra, was practised. This is a concentration and visualisation exercise from the tantric tradition of yoga, in which attention is applied to 31 (or 61) body points in a prescribed order. Through the inner drawing of the body contours, the later practised figurative drawing in poster format should thus be prepared.

Theory: In the theoretical part of the workshop, basic techniques of information visualisation were elaborated with a special focus on or an introduction to the “Objects-Placement-Territories” hypothesis [16], which were then worked out step by step with exercise material kindly provided by Stephen Anderson [17] (concerning Arrangement, Sequences, Shapes, Boundaries, Relationships, Attribute Intensity) and transferred to the context of poster design.

Practice / Homework: These presentations were alternated with short exercises in which different types of data, their metadata and their description in data papers and storage in repositories were recorded step by step with the help of specially created

cards. Finally, the students were asked to aggregate individual data on the CEVA project and compile it in an information graphic.

Workshop IV: Observe, Collect, Draw

Objectives: To work out the basics of the principles of data handling elaborated by Lupi and Posavec: Observe, Collect, Draw [18].

Meditation: In analogy to the method of Lupi and Posavec, it was assumed that meditation work should also be understood as observation, collecting impressions and dealing with inner images. To illustrate this, a meditation was put together which - after an introduction as in the previous courses - focused particularly on the breath. This was counted three times over the duration of one minute before the experience made in the meditation was individually reflected and visualised.

Theory: The book “Dear Data” [10] as well as the associated methodology of “Observe, Collect, Draw” [18] in the book of the same name were introduced in three steps.

Practice / Homework: Each step was coupled with a practical task. Afterwards, the students, who worked together in pairs anyway, were asked to create postcards at the CEVA stations or from data available on the web according to the procedure of Lupi and Posavec and to send them to each other. The postcards were presented by the recipients in the following workshop.

Workshop V: Tools

Note: Due to the particularly high incidence rate in the canton of Geneva at the time of the workshop, the course had to be conducted digitally at short notice. Thus, all components of the course (meditation, theory and practice) were taught synchronously by the instructors using appropriate online teaching software.

Objectives: To learn the basic functions of a visualisation software.

Meditation: Due to the special circumstances, an already existing meditation was used that seemed to be appropriate to the moment: the “Accepting and Letting Go Meditation” by Andy Hobson [19]. The meditation (translated into French by the teacher for this purpose) leads through awareness of a) the body in its entirety, b) the breath, c) the thoughts to d) a general attitude of acceptance and letting go regardless of external and internal circumstances.

Theory / Practice / Homework: The basic functionalities of a proprietary software for creating data visualisations were presented. The students were asked to create a visualisation with this software (based on their data collected so far) for the following workshop.

Workshop VI: Data Stories

Note: In the meantime, the class was switched to a so-called hybrid mode, which made on-site participation voluntary; students could follow the class either online from a location of their choice or in the classroom, following the current hygiene rules.

Furthermore, the practice of yoga was addressed for the first time in this workshop, due to a student’s reply of whether there were also practices for enlivenment, after the lecturer had regularly pointed out the calming effects of meditation.

Objectives: a) To acquire the basic knowledge of constructing a data story, b) the hero's journey as data story, c) data story typology.

Meditation: The yoga exercises began with a simple variation of the sun salutation Suryanamaskar, especially because of its dynamic execution and the resulting vitalizing effects. Afterwards, different yoga exercises were presented with respect to their connection to visualisation and data stories under the motto "Every yoga posture tells a story": yoga postures [20] often represent geometric figures themselves (e.g. the posture of the triangle, Trikonasana) or are imitations of nature (e.g. the posture of the dog, Adho/Urdva Mukha Shvanasana or of the moon Ardha Candrasana) or make references to myths, legends and stories (e.g. the posture of the hero Virabhadrasana and many more). The postures were introduced and then practised together. It was also pointed out that correctly understood and performed yoga is itself a meditative process. As in visualisation, yoga is also about representation and presentation, because the postures are representations of the body and thus presentations of the self.

Theory: After a historical outline of the importance of storytelling for humanity and historical examples of data stories, several construction patterns of data stories were presented and explained (e.g., Three-Act-Structure, Hero's Journey) as well as the importance of the necessary ductus and the procedure for creating the respective story. In addition, similarities and differences between "storytelling with data" [21] and data stories were discussed.

Practice / Homework: Each group was asked to create a data story from the data collected so far using one type.

Workshop VII: Synthesis

Objectives: a) Final Presentation of the works done throughout the course, b) personal reflection and evaluation of the experiences made.

Meditation: In the final course, restorative yoga in the tradition of BKS Iyengar [22] was offered, which allows to synthesise all the aspects practised before: the body work of yoga, the contemplation of the breath in the long postures and the meditative state that arises. For this purpose, a small sequence of five yoga postures was compiled, which was performed with props to enable to hold it for a long time, leading to the final contemplation of the breath.

Follow-up and closure: For the remainder of the course, the students were asked to make individual presentations of all the work they had done and to give a personal review of the course content and the experiences they made during the course, both in the area of data visualisation and in the area of meditation. The course ended with short feedbacks given by the two course instructors.

4 Return-Of-Experience and Recommendations

The beforementioned evaluation done by the students and the course instructors was unanimously positive, which is surprising and can only be explained by the small size of the students and the fact that the group has worked together in different courses of the bilingual information science program with the same and other teachers that were open for experimental courses including a high level of interaction.

Nevertheless, some conclusions and recommendations can be drawn on the basis of the experiences made:

- The overall experience of meditation remains the always same: meditation is simple and difficult at the same time.
- While considering its usefulness for academic teaching, it should not be forgotten that meditation has a value in itself and should not be understood in a purely purposive way.
- Meditations and yoga exercises are not a do-it-yourself thing and should be taught by experienced teachers who have already proven that are capable to guide both small (about 5) and medium sized groups (about 20) without major difficulties or even accidents. In the present case, it turned out that the course leader and author of the paper had this experience, which on the other hand made it possible to combine the ideas and techniques of meditation and data visualisation.
- Any form of meditation is an encounter with oneself and it should be assumed that not every student is willing or able to engage in this experiment. In this case, it is possible to make the meditation exercises optional or to tell students exactly what they should engage in.
- In any case, the person in charge of conducting the meditative exercises should have enough empathy and flexibility to engage with the general and current sensitivities of the students. The latter is certainly a competence that every lecturer and teacher should have, but in the case of mind-body awareness exercises, it is all the more necessary.

And, last but not least: Flexibility is everything, in the body and in the mind.

5 Conclusions

Meditation and data visualisation are cultural techniques that most likely emerged as a product or rather side effect of what is commonly understood as the cognitive revolution.

After the experience made in this course, it can be stated in a first conclusion that meditation techniques in a concrete and figurative sense are a suitable didactic means to introduce principles and skills of visualisation, to make them tangible and understandable. They train the skills essential in both contexts (meditation and data visualisation): the proper use of the senses (i.e., cognitive perception) [23], the association of mindfulness and attention [24], as well as mastering and presenting the resulting internal and external images (presentation) to allow discernment with the aim of telling comprehensible stories [25]. The totality of the techniques learned can be brought together in data stories.

To what extent the course described in this paper may as such serve as a blueprint for other courses on data visualisation or how far the alternation of meditations and practical experience of the meditated topic as a general scheme may be adapted to other contexts, requires further experiments and broader studies (preferably with control groups such as in [26]) in order to come to generally binding conclusions.

The integration of meditative components into the concepts of information literacy seems to be a worthwhile endeavour in any case.

Acknowledgements. The author would like to thank Laetizia Sabatini-Choquard for her very useful contributions and support throughout this course.

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Finding Access Points for Data Literacy: The Example of the ERASMUS+ Project DaLiCo (Data Literacy in Context)

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Abstract. The paper addresses the increased need for data literacy education in higher education. The background for this is provided by the international Erasmus+ project DaLiCo, in which four universities of applied sciences are developing concepts for the fostering of data literacy. Research results and lessons learned from project activities such as the joint summer school will be presented.

Keywords: Data Literacy in Context · DaLiCo · Project · Data literacy · Data literacy education

1 Introduction

We summarize and reflect our European shared data literacy journey based on our experiences in a ERASMUS+ project. We structured this article as follows. We first briefly describe the project as the starting point and basic setting of our research work. The initial research focuses on a common understanding of the not uncontroversial concept of data literacy and associated competencies and skills. Secondly, we present the results from our explorative institutional analysis of the level of awareness of data literacy, expressed needs, and educational offers. We summarize our findings with a focus on methodological insights and our conclusions for the design of the different planned project activities. Thirdly, using the examples of our Summer School on Open Governmental data and methodological results we show how we implemented our findings to foster data literacy. In the final summary discussion, we reflect on our data journey so far in terms of different approaches and access points to data literacy development.

2 Project Data Literacy in Context (DaLiCo)

The Erasmus+ -funded international project “Data Literacy in Context” (DaLiCo) brings together four European Universities of Applied Sciences with the mutual mission to foster data literacy education. The partner universities from Utrecht (Hogeschool Utrecht – University of Applied Science), Valencia (Universitat Politecnica di Valencia), Debrecen (University of Debrecen and National Library), and Hamburg (Hochschule für Angewandte Wissenschaften (HAW) Hamburg) are working together to support data literacy at their universities in an interdisciplinary way as a digital key competence.

DaLiCo focuses on increasing the visibility, quality, and usage of existing data literacy activities at the participating universities. The main project objectives are (1) to contribute to a cultural change at the participating institutions regarding student's and lecturer's attitudes towards data literacy and openness and (2) to enable lecturers and students to develop custom-tailored procedures to successfully deal with data in their specific domain and to significantly increase lecturer's and student's data competences and thus increase their academic success and qualify them for a successful career by adapting to the growing needs for data literacy competencies in the increasingly data driven job markets. To accomplish these objectives, five interconnected activities are being coordinated as sub-projects.

1. The Data Literacy Map will visualize existing competencies and personal expertise including resources, projects and good practice examples.
2. The Train-the-Trainer concept will provide e-learning material and a teachers' handbook including notes. Learning material will be conceptualized and designed in a way which allows a modular use.
3. We will develop within the Data Literacy Learning Space project a concept and prototypes how to combine relevant content and didactical components in a hybrid learning space.
4. The Data Literacy measurement and assessment tool will assist in mapping individual existing data literacy skills and help to identify potential gaps.
5. All activities result in recommendations how to include relevant data literacy topics into the local curricula.

A total of three summer schools supports the project developments at the practical implementation and testing level. Specific contexts within the summer schools were open government data, health data and research data and open science. In addition, best practices and lessons learned will be shared with a broader community outside DaLiCo in two so called Multiplier Events.

3 Finding a Common Language – The Need for Terminological Clarification

The concordant ability to competently use digital technologies interconnected with the proficient and confident dealing with data (data literacy) is perceived as becoming crucial in all disciplines and many areas of life [1, p. 14]. However, the terminology, the concepts, and the labels used to describe the needed abilities and competencies is far from unified [2–4]. Initially, the tracing of the manifold conceptual and terminological discussions on data literacy and related terms was not on the agenda of DaLiCo as we, in the joint project proposal, had already agreed to take the Ridsdale definition and the Ridsdale matrix of data literacy competences [5] as our starting point and agreed on an understanding of data literacy as “the ability to collect, manage, evaluate, and apply data; in a critical manner” [5]. However, it became evident at the very first international meeting that, in order to find a common language the conceptual clarification and contextualization of data literacy, defining data literacy was a necessary first step for DaLiCo. Our findings are

that understandings of the concept of data literacy largely differ regarding the aims and objectives of data literacy or rather the expected benefits of data literacy, the community of practice, [6, p. 35, 294] and the disciplinary and theoretical approach.

We identified three partially overlapping views on data literacy in recent summary publications [2, 3, 7]. First, on a fairly general level, the aim of data literacy is described as the informed and critical application of data [5]. Second, data literacy is more closely related to a process of economic value creation, innovation and disruption. Within this association context the expected benefit of data literacy is the support of management, especially managerial decision making. In the Future Skills Framework accounted for by the German Hochschulforum Digitalisierung this view is framed as the predominant understanding of data literacy. The Future Skills Framework defines data literacy as “the cluster of all efficient behaviors and attitudes for the effective execution of all process steps for the creation of value and/or decision making from data” [6, p. 25]. Third, data literacy is perceived a necessary prerequisite for societal and political engagement in a digitized and datafied society [8, p. 8].

These views can be mapped to various communities of practice. The first understanding is widely applied in the library and information science community and, to some extent, within the teaching profession at the secondary school level [2, 4]. Not surprisingly, the second understanding is a widely represented view in the business and industry sector as well as by institutions of higher education [7]. Proponents of the third view originate from various groups of civil society such as representatives of different NGOs. This example is seen in the widespread School of Data network that includes as well the Open Knowledge Foundations [9] and has also links to various national Open Government and EGovernment initiatives. Currently, activists with strong links to one or more of the above mentioned communities are building various networks with the aim to increase visibility and to promote exchange on data literacy education related topics. For example, in the German Data Literacy Education network [10] the ten participating universities are seeking to cross-link their activities.

The members pursue different priorities in their educational activities. For example participants with either a background in knowledge management or (academic) libraries focus on the classical aspects of data management (collecting, cataloguing, sharing) in relation to company data or research data. As a second priority one can identify a pronounced focus on data science competencies concentrating on teaching the analysis, visualization, and interpretation of data. Activities around this focus are characterized by the emphasis on coding, prevalently the application of data extraction, data cleaning and statistical analysis with the aid of appropriate programming languages.

A third priority is the consideration of legal and ethical aspects when dealing with data including broader cultural aspects like implications on power relations or more general epistemic questions.

From our overview we got the impression that the sometimes stated sometimes lamented lack of a single definition as well as a clear definition of what set of skills data literacy (should) cover does not take into account the different theoretical anchorings of data literacy activities and interventions. In the terminology of Bowker and Star, data literacy could be described as a “boundary object” partly shared between different research traditions and communities and “weakly structured in common use, imposing

stronger structures in the individualsite tailored use” [6, p. 16]. Boundaries are shifting constantly but at the time of our snapshot we identified five main prevalent research traditions.

In the current (mainstream) discussion [7] microeconomic approaches and the intention to foster the acquisition of data related skills that are suited to raise economic efficiency are prevalent. The resulting framework [11, pp. 27 ff.] considers competencies and skills along the complete data lifecycle with a focus on statistical and mathematical knowledge and skills [11, pp. 53–87]. Another prominent approach strives to carve out the relevance of (critical) data infrastructure and how platforms like Google and Facebook control what is perceived as data, which data we have access to and how they can be used, [6, 12] Sociocultural approaches resort to critical theory and question everything from the perspective of “who benefits and who loses [13, p. 757]. Critical data literacy is rooted in the Freire tradition of critical pedagogy [14] and related to political activism for instance within the data feminism movement [15] striving to sharpen the view on data ownership, power relations and arising awareness for the changeability of existing structures and power relations.

As within DaLiCo we are concerned with data literacy education we needed additionally to take into account the extended pedagogical discussions regarding university didactical aspects like specification of appropriate learning outcomes and teaching styles. As a common ground we take up a competence-based approach as suggested in the national and European qualification frameworks [16, 17].

For our terminological overview we focused on the concept of data literacy. In addition, we considered the relation between data literacy and information literacy. We found indicators that the data literacy and the information literacy communities of practice differ considerably. However, we also found evidence for attempts to carve out the connections between the two literacy concepts. Within the data literacy community information literacy is recognized and perceived [5]. In their comprehensive study of best practice examples for data literacy education Heidrich, Bauer and Krupka [1] assert a close proximity to information literacy. Integrated concepts like data information literacy [18] or statistical information literacy [19] are examples for attempts to interconnect the two approaches. The Future Skills Framework states a growing convergence [7, p. 11] between the two concepts.

The terminological clarification created the awareness within the DaLiCo team that DaLiCo members as individuals as well as concerning their institutional backgrounds are rooted in the following communities of practice: Business informatics, management (Hamburg, Utrecht), Data Science (Utrecht, Valencia), Library and information science (Hamburg, Debrecen) as well as a close relationship to the educational and didactical field (Hamburg, Utrecht). The special opportunity for DaLiCo is not to glaze over the different focal points but to explore access points and to build bridges between communities and research traditions. We agreed to accept that, likewise in the context of DaLiCo, data literacy is understood as a weakly structured boundary object that needs to be narrowed down for individual interventions. We agreed.

- That we understand data literacy as the set of competencies apt to bridge between communities of practice and provide interfaces between them. This understanding is in contrast to data science that is considered to be the specific domain of trained

specialists - In our view data literacy is closely related to data science but differs in the level of competence. This understanding calls for interdisciplinary collaboration that integrates different competencies and levels of skill. While the line of demarcation between data science and data literacy varies between disciplines, it is confined by the explicit focus on competencies and skills that bridge between specialists and non-specialists between domains or within a domain;

- To accept that within DaLiCo different aims and objectives are involved with the promotion of data literacy and that we need to express them explicitly. Taking up a term coined by Pedersen and Caviglia [20, p. 166] we consider data literacy as a compound competence ascribed to a community of practice rather than to an individual who demonstrates some level of competence in statistics, data visualization, and more generic competencies. This is seen especially in the field of data management and data analysis where individuals solve real-world problems using different data. Within DaLiCo, data literacy is used synonymously to “being literate in the age of data” [21, p. 1237]. Other than Giese, we do not restrict data literacy to the private area of data use and personal data but acknowledge that the personal perspective is a meaningful and motivating starting point. We limit our activities to university teaching with a strong focus on universities of applied sciences and the perspective of transferring results into the economy and society; and
- To expand our initial smallest common denominator “data literacy is the ability to collect, manage, evaluate, and apply data; in a critical manner” [5] by mapping data literacy competences along the data lifecycle by the six competence categories suggested in the Future Skills Framework. These categories are:
 - (A) Establishing a data culture from the system to measurable objects;
 - (B) Providing access to data from measurable objects to data;
 - (C) Analysing data from data to data products;
 - (D) Interpreting data products from data products to data;
 - (E) Interpreting data from data to measurable objects; and
 - (F) Deducing recommendations for actions from measurable objects to the system [7, p. 27 ff.].

This extension opens the view for the consideration of the dialectical interactions between data and data products and the distinction between coding (transform data into a de-contextualized processable format) and decoding competencies (by adding context again) [7, p.19].

4 Mapping Student Needs and Curricular Offerings - Methodological Approaches

The aim of the exemplary explorative institutional analysis of the current state of data literacy education was to find access to different domains. This should be done by analysing personal competence levels of learners (students) as well as the currently addressed competence level in teaching expressed within selected curricula of the University of Applied Sciences (HAW Hamburg). Therefore, we initiated an explorative research of data literacy education within the master course “Open Science and Digital

Literacy” (winter term 2019/20) at HAW. The research enabled us to gain first insights into the current experiences and expectations regarding topics and didactical aspects of data literacy education.

Our selected approach was to map the personal (experience level of the learners) with the institutional level and to gather data on various aspects of data literacy (competencies, topics, emotional needs, learning styles). We asked students to visualise their current data literacy competence as personal knowledge maps [22]. We then conducted interviews and asked students to document their learning experiences in the form of non-standardized learning diaries [23]. We conducted, on the organisational level, a text and content analysis of curricula documents. We analyzed the collected data by applying a qualitative content analysis [24]. For the coding we combined the competence areas of the Ridsdale matrix [5] with Bloom’s taxonomy [25]. This allowed us to explore in what respect the major competence fields (knowledge, comprehension, application, analysis, synthesis, and evaluation) are addressed within data literacy education programs.

The Following data competence needs are evident among students:

In terms of data collection, students identified needs for specific knowledge about search portals for data and they wanted to build up knowledge and more experience to formulate appropriate search queries for data. Data quality topics, such as how to evaluate quality and how to define criteria, appeared very important to the students. With regards to data management, students lacked knowledge about data formats and various topics referring to data application. This was seen in their lack of experience in sharing research data and publication outside the university. Their knowledge about data citation was limited to knowing where to look up the standards. Further needs have been identified for the topics of data ethics, data culture, critical thinking, and decision making based on data. Students put great effort on learning better use of data tools like SPSS. They were interested to learn R as a programming language as well as learning about other tools to improve their data evaluation and visualisation knowledge. The students reflected about empirical methods that they were used for the Bachelor thesis. According to the students’ experience it is a great challenge to cope with data evaluation; their experience is that they did not feel well prepared for this challenge.

After becoming conscious in reflecting on their needs, the students chose adequate data literacy learning materials to remedy the observed deficits. The students analysed and reflected on the way in which the applications supported overcoming data literacy deficits in the form of writing learning diaries. Within their learning diaries the students expressed a significant need for applications-oriented material. In their wording they want the learning experience to be ‘practical’, in other words useful and meaningful for them, and not ‘theoretical’ or abstract knowledge not related to their personal lives. Therefore, data projects offering context and using real data were relevant aspects for the learners. The students analysed the data literacy tools and courses according to the levels of Bloom’s taxonomy [25] and identified a strong emphasis on the first three levels: “Knowledge, Comprehension and Application”. Content and elements that refer to the higher levels of learning objectives like “Analysis, Evaluation and Synthesis” were only to a small proportion part of the programmes. They favored data literacy learning experiences with a focus on practical applications in relevant contexts in relation to their course of study.

Besides the student specific learning perspective on data literacy, we also explored the teaching perspective in order to find out, to what extent data literacy topics are integrated in accredited curricula of the HAW Hamburg. For the exploratory research we focused on the domains of health and governmental data. As part of the analysis, we identified course descriptions and material of fourteen bachelor and master courses from health and (public) management. In addition to the course descriptions, we examined recent theses from the study programs mentioned above in terms of data-literacy competences.

In applying the Ridsdale Competence matrix, we saw that the categories of data evaluation were frequently represented. Data storage, data application and data citation were not mentioned in any of the module manuals. With ten mentions, SPSS was the most often mentioned tool in connection with data literacy. Data literacy competencies were mainly addressed in seminars that teach research methods. Regarding the Bloom's taxonomy of learning goals the results of the analysis show that "Application" was the most common learning goal, this was followed by "Analysis" and "Knowledge".

The analysis of the final theses shows that the students applied data literacy competencies significantly regarding to the Ridsdale subcategories "basic data analysis", "data interpretation" and "data visualisation".

The results indicate the need for the integration of data topics into the curricula on a generic level, as they show that beyond statistical data analysis there are many "blanks" in the curricula.

In our preliminary conclusions from the exploratory analysis, we could identify competence areas that are not sufficiently covered at the HAW Hamburg.

We found that data management competencies are requested but not yet sufficiently taught and implemented into the curricula. Further topics are data ethics and critical thinking, that should not be handled as an add-on topic but integrated into projects. Curricula should strive to integrate tool training with teaching how to develop your own research questions on a dataset and the application on real projects. Our findings strongly coincided with experiences reported by the other DaLiCo partners. We took these findings into consideration when planning our further activities, first and foremost the DaLiCo Summer School.

5 Bringing Together Different Disciplinary and Interdisciplinary Approaches to Data Literacy

Below we present selected project results to illustrate how we, based on the insights we were able to draw from the analysis of the state of data literacy education at the HAW Hamburg, brought together different disciplinary approaches. The first focus is on the results generated by the Summer School. The second presents an exemplary methodological approach in connection with the sub-project, Learning spaces.

The DaLiCo Summer School. A first implementation of our holistic approach was the DaLiCo Summer School, "Doing cool things Open (Governmental) Data". It was addressed at PHD, Masters and advanced Bachelor students from the partner universities and took place virtually in the last week of September 2020. Whereas, the type of data and the domain governmental data were already determined in the original project proposal,

the actual choice of the example, the World Happiness Report 2020 [26], was informed by our research result that an emotionally engaging topic that relates to the students' own life realities is very motivating. Our didactic approach was inspired by the Library Carpentry movement demonstrating to learners how to solve defined problems with the help of special tools and providing hands-on practice, feedback, and a positive learning experience [27]. We chose to start from the emotional initial question, "what makes you happy?". Furthermore, as our Summer School addressed an international audience from various fields of knowledge and differing levels of competencies, the chosen example should invite the finding of different viewpoints and research questions. The decision to plan the program around a hands-on data project was based on our learning that the acquisition of data literacy is an iterative process that needs to provide room for learners to put knowledge and skills instantly into practice. In four teams - each coached by a project member - the participants critically assessed, creatively enriched, complemented, and deepened the data used for the report in order to tell their own data stories inspired by the data from the World Happiness Report. The resulting stories explored the impact of geographical and national influences, gender differences, crime, and unemployment rates on the reported sense of happiness.

The data projects team assignments were contextualized and framed by:

- a keynote discussing data literacy in the broader context of the crisis of information;
- and hands-on lectures on data-analysis and critical thinking, open data infrastructures, data visualization, data ethics, and research data management

In his keynote on "Literacy, Open Data and the Crisis of Information" Olof Sundin (Lund University) broadened the scope by alluding to the societal side of information literacy, especially the question how (access to) public knowledge is controlled. The importance of data infrastructures became directly tangible via the workshop on Open Data Infrastructures using the example of CBS – Statistics Netherlands (Erwin van Mierlo) and the Transparenzportal Hamburg (Lothar Hotz). On the last day of the Summer School, Edit Görögh and Adam Szaldobagyi embedded data literacy into the larger context of Open Science in their workshop on research data management and FAIR principles.

All teams incorporated the suggestions from the input of Andrea Conchado Peiro (statistician at the Universitat Politècnica de València) into their data project to focus on the bias that lay in the data itself. Taking up the Library Carpentry approach of fostering learning by example, Andrea provided a template for the basic statistic operations course that participants could adopt in the first analysis of the data for their data project. The awareness for ethical aspects was deepened in the session by Marlies van Steenbergen and Cathelijnn Timmers (Hogeschool Utrecht) on how to take into consideration ethical issues right from the beginning of a data project and what tools and techniques to use. Participants were encouraged to apply different tools like the intention outcome matrix and the ethical matrix [28] on their data project and to discuss their insights with Marlies and Cathelijnn within a coaching session. The decision to dispense with web tools for data manipulation and statistics that completely hide the underlying statistics proved to be right with regard to the goal of developing data competences and critical thinking. On

the other hand, the provision of working Excel templates with already prepared formula for basic mathematical functions facilitated the entry into statistical analysis, especially for participants from study programmes that involved no or little statistical knowledge.

Following our holistic claim to consider the complete data lifecycle, the project assignment initially addressed finding relevant alternative data sets to the ones used for the actual World Happiness Report. However, the workshop on research data management was scheduled too late and lacked a narrow direct relation to the assignment. Recruiting participants was more difficult than expected. In spite of early promotion, no PhD students from Hamburg and Debrecen registered for the Summer School. In Hamburg, the university-wide distribution of the call generated a broad echo among the group of international students. A colleague from Valencia successfully encouraged students from his classes to participate.

Based on the pre- and post- summer school surveys, the appraisal of the provided teaching material, the exchange of experience among the coaches and the appraisal of the student projects, the results of the summer school were evaluated in terms of insights on the intellectual outputs. The overall positive experiences from the Summer school had an inspiring effect on the DaLiCo team and provided valuable insights for our data literacy activities. This was especially with regards to the train-the-trainer-programme, the data literacy learning space, and the curriculum development. Through these activities we gained deeper insight regarding choice of topics, competencies to be addressed and appropriate research questions, the didactic approach, suitable learning environments, and prerequisites for embedding data literacy education into local university curricula.

Choice of Topics, Competencies to be Addressed, and Appropriate Research Question.

The participants' feedback affirmed our assumption that an emotionally engaging topic allows for a clear point of view, encourages cooperation and interdisciplinary discourse and, thus, supports learners in finding a starting point for a data project. It proved to be helpful for less experienced students to set an initial research question. Another criterion for success was to make the iterative and spiral approach to data projects tangible by incorporating the complete data lifecycle. This was particularly true for the necessity to interweave analysis with normative aspects and ethics by, for example, pointing out the bias within the data. The fact that we did not fully succeed in satisfactorily integrating the teaching of competencies in the field of research data management during our Summer School inspired us to explore how this might be done together with colleagues. We did this together with trainers from the partner countries on the occasion of our planned multiplier event on the topic of FAIR-Data.

Didactic Approach. The mixture of guided learning, learning-by-example (assisted by templates), self-directed projects, and coaching proved successful. However, as the teachers themselves already observed during teaching at the Summer School and wherein we were confirmed by the participants' responses in the post Summer School survey, we had expected far too much from our participants regarding the amount of learning material that could be digested. To really grasp the taught concepts, the students would have needed more actual training or, in the words of the students, more 'concrete exercises.'. The nevertheless satisfactory quality of the data stories were partly owed to the fact that team members contributed different knowledge and competencies and, therefore, were

able to work creatively and productively together. In the final presentation it became also clear that not all members had completely understood all necessary mathematical steps. The valuable feedback participants gave in the final wrap up session as well as in the written follow-up survey also suggested that we needed to take up a more participative approach and involve learners more in the planning of data literacy interventions. As a further conceptional outcome we noted how important it was to formulate common and realistic learning outcomes.

We fed the results of these insights into the further development of our train-the-trainer concept and the planning of future? pilot events. We are elaborating on interactive workshops with already data literate persons who want to pass on their data literacy experiences to others led by experts in the field. The aim of this approach will be to examine how the group of participants in such a learning activity will subsequently lead similar workshops to distribute the knowledge as well as provide advice and supervise the people they teach [29].

Extra-curricular activities like summer schools that do not award credit points are difficult to fit into this time frame. In our further activities within DaLiCo we plan to explore and evaluate various alternatives to include data literacy education into existing curricula. We will assign the participants in the Summer School to combine statistical analysis with critical and analytical thinking and data ethics. We will reuse some of the material (lectures, assignments, project results) that resulted from the Summer School in a MOOC. As well as students in the Summer School, the MOOC will encourage involvement by students and professionals who need an introduction into data literacy. The MOOC will differ from the Summer School that was addressed at a disciplinary mixed audience. Instead, the MOOC will have an applied approach towards the acquisition of professional competences in the field of management and business. The MOOC will be designed in a modular way so that it can be part of informal self-paced learning activities of students but will also be suitable for use by lecturers as teaching material in the context of existing curricula. As part of a master's module at HAW Hamburg, students are currently developing and trying out concepts to integrate more data literacy training into a study program in business economics.

The Data Literacy Learning Space. Virtual Learning Environments (VLE) are already in use for data literacy education as seen in online courses, MOOCs, or social media applications [5]. It seems seductive to adopt existing models. As data related learning spaces are answering the specific needs to practice data literacy education, VLE need to be adjusted to the local conditions of universities. We explored different possibilities how this might be done by setting up prototypes of data literacy learning spaces that can be used as part of different formal learning settings. This includes certain educational formats like train-the-trainer-concepts as well as independent and self-paced learning activities.

The step-by-step conceptualization of the learning space can serve as an example for this way of working. In the first project phase, we conducted an overview of existing infrastructures, resources and practices (physical and virtual learning spaces), and identified the needs and requirements of learning space stakeholders.

By adopting the Business Model Canvas [30] and using the Open project management canvas [31] as a blueprint, we developed a Learning Space Canvas Model. The

Canvas helped to find a mutual understanding of the concept in terms of structuring and visualizing the existing ideas concerning the data literacy learning spaces.

Within the “Learning Space Canvas Model” the relevant conceptual elements of the Data literacy Learning space can be systematically structured. “Building blocks” of the template are learner segmentation, learning process, data literacy competences, data applications, and tools. We used the Learning Space Canvas Model for the preparation of the pilot train-the-trainer workshop at the multiplier event in July 2021. This Canvas model can serve as a methodological template to support the systematic design of data literacy learning space concepts.

6 Identifying Access Points - Towards a Holistic Understanding and Concept of Data Literacy Education

Looking back on our data literacy journey within DaLiCo we explored the access to data literacy from different perspectives: a) conceptual and disciplinary and in relation to the communities of practice involved in the promotion of data literacy; and b) from a methodological and organizational perspective. Both of these perspectives are described as follows.

Conceptual and disciplinary perspective: The terminological clarification created the awareness within the DaLiCo team to appreciate the fact that we, regarding professional affiliation, could be seen as ‘quite a mixed bunch.’ This was experienced not as a disadvantage but as an encouragement to try out different approaches. The respect for each other’s knowledge and experience of data literacy had even grown.

We realised that there is no data literacy without some amount of mathematics and statistics. We were confirmed in our shared conviction that awareness of ethical issues and how to methodologically approach them are equally important for a data literate person. The fact that the summer school student data project teams were able to collaborate well across disciplines confirmed that data literacy, in fact, has the potential of a boundary object to bridge between disciplines and that the interdisciplinary cooperation really created an added value. On the other hand, data literacy also offers the possibility of professional deepening and specialization. The stimulation to develop research questions step-by-step plays an important role in this context. In order to establish relevance for students, these should be drawn from the students’ disciplinary contexts or personal lives.

Methodological and organizational perspective: From a meta perspective within DaLiCo we have gone through a behind the background of the all-embracing digital transformation typical learning process. We started with a rather sequential and linear project management structure and process known as waterfall project management. Gradually, we adopted a more iterative and/or incremental, circular development process. The step-by-step conceptualization of the learning space as part of the summer school and multiplier workshop serves as an example for this way of working. Working with prototypes and pilots enables an alignment to the planned output and results. The concept of the summer school will mature within the DaLiCo project period because every lesson learned will be applied to the next concept.

For the successful progress of the project work, the methodological approach such as the method of researching a learner's data literacy with the help of an individual knowledge map and the learning space canvas also play an important role because they support the common understanding of the topics.

To sum up: after the first year and a half of the DaLiCo project, we did not come up with a fixed set of data literacy topics as a must-have in data literacy education. Exploratory research involving study of students and curricula revealed some neglected competency areas like data management, data publication, and data ethics. However, we also found that the central problem is not the general neglect of individual areas of competence - even if there are popular and less popular topics - but the still lacking connection between individual areas in didactic interventions. With the experiences from the implementation of the Summer School, the holistic approach to fostering data literacy formulated as a theoretical concept became concrete and tangible.

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Managing Personal Data in the Age of Surveillance Capitalism: A Sociomaterial Reading of Mozilla's Data Detox Kit

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Abstract. Within the logic of surveillance capitalism, individuals become objects from which raw material (data) is extracted to enable the selling of predictions of behavior. In this study, the Data Detox Kit (DDK), developed by the not-for-profit Mozilla Foundation, is viewed as a contemporary, practical example of data literacy expressed through descriptions of information activities. A sociomaterial perspective is applied to identify and analyze sociomaterial assemblages among the information activities described in the DDK. Two forms of data literacy are identified and discussed: a re-active mode, focused on removing data already gathered, and a pro-active mode, focused on preventing data from being gathered. Through the analysis it is possible to discuss the role of data in our everyday lives, including the challenging task of managing personal data online.

Keywords: Data literacy · Information literacy · Personal data · Surveillance capitalism

1 Introduction

For two decades, dominant internet companies have successfully implemented a new business model that capitalizes on the gathering of enormous amounts of personal data about every aspect of our lives. Within this logic of surveillance capitalism [1], individuals become objects from which raw material (data) is extracted to enable the selling of predictions of behavior. Personal data are both socially constructed and fluid: any piece of digital personal data is constantly being interpreted, used, and applied in new ways [2]. Personal data, combined with algorithms, enables personalization of digital services enticing users to release even more personal data for the benefit of the service provider [3], making users increasingly vulnerable to various influences (for example, commercial and political). Google, the dominant surveillance capitalist company, launched this new form of capitalism through conceptualizing human experience as a commodity: “[h]uman experience is subjugated to surveillance capitalism’s market mechanisms and reborn as “behavior”” [1, p. 100]. Once, the personal data harvested as “behavioral surplus” was used to improve the service provided (for example, a search engine), but increasingly, the primary use is to predict user behavior and ultimately to govern our

behavior and our emotions [1]. In this way, surveillance capitalism poses a fundamental threat to democracy and to the rights of individuals to shape their own lives and futures. The sharing of personal data, necessarily and sometimes unknowingly, mediates our lives [4].

This development has provoked policy makers to propose new legislation, but far-reaching regulation is yet to come. Given the lack of legislative regulation and a growing awareness of the value of personal data, for both individual integrity and for economic ends, data literacy is becoming increasingly important. Data literacy refers to the ability to “access, interpret, critically assess, manage, handle and ethically use data” [5, p. 126]. In previous research, data literacy has been described as a component of information literacy, often in relation to scientific data [6]. Critical data literacy is also closely related to critical information literacy. Špiranec, Kos and George [3] point to a critical dimension of data literacy, similar to notions of critical information literacy, and through a systematic literature review they come to understand critical data literacy as situated and enacted in “the problematization and transformation of oppressing and unjust conditions of life produced by exclusionary, exploitative, invasive and manipulative uses of data” (no pagination). In line with this critical understanding of data literacy, this paper connects to the emerging perspective of ‘critical data studies’ highlighting issues of power and politics in relation to personal digital data [e.g. 7–9].

In previous research, we find illustrative examples of how young people negotiate use of digital services and the collection of personal data. Selwyn and Pangrazio [9] discuss personal data strategies and tactics among teenage mobile media users. They find that most of their informants preferred to read ‘Terms of Service’ and to adjust default platform settings rather than engaging with social media tactics such as installing blocking and tracking software or posting ugly selfies. Andersson [10] studies how young people understand and manage online traces of search, something that may reveal information about a person in other contexts than intended. The strategies employed by these informants were focused on removing visible traces rather than pro-active measures to counter collection of data. Selwyn and Pangrazio [9] emphasize the need to further develop understandings of the wider context of young people’s everyday lives and data practices. Similarly, Andersson [10] points to the need to equip young people with better knowledge about data, online traces, and a critical awareness of how data flows between devices and platforms [cf. 2].

Drawing on these previous studies, this paper departs from the overarching question: how can data literacy be understood in terms of socially and materially constituted activities that can help individuals to understand and manage their personal data in an age of surveillance capitalism? The digital industry collecting, analyzing, and profiting from personal data is opaque and complex [9]. Several campaigns to increase public awareness of these issues have been run in recent years by civil society organizations. As one example of such an effort, that is to increase knowledge of how personal data are collected, used and how individuals may take better control over these processes, the not-for-profit Mozilla Foundation has presented an online guide, *the Data Detox Kit* (DDK), available in several languages. In this study, the DDK is viewed as a window into what influential internet organizations consider important and reasonable for average internet users. Following research portraying information literacies as enacted in

information activities [11, 12], the DDK is considered a contemporary, practical example of a data literacy expressed in descriptions of data-related information activities. Using a sociomaterial perspective [13], recognizing the constitutive entanglement of the social and the material, this study identifies and analyzes the information activities described in the DDK and connects this practical example of a data literacy to previous research. In this way, this paper contributes to a sociomaterially informed understanding of data literacy in relation to the increasing collection and exploitation of personal data. The results may be of use to both researchers concerned with data literacy and personal data and to librarians and educators within the field of information literacy.

2 A Sociomaterial Perspective

A sociomaterial perspective acknowledges the constitutive entanglement of the social and the material [13]. This constitutive entanglement implies a post-humanist position that does not privilege humans or technology. Indeed, humans and technology do not merely shape each other as ontologically separated entities. The distinction between humans and artifacts is analytical. Instead, all practices are sociomaterial since “there is no social that is not also material, and no material that is not also social” [13, p. 1437]. Conceptualizing online searching as sociomaterial, Haider and Sundin [14] assert that search engines are made by us as we search for information and, at the same time, this act of searching makes us. In other words, our search practices are constitutively entangled during interactions with the materiality of search engines. A Google-based search, both the activities and the results, is an example of a ‘sociomaterial assemblage’ [15] where humans and artefacts enact each other in practices. In the context of this paper, this theoretical understanding implies that the performativity of personal data is sociomaterial fashioned by the specific ways that collection and use of personal data are designed, configured, and enacted in practice. Next, we turn to the material and method of the study.

3 Research Design

The DDK is a website (www.datadetoxkit.org, accessed 2019–12-09) containing 20 pages divided into three main categories: privacy, security, and wellbeing. The DDK is concerned with personal data – something that could seem trivial and harmless. But, according to the DDK, “[t]he problem lies in what’s happening with your data. Taken together over time, intimate digital patterns emerge: your habits, movements, relationships, preferences, beliefs, and secrets are revealed to those who analyze and profit from them, like businesses and data brokers” [16]. The purpose of the DDK is for people to “get a glimpse into how and why this is all happening, and take practical steps to control your data traces across the internet” [16].

To enable a structured analysis, on December 9, 2019, every page of the DDK-website was downloaded and closely read. Potential information activities were marked in the documents, and subsequently copied into separate text documents. In this way, 105 information activities were identified. After removing duplicates, 65 of these activities

were labelled as data-related and included in a conventional qualitative content analysis [17]. In this stage of the analysis, information activities were structured in themes corresponding to the digital tool (or platform) involved. Eight themes were identified: browser, dating services, e-mail, Google, phone, social media, voice assistant, and not tool specific. At this point in the analysis, three types of information activities connected to different modes of agency (of the human actor) were classified: 1) to remove data already gathered (active data protection); 2) to prevent data from being gathered (pro-active data protection); 3) to use technology more on your own terms (for example, avoiding casual phone use, dark patterns, and misinformation). From this initial classification, a fundamental distinction among the information activities could be identified: whether the activity could be described as *pro-active* (managing how personal data might be collected and used) or *re-active* (managing already collected personal data). Next, the analysis was guided by the notion of sociomaterial assemblages [15], allowing for a deeper understanding of how different entanglements of technologies and human actors interact with how personal data are collected and distributed. In the following section, the findings of the analysis are presented together with a thematic overview of the information activities identified.

4 Results and Analysis

The eight themes identified connect to different types of digital tools or platforms. In quantitative terms, the number of information activities related to personal data connected to a certain theme indicates the prominence of the technological actors associated with the theme. Sorted by the number of information activities ($n = 65$), the order of the themes is as follows: phone (15), social media (10), Google (7), dating services (6), browser (4), voice assistant (4), and e-mail (2). Additionally, 17 information activities can be related to the category ‘not tool specific’ where activities are too general to be connected to specific tools or platforms. Of all the information activities included in the analysis, 20 information activities are labeled re-active and 45 information activities pro-active. Given how data-related information activities, and descriptions of these activities, make it possible to discuss data literacy [cf. 11, 12], the pro-active mode of data literacy is more prominently represented in the DDK. The pro-active type of data literacy includes descriptions of information activities that can prevent or mitigate collection and use of personal data. Most of these activities describe a course of action, for example in terms of actively choosing digital tools and adjusting settings to regulate the information being collected. Some activities are instead focused on what not to do, for example to avoid the use of a certain digital tool. The descriptions of information activities associated with the re-active mode of data literacy are focused on two courses of actions: 1) to discover what personal data have already been collected, and 2) to delete this information. In Table 1, the 65 data-related information activities are presented, thematically organized according to type of data literacy and theme.

Table 1. Information activities organized according to theme and type of data literacy.

Theme	Re-active mode	Pro-active mode
Browser	Clear cookies and browsing history, and then every month (if you don't always browse in private mode)	Download and use a browser that keeps web activities more private by default
		Install add-ons/extensions for your browser that makes online activity more private (for example, by blocking invisible trackers and spying ads)
Dating service		Browse using private or incognito mode
		Separate your dating profile(s) from social media accounts (the dating service will otherwise collect data from Facebook, for example)
		Do not share too much personal information on dating services
		Use a unique photo of yourself for dating services to avoid cross-platform identification
		Turn off location information for the dating app when not necessary
		Use other services to talk in private
		Delete account and remove dating app
E-mail	Search for specific valuable information in your e-mail and delete it	
	Archive and download everything from your e-mail and social media accounts, and then delete everything in the account	
Google	Delete individual items through "My Activity"	Set activities to be automatically deleted periodically
	Delete activities by topic through searching, for example "youtube", and then delete results	Set Web & App Activity to "Pause"
	Delete location information from Google Maps	Do a Privacy Checkup on Google

(continued)

Table 1. (continued)

Theme	Re-active mode	Pro-active mode
	Delete everything	
Phone	Clear location footprints that may reveal your location info	Do a full system reset (if it is second hand)*
		Set up a passcode to lock your screen*
		If possible, enable full-device encryption*
		Turn on “Find My Phone”*
		Select how to back up your files on the cloud or other alternative?
		Turn off displaying controls or settings on the lock screen*
		Turn on automatic updates only when on Wi-Fi*
		Disable pre-installed apps*
		Change the device name to avoid your name being visible through Wi-Fi or Bluetooth
		Turn off location services for each individual app that do not need it
		Turn off location information for the whole phone
		Get rid of random apps on your phone that you never use since they may collect data
		Turn off any permissions the app does not need to function
Find alternative apps that perform the same function but without collecting or selling personal data		
		* When getting a new phone
Social media	Untag photos and posts of yourself and friends	Do not use the social media app, use a browser instead
	Encourage friends and family to untag	Update “Ad Preferences” to restrict use of data for ads on Facebook
	Find out what Facebook knows about you under “Ad Preferences”	Update settings to restrict data being shared to the general public

(continued)

Table 1. (continued)

Theme	Re-active mode	Pro-active mode
	Remove items from “Activity Log” on Facebook	Separate social media accounts to avoid cross-platform data sharing
		Archive and download everything from your e-mail and social media accounts and then delete everything in the account
		Encourage your friends and family to do personal communication face-to-face or over private chat platforms, like Signal, rather than social media
Voice assistant	Delete individual recordings	Turn off the microphone for private conversations
		Use services not connected to your voice assistant for guilty pleasures
		Use ethical search engines for internet searches, not the voice assistant; low-paid persons in poor conditions processes several recordings
Not tool-specific	Change passwords*	Use a combination of letters, numbers and special symbols for passwords
	Notify your bank*	Use a dedicated password manager to generate and handle passwords
	Inform your closest friends and family of the breach*	Use account security questions that are impossible for others to guess
	Search for your personal information on the internet to find out what is available*	Make sure other people cannot see your PIN or password
	If you are unhappy with your search results, contact websites directly to remove data about you – following the GDPR*	Set up a two-factor authentication
	Clean out linked accounts periodically	Do not sign in using Facebook or Google

(continued)

Table 1. (continued)

Theme	Re-active mode	Pro-active mode
	Find out what data of yours is available online from banking, e-mail, shopping and consider deleting data you do not need, and download anything you do so you can delete it	Let companies know that you do not agree with their addictive design, such as dark patterns or misinformation; send e-mails and tweets
	*Respond to a breach	Be aware of dark patterns, ask critical questions and read up on current deceitful designs
		Take screenshots of dark patterns online and share them with your community using, for example, the hashtag #darkpattern
		Share the Data Detox with friends and family

As pointed out above, the number of information activities connected to a certain theme tells us something about the significance of the technological actors in play. We will now consider the eight themes and the nature of the sociomaterial assemblages suggested by the described activities, starting with the themes that collect the highest number of information activities.

Phone. Arguably, our phones are nowadays the main access point for many people when using the internet. With phones, we can surf the web, do online searches, use social media, and manage banking and access healthcare. This versatility makes the phone an important actor in sociomaterial assemblages of several kinds, and information activities in this theme are aimed at securing the physical device from unauthorized access but also to avoid various apps from collecting data. Notably, several activities address the issue of location information, illustrating how phones are key tools in the process of collecting location information of users – a particularly valuable and sensitive type of personal data [1].

Social Media. In several ways, information activities described in the DDK suggest that we should avoid the use of social media and try to communicate through tools that do not harvest our personal data. The collecting of data when using social media can be mitigated by using a browser rather than the social media app (an actor that is generally more invasive to privacy) and by adjusting what data are shared for advertising purposes and for public display. Selecting technological actors and interacting with default settings of platforms consequently affect how personal data are collected and distributed. Other activities concern untagging, that is to remove identifying information from photos and other posts; implying that we should avoid providing identifying information through tags, as this adds significant value to our collected personal data by linking data.

Google. Google is not one tool but, rather, a platform combining several infrastructural devices [see 14] including search, maps, and documents. Since Google is a main actor in online search and controls services such as YouTube, activities in this theme are focused on pausing the extensive tracking of web and app activities, the periodical deletion of personal data, and to delete individual items of information through the platform’s “My activity” page.

Dating Services. Information activities collected in this theme suggest that we should avoid dating services and, rather, communicate through other tools. If still used, the amount of information collected and shared can be mitigated. To avoid the dating service from collecting data from social media platforms, such as Facebook, one activity notably concerns separating dating profile(s) from social media accounts to avoid cross-platform data sharing. This illustrates how several different tools make up sociomaterial assemblages together with human actors, and that we need to consider how individual technological actors communicate together – often without direct human control – as data flows between platforms [cf. 10].

Browser. The web browser is a key tool to access and navigate the web. Pro-active information activities include browsing in private mode (for example, blocking invisible trackers and spying ads), while deleting cookies and browsing history is the re-active course of action. Cookies are saved on computers and track how browsers are being used, enabling platforms such as Google unparalleled means to track users on popular websites [18]. Using a browser that can keep web activities more private is to engage in a sociomaterial assemblage that grants more agency to the human actor. This example illustrates how technologies are entangled with users in different ways affecting how personal data are collected and distributed.

Voice Assistant. Information activities in this theme suggest that we should avoid this service for private conversations, or sensitive matters, and consider alternative search options that do not exploit low-paid workers in poor conditions that process several recordings.

E-mail. Rather than stockpiling sensitive information in old e-mails, potentially enabling unauthorized or unintended access, information activities collected in this theme suggest the archiving and deletion of old e-mails. In effect, the DDK questions the use of e-mail services as safe options for archiving potentially sensitive information. A safer technological partner for these ends might be your local computer.

Not Tool-Specific. This theme collects descriptions of information activities including general advice on how to design secure passwords, how to respond to breaches when personal data are made publicly available, for example, through hacking attacks, and how to avoid being negatively affected by addictive design such as dark patterns or misinformation. These activities are more general in nature and not specifically connected to a certain technological tool.

As we have seen in a number of themes, several different tools make up sociomaterial assemblages together with users – for example when you post on social media through an app from your smartphone. This has several implications. First, the distribution of

agency between human actor and technological actors can be modified by engaging with a tool that grants you more control over how personal data are collected and shared. Second, the interaction between technological actors needs to be considered, something that is reflected in one significant information activity in the DDK – to separate social media accounts to avoid cross-platform data sharing. In the next section, these findings will be discussed and related to previous research.

5 Concluding Remarks

From a critical perspective on data literacies, it is crucial to foster an “awareness of the social, political, economic and cultural implications of data” [2, p. 426]. As a way to highlight and explore these issues, this study contributes with a sociomaterially informed understanding of data literacy in relation to the increasing collection and exploitation of personal data against the background of surveillance capitalism [1]. This sociomaterial reading of the DDK shows that information activities related to controlling the gathering and sharing of personal data are intimately connected to the tools used for accessing internet. Our data-related activities are constitutively entangled during interactions with the materiality of the technologies we use – and that use us [cf. 14]. In particular, phones, social media, and Google interact with users in different ways affecting how personal data are collected and distributed.

Through this analysis of an empirically grounded example of data literacy, it is possible to discuss the role of data in our everyday lives, including the challenging task to manage personal data online. Two forms of data literacy are identified: a re-active mode, focused on removing data already gathered; and a pro-active mode, focused on preventing data from being gathered. The re-active mode of data literacy collects descriptions of 20 information activities while the pro-active mode of data literacy includes 45 information activities. These two modes of data literacy can be related to findings from previous research where young users tend to manage online traces by searching and deleting unwanted traces [10] – hence resorting to primarily re-active strategies. Another study shows how pro-active tactics, such as installing software that prevents tracking, was considered too time-consuming in relation to the importance placed on the issue of personal data [9]. These findings imply that pro-active measures require time and knowledge, something that may prevent users from taking a pro-active stance. Arguably, pro-active efforts can be more effective in the long run; descriptions of information activities from the DDK collected in the pro-active mode of data literacy appear to provide better protection for personal data.

Pangrazio and Selwyn [2] argue that we need to create a better understanding of the place of individual users within the context of a data economy. DDK, and similar initiatives, give some power and agency back to users from platform providers and other parties, but both time and liability is placed upon the individual, something that can be considered problematic. Indeed, Selwyn and Pangrazio [9] show how young mobile media users voice irritation since they believe the obligation to act should not be placed on individuals, but rather on the internet companies. This position echoes arguments from critical data research [e.g. 7]: individual actions are to be encouraged, but it is

necessary for platform companies and governments to address the structural injustices and problems of the data-driven economy. Also, some users consider it to be a fair trade that companies use personal data since the services the users get in return are highly valued [9]. Consequently, functional tactics aiming to change how for example social media platforms collect and use our personal data should be employed on a collective level. However, collective action requires individuals with knowledge and motivation to act. In this way, initiatives such as the DDK can be one of several necessary steps to counter the negative effects of surveillance capitalism.

The results of this study place data literacy, as a crucial component of information literacy, in the context of surveillance capitalism. This illustration of the extent of personal data gathered offered by examining the plethora of information activities suggested in the DDK to individuals interested in taking control over how personal data are collected and used by internet companies can foster a critical awareness of issues connected to digital personal data. Such insights can enable further problematization and transformation of oppressing and unjust uses of personal data, the essence of critical data literacy [3]. Future studies should continue to chart how data literacy is enacted as data-related activities are constitutively entangled during interactions with the materiality of the technologies we use – and that use us.

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

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Digital Literacy and Digital Empowerment



Digital Literacy Competencies and Interests of Elderly People

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Abstract. The research aimed to collect information on the elderly's level of information literacy and their interest in further education in areas regarding the Internet and other ICT. We identified the interests of the elderly (65 years of age and older) in particular topics in which they would be most motivated to study. However, these areas should reflect their entry level of digital competence, evaluated through a self-evaluation scale. The results reveal that the younger among the elderly reach a higher level of digital literacy than the older. The elderly who learned to use ICT and the Internet independently assessed their skills better than those who were helped or trained. Regardless of their self-evaluation, most of the elderly showed interest in further education in other areas of ICT. The lowest number of elderly expressed interest in further education in traditional issues, followed by topics connected to information literacy, while skills that facilitate active ageing attracted the most interest.

Keywords: Digital literacy · Digital divide · Education · Elderly people · Internet · Research

1 Introduction

Digital literacy among elderly people is an important topic in a society increasingly dependent on modern information and communication technologies. More than ever, it is essential to explore the issue and look into how to help the elderly (65 years of age and older) develop their ICT (information and communication technology) skills. Research has shown that the elderly have a certain degree of information literacy and use the Internet, but their competencies fluctuate from one person to another [1].

Different digital literacy and Internet use levels correlated with differences in age, gender, education, and prior experience [2]. Digital literacy among senior citizens can be improved through education, and that is where libraries can play a crucial role. Libraries provide elderly people with a safe and comfortable environment that is easily accessible; with one library per 1,971 inhabitants, the network of libraries in the Czech Republic is the densest in the world [3].

The research presented in this paper yielded results that could be applied when designing a portfolio of classes on information literacy in libraries for the elderly. However, the libraries need to consider various limitations: the possibility of the second-level digital divide, the level of digital skills of the target group, their motivation to work with ITC, and not least, their age [1]. It is essential to select appropriate content for the classes interesting to the target group of senior citizens. It is also crucial that participants of the lessons focused on information retrieval be active Internet users. These skills do not entail merely finding a piece of information but also recognising what information the user needs, looking it up, evaluating, and using it effectively and properly. Skills such as these are an essential prerequisite to other Internet-based activities, making life simpler and bringing about numerous advantages associated with Internet use [4]. Elderly people need to be taught these skills or at least get some bearings to navigate the information landscape. It is no longer necessary to deal with issues such as access to technologies itself (primary digital divide), but rather how to use them effectively when working with information (second-level digital divide) [5]. Dramatic technological advances place the elderly under pressure to escape digital exclusion and use the Internet and ICT's advantages. A similar topic was explored in qualitative research into the needs of Czech senior citizens when working with the Internet [6].

The present research aims to reveal the self-assessed level of digital skills among Czech senior citizens and their preferred areas of further education provided by libraries. We designed the quantitative survey to answer specific questions about information literacy skills among the target group and their interest in education provided by libraries and preferred fields of interest.

2 Literature Review

Digital literacy is a multidisciplinary concept [7] and as the core term in this study it could be interchangeable with other related terminologies as information, computer or media literacy. Some surveys [5, 8] emphasise the social aspect and the importance of investigating the use of the Internet and technologies in different demographic groups. Countless studies in the Czech Republic and abroad explored digital literacy, attitudes toward ICT and the skills level of the elderly [9, 10]. Foreign research on the use of the Internet among the elderly and their habits and skills reveals that they feel the need to learn certain specific skills [11], use the Internet and have a degree of information literacy [2]. Their motivation to use the Internet is determined by their abilities and the time and effort invested into further learning [12].

The Internet will increasingly reflect the social, economic, and cultural relations as they are in the offline world, including inequalities [8]. Scholars often distinguish among various digital skills: those necessary to use the technology itself, skills used for working with content, and skills needed for active ageing [4]. We can find a parallel between the different sets of skills and levels of the digital divide, especially the relationship of skills essential for active ageing [11]. The social influence of senior citizens is severely weakened without the ability to use new technologies and work with information. The ever-growing number of people who communicate through modern technologies brings about a severe disadvantage to those who do not have the skills to use these technologies, known as a digital literacy paradox [13].

International research focused on the elderly [2] reveals that it is the level of their digital competence that poses a problem; they may have basic computer skills but still find it challenging to navigate through the wide range of options that the Internet offers. It may be difficult for them to find the information they need and be able to evaluate the outcome of the search, as well as make use of online tools such as Internet banking, online shopping, online learning, e-government [14]. An essential step towards overcoming the secondary and tertiary digital divide is raising digital awareness and educating the groups most affected by the divide [15]. Education needs to be tailored to the senior citizen's level of digital competence and focus on specific skills within information literacy, rather than basic lessons on computer literacy, which most libraries nowadays provide [16].

3 Methodology

The research aimed to explore digital literacy among elderly people and their ambition to better their digital skills. The main research questions were: How do the elderly themselves evaluate their digital literacy? If interested in further education, what topics do they prefer? Based on the questions and based on findings from prior qualitative research [6], we formulated four hypotheses:

- H1: The younger people among the elderly evaluate their level of digital literacy higher than those who are older.
- H2: The elderly who were taught to use digital technologies evaluate their skills higher than those who learned it independently.
- H3: The elderly who evaluate their digital skills lower are more interested in further education.
- H4: The elderly are more interested in education that facilitates active ageing than traditional digital skills.

We created a quantitative questionnaire that contained 27 questions divided into four categories: Skills, Previous Education, Areas of Further Education, and Demographic Information. We used the categorisation of digital literacy competencies according to the Digital literacy strategy of the Czech Republic for the period 2015–2020 [17] created by the Ministry of Labour and Social Affairs of the Czech Republic. The strategy distinguishes among operational, formal, informational, communication and content creation skills. We used a five-point Likert scale (the lower number indicated higher skills level) for self-evaluation of the level of these competencies. Three activities represented each of the five skills categories. Aspects of previous education and topics of interest for further education were multi-choice based on previous research of one of the authors [6].

Respondents had to meet two criteria: required age (65 years and older) and have basic computer skills. We distributed the survey solely in an online form using Google Forms. Thus only people with computer skills and access to the Internet could respond. We ensured age requirement by asking in the first question. The Czech statistical office registered more than two million persons aged 65 and older in the Czech Republic at the end of 2018 [18]. We found no data about the number of elderly who are active

users of the Internet, the group on whom we focused. Considering the sample group's size ($n = 717$), this survey provided significant insight into the studied topic. However, the research did not meet the criteria to be representative and, therefore, we should not generalise our findings.

The questionnaire was anonymous, and all questions (except the first that ensured age criteria) were optional. We distributed it through personal acquaintances, organisations providing senior support, and social networks. We used snowball sampling where subjects of the study recruit future respondents. The questionnaire was available from 17th January to 7th February 2018. We analysed the data quantitatively with IBM's SPSS Statistics software. We used Pearson correlation, Kruskal-Wallis test and Paired Samples T-test (with Cohen's d to estimate effect size) to test our hypotheses.

4 Results

The demography of our sample did not mirror the population, and it could cause differences preventing generalisation. Regarding gender, our respondents mainly were women (81.4%). The majority of the respondents completed secondary education with a school-leaving certificate (38.2%), closely followed by those with a university degree (32.2%). Groups of participants with only primary education and secondary education without a school-leaving certificate, the two prevalent types of education among the population [19], accounted for no more than 18.8% of the respondents altogether. The average age was 71 years, and the range of the date of birth was 1925 to 1953 (the latter was the limit for participation).

The first set of questions aimed at self-evaluation of the respondents' IT skills. On average, the self-evaluation was gradually getting lower throughout the categories in the order they are listed in the national strategy [17] (operational, formal, informational, communication, and content creation skills). There was not much difference between the first four categories, and it was only within the last category that evaluation showed a significant drop. The respondents positively assessed the following skills (listed in order from the most positively evaluated task): turning on and off the computer; using email; opening an Internet browser; entering the website URL into the address bar; searching for information on the Internet. On the other hand, participants evaluated all three activities from the category of creating and sharing (uploading a photograph, text, and a video on a webpage) as the most problematic.

We created an index for each skills category and the whole sample to determine the level of self-evaluation (lower number meant higher confidence level). These indexes (especially those for the overall skills) were the variables for testing our hypotheses. We assumed that the younger among the elderly would have a higher level of digital literacy than the older respondents. This hypothesis was proven valid (Pearson correlation 0.214, significant at the 0.01 level). The correlation was significant at the 0.01 level for all skills categories except for the basic computer skills. But there are many outliers in self-evaluation, especially for older respondents (see Fig. 1).

The second hypothesis, which compared the level of skills of the elderly according to who taught them (or whether they taught themselves), was not supported by the data. We distinguished three groups:

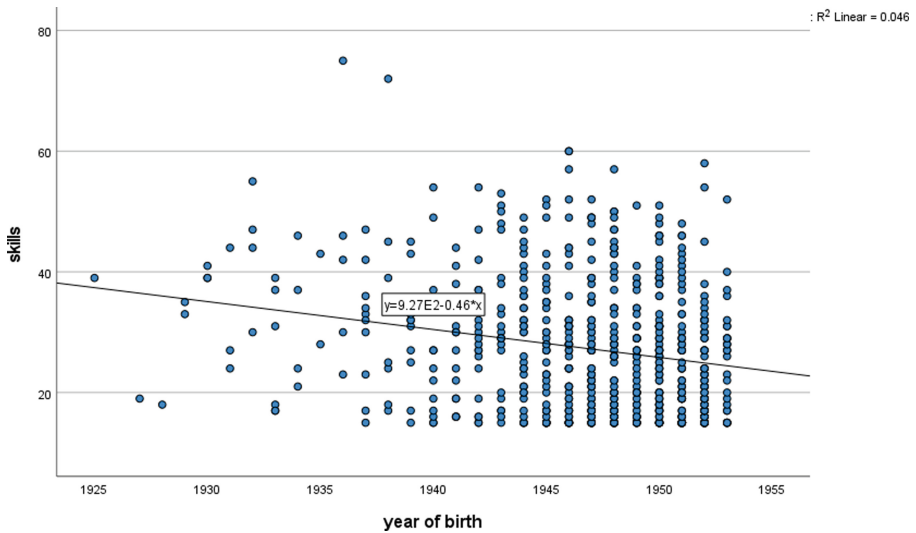


Fig. 1. The relationship between the year of birth and perceived digital skills

- respondents learning exclusively on their own how to use both computers and the Internet,
- respondents taught by someone else to use both computers and the Internet, and
- respondents learning to use computers independently, but also taught by someone else to use the Internet.

The Kruskal-Wallis test proved a significant difference among the groups ($p < 0.000$); only the category of basic computer skills was less significant ($p = 0.042$). Contrary to our assumptions, the elderly who learned to use the technologies themselves felt more confident about all the variables than the other groups. The elderly who got some help with the Internet followed, and those trained in both areas showed the poorest results (see Fig. 2). A follow-up question about who was helping them learn to use the technologies was multiple choice. It was family members the most often (42.26%), followed by employers (29.71%), acquaintances (13.11%), lifelong learning universities (6.69%), and libraries (5.58%).

Most of the elderly showed interest in further education, regardless of their high self-evaluation (70.5%). A total of 15.3% were not interested in further education, while 14.2% would like to improve their skills through education but could not for personal reasons. The Kruskal-Wallis test again proved a statistically significant difference in the self-evaluated skills among the groups sorted by interest in further education ($p \leq 0.001$). The exception was the category of content creation and sharing, where we did not find a significant difference. The respondents who showed interest in further education evaluated their skills as better (see Fig. 3). The other two categories distinctly overlapped in their confidence intervals. The group who could not improve their skills through education for personal reasons had the poorest results in more cases.

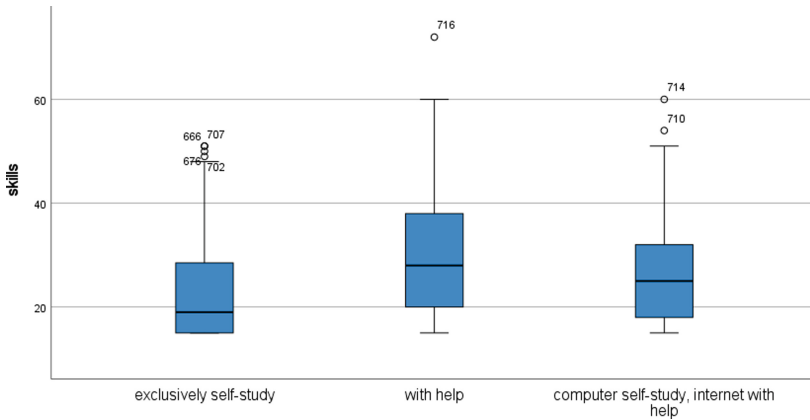


Fig. 2. Perceived digital skills according to help to work with ICT

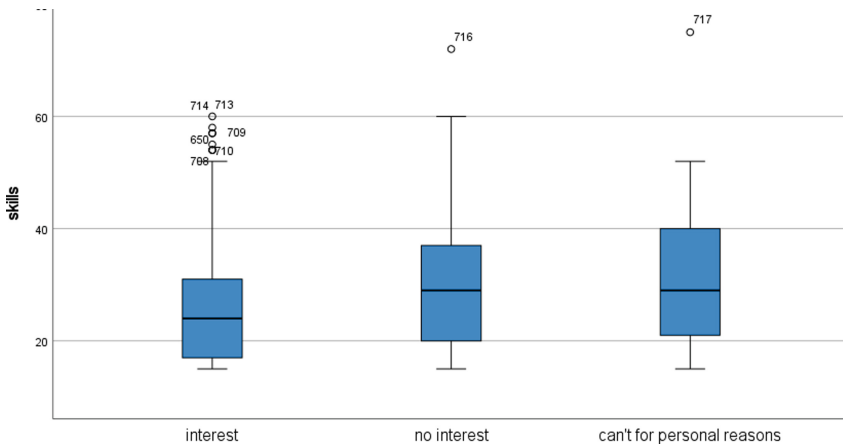


Fig. 3. Interest in further education according to currently perceived digital skills

Another set of questions specified the areas of interest for further education. Out of 37 topics, 11 were found interesting by more than a third of the respondents. They asked the most for editing and sharing photographs (51.7%), evaluating information quality (43.1%), dangers of information misuse (41.0%), downloading photographs (38.6%), translators (37.9%), creating graphics (37.2%), Google tools (37.0%), Windows OS (35.1%), downloading content to the computer (34.3%), editing and sharing videos (33.9%), and calling via the Internet (33.5%). In contrast, participants showed the lowest interest in spreadsheets (8.6%), presentation software (5.7%), and online dating (3.8%).

We categorised topics into more expansive areas: traditional skills (e.g., Windows OS, Office suite, web browsers, email), information literacy skills (searching for and evaluating information, information safety), skills supporting active ageing, such as e-commerce, e-communication, travelling, and content creation. The respondents could also add their suggestions for topics to every category. Each category listed a different

number of topics. Therefore, we compared whether the respondents picked at least one issue when assessing the interest. Paired samples t-test showed a significant difference when comparing all three categories ($p < 0.024$). But all three paired comparisons had Cohen's d in the range $< .30; 0.36 >$, which implies a small effect size. Respondents graded traditional skills as the least interesting, followed by information literacy. The greatest number of the respondents showed interest in skills supporting active ageing. It is necessary to emphasise that it was the category with the greatest number of the suggested topics. Within the categories, we were interested in the differences in the number of chosen topics according to age and gender. However, we found no influence of these variables on the number.

5 Discussion

The research proved that the self-assessed level of digital skills negatively correlated to age; the younger elderly felt more competent using technology than the older ones (H1). Many of the younger respondents (age 65–74) had experience using the Internet during their working life and retired with a certain level of information and digital literacy. Some of the respondents were still employed and were likely using the Internet as part of their jobs, accomplishing more sophisticated tasks than the older respondents who were no longer working [1]. Yet another factor could be the younger respondents' self-confidence when self-evaluating their ICT skills, as is pointed out by González [14]. Some authors [20] also mentioned that the younger elderly adopt technology faster, which results in their feeling more comfortable using it.

Surprisingly, the elderly who learned to use digital technologies with help assessed their skills as poorer than those who discovered it independently (H2). This came as a surprise because support on the part of the family is one of the key factors influencing the relationship of the elderly towards the Internet and ICT; a claim supported by previous qualitative research conducted in the Czech Republic [6] and abroad [14]. The explanation may lie in the efforts spent, having learned exactly what they wanted to: knowing they would learn the very skills they need, the elderly were more motivated to overcome obstacles. Therefore self-tuition aiming for specific skills was more effective than more general lessons. Such courses often cover basic skills that the elderly are already familiar with and do not learn anything new [16].

A number of the elderly participate in lifelong learning of digital skills, which requires a higher level of digital literacy [16]. The assumption that the respondents whose skills were poor would be more interested in further education was not confirmed (H3). Contrarily, those who evaluated their skills well have shown greater interest in education and further improving these skills. The high percentage of respondents who wished to pursue further education (or had done so) is closely related to the sampling bias towards higher education, which is uncommon among this age group. The elderly who pursued continuing education in their adult life were more likely to attend classes on digital skills than their peers who did not pursue any further education in their adulthood. The relationship between completed education and the interest in informal education is obvious; the higher the completed education, the more likely the senior citizen is to participate in workshops or lectures now and in the future [21].

The hypothesis (H4) that the elderly prefer education in areas that support active ageing rather than more traditional topics was proven valid. However, libraries often taught just the traditional topics. The respondents also expressed interest in information literacy. The areas of interest chosen for further education were often connected to the skills and tasks that the respondents felt least confident about or admitted not performing. For instance, editing photographs was a skill the respondents generally did not master well, and it appeared first among the areas of interest of further education.

The sample might heavily influence the results of the research. In the first place, they were all active Internet users (not only computer users), as the questionnaire was only available in an online environment. The respondents' education also played a role because people with higher education probably were already confident in the traditional areas; no single respondent chose to be unfamiliar with basic computer or Internet skills. The relatively low average age of the respondents could have skewed the results, as the younger people among the elderly usually use the Internet without much difficulty. Sampling bias could also be caused by snowball sampling; the respondents possibly shared the questionnaire in their social cluster amongst people of similar educational attainment and professions, such as among librarians or teachers.

6 Conclusion

Adapting the elderly to using digital content has considerable benefits. The elderly who daily use ICT find it easier to cope with the requirements the information age enforces upon them. The elderly often encounter prejudice about their level of ICT skills and Internet use. Many senior citizens do nowadays benefit from technology and the Internet, often more effectively than younger users. The age of computer courses for the elderly covering basic skills is long passed; these should be replaced by lessons focused on information literacy and how to use digital skills for active ageing. The research presented bears witness to this shift of interest, suggesting a future possibility in classes that could positively reflect the elderly gaining skills to encourage active ageing.

Libraries and other institutions should provide lessons related to active ageing. The elderly were interested in editing photographs, various online tools, information sources for building family trees, recognising reliable information, or information safety, for example. The elderly (65 years of age and older) are an attainable target group, but libraries should reevaluate what they have to offer and put forward a more comprehensible set of lessons on digital skills. Libraries and other educational institutions should rethink their offerings of lessons to reflect the current interests of the elderly.

The respondents generally evaluated their information literacy as adequate. Nothing from all the mentioned skills would pose a problem, except for content creation and assessing the reliability of information found on the Internet. These positive results can be attributed to an increasing level of information literacy, a trend that will be reinforced in the future and not solely by training and education. The influence of the environment will also be waning in the future, and it is hard to predict the issues that the elderly who were born in a technological era will have to face. Future research will consider the increasing level of their skills and progress related to technology development.

Acknowledgement. The paper was funded by the Institutional support for long term conceptual development of a research organisation (The Moravian Library) by the Czech Ministry of Culture.

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How Do People Help Each Other with Digital Technologies: Techhelp Study in the Czech Republic

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Abstract. Global TechHelp Networks is an international study that focuses on finding out the ways people help each other with digital technologies in different countries and cultural settings. This paper presents the results of the Czech study and contributes qualitative data that can ultimately lead to improved support for developing digital literacy at an informal level. We asked the research participants to describe situations when they were either receiving or providing help with some digital technology and to reflect on the evolution of how they used technologies. Czech research participants generally feel that they have enough support with digital technologies. When they need help, they seek it from their friends or family, but they usually also have some other person with IT knowledge within reach. Some participants expressed a need to keep their interaction with technologies under control.

Keywords: Digital literacy · Digital technologies · Help-seeking · Helping relationship

1 Introduction

Digital technology is transforming how we communicate, work, learn and live, but around 40% of the European population, aged 16–74, still lack basic digital skills [1]. Statistical and quantitative data about digital technologies usage exist both at the national level and for various social groups, but qualitative data on different aspects of digital technology competencies and knowledge transfer is lacking. We know how many people carry out their different digital activities, but we know little about how people need help with these activities, their personal digital technologies history, and their views of future digital technologies use. The purpose of our paper is to find out which moments in people's lives influence the use of digital technologies, which parts of their social network play a role in technology adoption, what the motivators of change are and whether there are any substantial differences between generations. This study hopes to offer both directions for further research and a basis for informal educational activities.

We base our research on the Global Tech Help Networks data subset containing data collected in the Czech Republic. Global TechHelp Networks is an international

study coordinated by the University of Illinois with participants from the United States, China, Norway, and other countries, including the Czech Republic. It focuses on two primary outcomes: the first goal is to find out the ways people help each other with digital technologies in different countries and cultural settings, and the second goal is to prove the feasibility of such a large scale study that includes both faculty and students as researchers. In other words, to “turn the classroom, a site where students consume knowledge, into a site where they produce it” [2].

2 Community Informatics, Informatics Moment and Informatics Lifecourse

Our research builds on knowledge generated by community informatics researchers. Community informatics (CI) is a field of study that focuses on the social and cultural factors shaping the development and diffusion of new digital technologies, their effect upon community development, regeneration and sustainability, and the relationship between technological innovations and changing social relationships [3]. It is both fields of study and practice whose *central concern is to understand and ameliorate digital inequalities* [4]. That means bridging the digital divide, which we view in line with one of the first CI proponents, M. Gurstein, as being not the issue of access to digital technologies such as internet connection and smartphones, but its effective use, which provides the resources and tools for transforming one’s economic, social, political and cultural condition [5]. According to Williams [6], the rise of CI was inspired by four social trends: change in social structure, change in culture, change in libraries and change in social inequality, and the theoretical foundations of CI are intertwined with the theory of social network represented by authors such as Wellman and Granovetter [7–9] and social capital, using the approach of, for example, Coleman, Putnam and Lin [10–13]. CI research focuses on the mutual influence of the community structure and technology, the role of personal networks (strong and weak ties) or individual’s social capital in technology adoption [i.e., [14–16]], and the role of technology in creation, development and support of the community structure and in overcoming social inequalities, mainly in disadvantaged communities [17–21]. There is a solid link to the topics of the digital divide [22] and digital literacy, such as the work of Arden [23], who focuses on how information and communication technologies are connected with community learning and development of digital literacy, including the role of libraries, Williams [24] and Lenstra [4].

Two theoretical concepts are at the base of our current study, and these are the informatics moment and the informatics lifecourse, terms coined by Williams [24] and Lenstra [4]. Williams [24] shows the importance of social capital in bridging the digital divide in her research into informatics moments in Chicago’s branch public libraries. She defines the informatics moment as the moment when a person seeks help in using some digital technology that is new to him or her. She builds her description of informatics moment structure and process on observations and focus groups with CyberNavigators, who help others overcome problems with digital technologies within the library. She also points out four main types of literacies involved in the informatics moment, that is, basic literacy, computer literacy, library literacy and domain literacy.

Lenstra [4] further developed this concept by incorporating it into his informatics lifecourse concept and incorporating it into digital literacy. *Informatics lifecourse is populated by many informatics moments, episodes of seeking, getting and offering help with technology.* The frequency of informatics moments is an essential indicator of the individual's digital literacy. Lenstra suggests that those who can find and get whatever help they need and thus learn new technologies as they emerge are digitally literate. The concept of the informatics lifecourse also illustrates the temporal dimensions of digital literacy and digital inequalities. To be digitally literate during one stage of life does not guarantee digital literacy at a subsequent stage.

3 Methods

3.1 Data Collection Methods

The study's design is qualitative as it has the potential to bring richer data, not limiting the participants' course of thinking, and it allows for the exploration of underlying or non-obvious issues better than quantitative methods [25]. Also, the students as data collectors could and were encouraged to offer help to the research participants together with the interview.

We collected the data for the study from November 2019 to January 2020 through structured interviews using a research instrument created by the US and Chinese collaborators as founders of the TechHelp study. It was translated into Czech and complemented with clarifying remarks for the interviewers because some questions were not self-explanatory.

The instrument consists of the technology part, which contains questions on digital devices currently used by the interviewee, the "help" part, and the demographic part, which contains questions about age, residence and economic situation in general terms.

The questions about help with digital technologies, which are the main topic of our article, ask participants to describe situations when the research participant was either receiving or providing help with any digital technology, that is, the informatics moment [24]. It could be a problem with malfunctioning hardware or with some task such as printing or paying via online banking; it was up to the participants what they had considered an event appropriate for recording. The participant should describe what she/he was trying to do, who helped her/him with it, why she/he turned to that person for help and what that person did, and the same questions apply for the situation when the participant helped some other person. So this part of the interview focuses on the participant's problem with digital technologies and the participant's social network involved in its solving.

We also asked the participants to reflect on the evolution of how they used technologies, for instance, when they first started to use the technologies, what made them change their use and how they want to or plan to use them in future, that is, the informatics lifecourse [4]. This part of the interview also involved a question about the first use of some digital device.

To fulfil one of the study goals, which is to include students in the research process, a group of students, under the supervision of the principal investigators, collected the data using the snowball sampling method, as there were no specific requirements from

the TechHelp coordinators for the sample selection. We entered the responses into a spreadsheet file in Czech, controlled and cleared them, and translated them with the help of a native speaker.

3.2 Data Processing

All the documents were coded by at least two of the authors. We did the first round of coding using the open coding method in the original spreadsheet files then entered the data into the Atlas. TI software to unify the codes and create code categories and relationships between codes and categories. In addition, we prepared selective protocols for some of the categories. The selective protocol is a transcription procedure [26], but some authors also used it to simplify the presentation of the results and show the anchoring of the concepts in data [27].

4 Results

We collected responses from 20 research participants, 11 females and 9 males. The age distribution of the group was influenced by the fact that the data were collected by students who tended to approach their peers. Most of the research participants were born either in the 1980s ($n = 8$) or 1990s ($n = 7$); only one was born in the 1950s and 2 in the 1960s. They came from different settings, both from a large city (Prague) and smaller towns or villages.

In general, the participants felt they had enough support with their digital technologies related problems; none of them mentioned she/he had no one to ask for help. One of them even stated she never asked for help as she considered herself sufficiently skilled.

We grouped the results in four main categories that correspond with the main topics of the study: current use of digital technologies, informatics moments, informatics lifecourse and future use of digital technologies. We present the selected results with selective protocols tables.

4.1 Current Use of Digital Technologies

Participants' answers about the use of digital technologies are not surprising and show their ubiquity both in work (or school) and in leisure time. Home, work and school were the most frequently mentioned places where they use the technologies, with some unexpected ones such as church. Nearly all the participants use more than two devices, usually three or four, including mobile phones, notebooks, PCs and tablets; virtual assistants, on the other hand, are not commonly used.

4.2 Informatics Moments

The different informatics moments that participants mentioned in the interviews, both asking for help and providing help, can be described from three angles: what they seek/provide help with, whom they ask/provide help, and why. The situations that caused either request or provision of help included problems with different types of hardware and

software and different types of tasks (e.g., installation, printing, online banking). Table 1 illustrates the “asking” moment with selected codes, and we can find similar codes in the “providing” parts of the interviews. The persons connected with help-seeking or providing fall into categories of family members, friends, colleagues and technology distributors, with the first three categories prevailing, which means people usually turn to their closest people. Parents often ask their children, and children provide help to their parents, but it can be vice versa. One participant’s answer illustrates its reason most accurately: *I turn to my friend first because I have no difficulty showing my inability in front of her.*

Table 1. Examples of “asking” informatics moment codes.

What	Whom	Why
Burned display	Brother	Not feeling embarrassed
Drowned phone	Brother-in-law	
Hard drive failure	Business partner	
iOS	Colleague	
Keyboard installation	Family	
Online banking	Friend	
Software download	Children	
	IT staff partner	
	Seller	
	Service support	

4.3 Informatics Lifecourse

The participants’ reflections on the evolution of digital technologies use during their lives took three different forms. They described the evolution in terms of devices they were using, the attitude to the technology they adopted, and the purpose for which they used the technologies. While the answers differ in the categories of devices and attitudes, we found some distinct trajectories in the category of purpose. The most evident initial purposes are communication and entertainment for the younger participants and work or schoolwork for the older ones (Table 2). The younger participants often began with playing games, watching videos or pursuing other kinds of entertainment, then changed the main purpose to schoolwork and later to work. For example, one of the participants said that he *dropped off on the fun and games and gradually started using my computer more and more for work.*

The lifecourse description often included comments on motivation for change in the use of digital technologies. The motivators split into categories of social influence, mostly peer and society pressure, stage of life, for example, ageing or maternity, more duties, and change of purpose under which we understand the transition from school work to work or from work to home activities.

Table 2. Selective protocol for the purpose of digital technologies use

Initial purpose			
Entertainment	I dropped off on the fun and games and gradually started using my computer more and more for work		
	I don't play on the computer anymore. I use it for work, calendar, notes. It used to be a toy for me; I communicate a lot today		
	I don't play games so much anymore, but rather I work or watch videos, series, etc		
	In the beginning, I was playing games, sending SMS (nothing important). Later, at school and to work. After joining Facebook, also for communication. Now I work on projects and use them for work		
	Gradually, I stopped using my PC to play games and began to use it more to study and work		
	I started using it at school and at work instead of having fun		
Communication	When we were young, we mainly wrote text messages and occasionally wrote some papers for school on the PC		
	I started with those phones, and for a long time, I used them only for SMS and calls		
	As for the phones, so it changed fundamentally, the evolution from SMS to the office, which I have on the phone		
School	Introduction to them (PC) took place about 20 - 25 years ago. I think I started using them at school. Later, at work		
	Previously I used them to study at school. Now just for work or for private purposes - internet, shopping, videos, banking		
Work	I learned to work with a computer first (Word, communication, cataloguing programs), and now I use it also at home		
	As far as the computer is concerned, I was mostly working on the PC before maternity leave. Now I use my computer more as a consumer - for news, shopping, videos, etc		
Home	I started using my computer at work in 2001, at home in 1998 or 1999		

4.4 Future Use of Digital Technologies

We also asked the participants how they imagined their future ICT use. The majority of answers took the form of an attitudinal or even emotional statement towards the use of digital technologies. The participants often answered that they wanted to preserve the level of interaction with technologies and not augment it; there were worries about addiction and wishes for limits. Generally, there was an understanding of the necessity of digital technologies, demand for better and faster internet connection and various smart

devices, and caution and awareness of the problems connected with excessive technology use, such as loss of social contacts, the necessity of balancing use, and addiction. The participants demand that digital technologies make their lives easier, not more difficult.

5 Discussion

This part will comment on two principal findings: the importance of strong ties in people's informatics moments and its implication for informal learning of digital literacy; and cohorts defined according to their lifecourse trajectory.

From the description of various informatics moments, we can infer that they comprise both knowledge transfer and problem-solving. The importance of ties' strength for both of these components has been discussed widely by prior research, but the results differ. In the CI field, Williams [16] found out that strong ties in the community helped lead to more extensive technology use, while Liff and Steward [14, 15] report the opposite. Our findings show that in seeking help with digital technologies, the participants rely more on strong ties (family and friends); the weak ties (colleagues, acquaintances) are also present but in a limited number, and the same applies to providing help. The reliance on strong ties is usually explained by the existing trust or, as Levin [28] calls it, perceived trustworthiness of the person who is asked (i.e., that the quality of the trusted party makes the trustor willing to be vulnerable). In a setting where digital skills are considered necessary for being a fully-fledged part of society, revealing ignorance of something digitally-connected makes a person vulnerable, and subsequent defensive behaviour can hinder her/his learning [28]. As Levin also shows, trust is not one-dimensional; at least two components influence knowledge transfer, that is, benevolence-based trust and competence-based trust, and trust itself is a characteristic distinct from the strength of the tie [28].

Most of our participants described themselves as living comfortably, and they have both strong and weak ties that are benevolent and competent, but the situation in disadvantaged communities might be different. While members of these communities probably have strong ties with benevolence-based trust, these ties can lack competence-based trust in the case of digital technologies, but our data do not support this assumption.

For the success of informal learning activities, the results imply that it is important to build an environment of trust, base the learning activities on real-life problems of the participants and on intergenerational learning. There is a potential for involving the younger generation in support of the older ones. As for the environment of trust, libraries can be places for such informal learning activities as they are considered safe places and also places where people from different generations meet. The CyberNavigator service [24] mentioned earlier in this work is a great example of such activity.

In the last twenty years, several names for technology users' age cohorts have emerged, such as digital natives and digital immigrants [29, 30], digital generation [31, 32] (an overview can be found in an introduction to [33]). Our research also tried to determine the differences between generations, but our data is not sufficient for that purpose. Instead of that, we propose division according to the purpose of using the technology for the first time – entertainment, communication, school, or work, based on the informatics lifecourse description, not as definitive cohorts, because our research did not provide enough characteristics to support it, but as an interesting topic for further investigation.

Limits of the study. The main limits of the current study result from the data collection. Although the sample's representativeness was not a goal initially, the sample is strongly biased towards younger participants and those well-off. Therefore it probably creates a more positive picture of the situation. We collected the data before the Covid-19 pandemic that has caused a tremendous change in the use of digital technologies and has brought informal ways of knowledge transfer to the fore, given the situation in which anti-epidemic measures largely hindered formal means of knowledge transfer. More extensive quantitative research is needed to support or refute the results.

6 Conclusion

The TechHelp study in the Czech Republic contributes qualitative data that helps clarify how people help each other with digital technologies, which can support the establishment of improved support for developing digital literacy at an informal level. The method based on participants' description of their informatics moments allows for a better view of the broad scale of moments that influence people's use of digital technologies and problems with them they encounter during their lives. Although the results are inconclusive, they support the importance of strong ties in help-seeking and providing, and they lead to a proposal of digital technologies cohorts according to different lifecourse trajectories.

Acknowledgements. The publication was supported by the Charles University programme Progres Q15 "Life course, lifestyle and quality of life from the perspective of individual adaptation and the relationship of the actors and institutions". We also thank Jitka Doubkova, Ondrej Maly, Marta Pavlickova and Anna Valentova for participating in data collection.

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Ecological and Ethical Contexts of Digital Literacy in the Light of Phenomenographic Studies

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Abstract. The paper is aimed at exploration of new contexts of the concept of digital literacy from the perspective of phenomenographic studies. Concepts and basic models of digital literacy are briefly summarized. Results of phenomenographic studies of information literacy are related to digital literacy concepts. Following the sociocultural background, we frame the concepts of digital literacy into ecological and ethical factors of digital information. We apply a meta-analysis of three selected phenomenographic studies in Slovakia related to information literacy, information ethics and information behavior. Common ecological and ethical factors were found, namely emotions, responsibility, truth and value of information. A new interpretation of digital information literacy is derived, based on social representations of experiencing digital information. Ethical awareness of digital resources and ecological adaptations are emphasized. We recommend including values of information, verification of information, digital creativity and experiences into digital information literacy development and courses.

Keywords: Digital literacy · Information ethics · Information ecologies · Phenomenographic studies · Digital information literacy

1 Introduction

Digital literacy is a concept which has been established by many authors and organizations since the 1980's. In the last decades, the concept has been developed into several models which help understand its meaning, but also educate different communities, especially students, researchers and teachers. Originally, digital literacy was explained by Paul Gilster as the cognitive ability to understand information in different formats presented by computers. The concept of digital literacy was determined by many authors and projects (e.g. [1–4]). The purpose of this paper is to explore new contexts of the concept of digital literacy using the results of phenomenographic studies of information literacy which emphasized sociocultural practices and experience in information use (e.g., [5, 6]). We suppose that new dimensions of digital literacy are related to information ecology and information ethics. That is why we ask the question: Which new factors explained by phenomenographic studies and concepts of information ethics and information ecology can enrich the concept of digital literacy?

2 Related Research: Digital Literacy

The concept of digital literacy is usually referred to as understanding and skills with regard to use of digital information, resources and tools. It is connected with ICT skills, computer literacy, media literacy, and many similar concepts (e.g., e-literacy, network literacy). That is why some authors prefer the use of the notion of digital literacies. A comprehensive review was presented recently by Littlejohn et al. [7], pointing to changes in learning and academic work with pervasive digital forms of communication. Findings of this study confirmed that digital literacies are evolving and are embedded in information practices and situations (digital practices). It involves personal development, collaboration, and communication, as proved by other recent models and reviews of digital literacy [8, 9]. The authors call for support of learners which should be modular, embedded in contexts of information needs and uses, and integrated in communities (disciplines, workgroups, etc.). Some studies regard the concept of digital literacies as a more appropriate term which represents cognitive, constructive and communicative aspects of information processing, including critical thinking, creativity, confidentiality and culture [8]. At the European level, the framework of digital literacy was developed [10], including digital resources and tools usages, awareness and abilities. Although many frameworks of digital literacy have been developed in contexts of national and international information policies (UNESCO [11], IFLA [12–14]) or in the context of technological companies and pedagogical research, we will concentrate on the research paradigm in information science and we will use a more precise term of digital information literacy which indicates intersection between digital and information literacy.

The seven elements of digital literacies have been identified by JISC (2018) [15] as consisting of media literacy, information literacy, digital scholarship, ICT literacy, learning skills, communication and collaboration, and career and identity management. In our analyses of existing models and concepts we found that digital literacies can cover a broader range of competencies and components with regard to information use.

However, we have not identified explicit detailed descriptions of ethical and ecological, or non-cognitive components in the analyzed traditional models and theories of digital literacy. As Littlejohn et al. [16] put it, we should interpret the issues of digital literacy as digital knowledge practices, which are visibly included in information behavior as sociocultural practices. Knowledge transfer is embedded in knowledge practices, cultures of communities and disciplines in digital environment. We also have to take into the account that new methodologies and perspectives can lead to new contexts of the concept and new interpretations of digital knowledge practices.

That is why we try to re-interpret digital information literacy in relation to qualitative studies of information literacy and information ethics. We emphasize the sociocultural framework of information practices [17] as the starting point for new perspectives on digital literacies. We also take into the account the studies of information ecology/information ecologies [18–20], and new frameworks of information ethics [21, 22]. We suppose that new factors can be found in relation to qualitative phenomenographic studies of information literacy.

Although many concepts and frameworks have been developed with regard to the concept of digital literacy, we would like to emphasize the holistic approaches, which

consider the ecological and ethical factors of information use as part of digital information literacy reconceptualization [4, 23]. Recent comparative analyses of digital literacy frameworks [3, 13, 24] proved that more attention is paid to ethical issues, including online ethics, data protection, contexts, emotional intelligence, online communities, and culture and digital citizenship. Further ethical and ecological factors of digital information literacy can be explored in detail with the use of knowledge of information ecology and information ethics studies.

3 Related Research: Phenomenographic Studies of Information Literacy

Phenomenographic studies of information literacy have resulted in a number of new perspectives and reconceptualization of information literacy as an experience and variation of different experiences of people when using information [5, 25, 26]. This has been applied also to the concept of digital literacy as knowledge practice [27]. However, new digital information practices evolve, and more holistic approaches in the conceptualization of digital information literacy emerge, including affective, social, ethical and ecological factors. These approaches emphasize interactions with information environment, practices in different contexts (education, workplaces) and participation in social networks. Phenomenographic studies did not pay so much attention to the concept of digital information literacy as sociocultural information practice which could include not only information use, but also information production and creativity with the use of digital tools. This holistic perspective can be understood as the intersection of phenomenographic studies and digital information literacy practices with the emphasis on values of information. Values of information are regarded as utility, knowledge acquisition, critical thinking, cognitive development and social benefits. Our analysis of phenomenographic studies of information literacy and information ethics confirmed that values of sociocultural and sociotechnological frameworks can enrich our understanding and perception of digital literacy [4].

4 Methodology: Meta-analysis of Case Studies

In this paper, we apply a meta-analysis of three studies completed in the Department of LIS, Comenius University in Bratislava, Slovakia [28] in the context of other selected phenomenographic studies. The studies applied phenomenographic methodology which is regarded as the theory of variability and diversity aimed at understanding different experiences in information use or learning [29]. Phenomenography can reveal new relations of people to the information environment, based on different perceptions and experiences with regard to information objects [25]. Several previous phenomenographic studies presented new conceptual spaces related to information literacy (e.g., informed learning, information landscapes, radical information literacy). Many of them were set into the digital information environment [30–35]. The conceptualization of information literacy as personal, social and ethical information interactions was presented by Boon et al. [36].

4.1 A Phenomenographic Study of Information Literacy of Students

This phenomenographic study was part of a dissertation project [37, 38]. Fázik analyzed data gathered by written tasks, drawings (281 students) and semi-structured interviews (40 students). Students were in their first-year of studies, accepted in 4 faculties of the Comenius University in Bratislava, the average age was 18–21 years old. The resulting outcome space, based on phenomenographic analyses, included the concept of digital technologies, the concept of knowledge, and the concept of truth. Special contexts were identified, especially the context of education (knowledge growth), and use of information in practice. Digital literacy has been determined as ways of using digital sources and digital tools in information interactions. The concepts of information literacy and digital literacy overlap. The study reveals that values of truth, protection of privacy, and responsibility should be preserved and cultivated in the digital environment.

4.2 A Phenomenographic Study of Information Ethics

The phenomenographic study of information ethics [39] focused on depersonalization of a moral agent in the digital environment. The problem statement concentrates on different information behavior in online digital environment, especially in the context of identity and responsibility of people. The empirical data were gathered using the method of semi-structured interviews with 25 students active in selected online groups; the average age was 17.6 years. The phenomenographic analyses confirmed the subjective perceptions and different experiences of depersonalization. The resulting outcome space was composed of five concepts, including the concept of values of information, the concept of online information environment, the psychological concept (personal factors, disinhibition in online environment), the situational concept (different situations and contexts), and the social concept (problem in wider societal context). These concepts are interconnected and visualized in five angles of a matrix. Further analyses confirmed that the contexts were composed especially from emotions which manage the online information behavior. That is why depersonalization is further explained as both positive and negative manifestations of the online information behavior. The experience is different, however, the depersonalization emerges from emotional experience in relation to information and information technologies. Further factors were identified, especially anonymity in the online environment, but also value system and personal factors. These manifestations include false identities, misinformation, hatred, trolling, flaming, and rumors. The study confirmed that the value system managing the information behavior is changing in the online environment and that differences in online information behavior are the results of the mixture of personal, value-driven and technological factors with dominant emotional background. Final recommendations point to the need for protection and cultivation of the common digital information spaces based on traditional values of truth, human flourishing, and responsibility as part of digital ethics.

4.3 A Phenomenographic Study of Information Behavior of Researchers

The qualitative study of information behavior of researchers used semi-structured interviews with 19 researchers in Slovakia and applied phenomenographic analyses [40].

The results were set into the context of models of digital science and open science. Four groups of sciences were represented in the selected sample, including humanities, social sciences, sciences and medicine, and computer science. The average age was 54.4 years; participants included 13 males and 6 females. The resulting phenomenographic analyses were represented by concept maps of the collective discourse of researchers with regard to questions involved in the design of the study (23 maps). A majority of the questions resulted in the division of discourse into both critical (pointing to problems) and constructive (proposing solutions). The final results were visualized in the models of common features across the disciplines and differences among cultures of disciplines. The common features are represented by the methodological factors, factors of open science, and factors of domain expertise. Differences are based on categories of problem statements, methodologies, research data, collaboration, information strategies, used systems and databases, and publishing cultures. The final model visualized the academic information ecologies composed of digital information infrastructures, information resources and services, and values and cultures of disciplines. Relationships of researchers to the information environment point to values of information, creativity of researchers, deep personal motivation, long-term engagement and domain expertise.

5 Results of Meta-analysis: Ecological and Ethical Factors of Digital Literacy

Based on these studies, we have analyzed the ethical and ecological factors of digital literacy in relation to selected studies of digital and information literacy. The procedure of this conceptual analysis focused on identification of ecological factors in the three studies, including key resulting common concepts, maps and models (outcome spaces). Following this, the common ethical factors and values of information were identified by content analyses of results of the studies in relation to the analyzed phenomenographic studies of information literacy, studies of information ecology and information ethics. Finally, the identified concepts were systematized in the final table (Table 1) and main examples of digital information practices were included. We propose the re-definition of the concept of digital information literacy as information practices and experience framed in information interactions. Apart from universal meanings, digital information literacy is driven by values of information. This leads to variability of personal digital information literacy experiences and ecological characteristics embedded in socio-cultural, socio-cognitive and socio-technological contexts of information use. The ecological factors include socio-technological evolution, adaptations to contexts of information use and re-use of information resources. The ethical factors emerge from values of information embedded in information use contexts, namely acquisition of knowledge, ways of fair uses of information, interactions. Values of information relate also to results, benefits, utility and worth of problem-solving, decision making and interpretations.

Common ethical factors identified in the studies are emotions, truth (accuracy, information pathologies), responsibility, and values of information. Emotions direct the ethical information practices to intuitive assessments and fair use of information, citations, publishing behavior, and especially, communication and distribution of information (in social networks). Ethical factors of digital information literacy include truth and trust in

information, which can be supported by verification, cognitive and emotional authorities. With regard to online communities, these factors are supported by empathy. Results of our meta-analysis are summarized in Table 1.

Table 1. Main ecological and ethical factors of digital information literacy

Ecological level	Ethical values	Examples, contexts of information use
Environmental sustainability	Values of information	<i>Accesss, property</i>
Adaptations	Personality	<i>Digital identity, Privacy, Intentions,</i>
Socio-technological evolution	Cognition	<i>Motivation, Experience</i>
Re-use of information	Emotions, intuitions	<i>Engagement, utility</i>
	Interactions	<i>Being informed</i>
	Results, fair use	<i>Verification, Human welfare</i>
	Truth	
	Responsibility, trust	

Ethical awareness is based on ethical intuitions, which represent mainly emotions in access, fair use and understanding of social consequences of personal information practices. At the level of ethical utilitarianism, ethical factors of privacy and identity appear, mainly digital traces of human information interactions and personal data protection. The ethical issue of accuracy of information can be part of ethical awareness with regard to disinformation, misinformation and other information pathologies.

As ubiquitous digital information environment impacts the ways of information practices, human identity is being reshaped. Holistic ecological models of human information interactions could involve digital information literacy. New models of digital information literacy should be developed in integrated fashion, including the cognitive, affective, social, goal-driven, communicative and everyday information practices.

Digital information literacy can be modeled as personalized pathways to information resources, including access, cognition and interpretations in contexts of knowledge growth, intellectual discoveries, and social impact. It is embedded in the personal experience and covers the semantic dimension (construction and representation of meaning, understanding, relevance, creativity), the behavioral dimension (information interactions, information styles, communities, communication and collaboration), and the managerial dimension (management of information, knowledge organization and presentation). Multiple ecological and ethical factors and dimensions are reflected in similar studies of information literacy, which emphasize transliteracy [8, 41], multiliteracies, participatory approaches [42], professional ethics [43], context-specific, dialogic approaches of radical information literacy [44], and moral literacy [45].

Digital information literacy can be explained as the social representation of experiencing digital resources in digital information environment. From the viewpoint of digital information environment, we emphasize ecological adaptations of people to digital tools and digital information as part of digital information literacy.

Based on phenomenographic studies, we can model digital information literacy as personal information ecologies which are represented in three strata. The first stratum

includes access to information infrastructures; the second stratum represents information skills and experiences with the information process in various contexts of learning, research, or workplaces, including communication and collaborative skills. The highest (third) stratum is composed of values of information in contexts of creative exploration of information spaces and places. The model is visualized in Fig. 1.

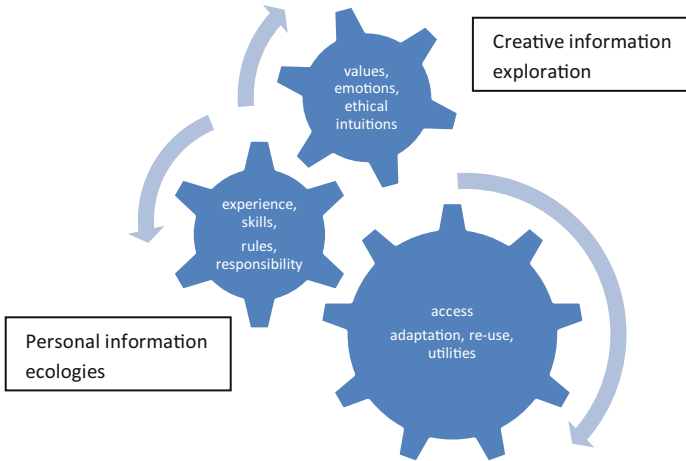


Fig. 1. A conceptual model of digital information literacy with regard to information ethics

6 Conclusions

In line with our analyses, we can recommend the value-sensitive analysis for further exploration and development of digital information literacy, both at theoretical and methodological levels. The concept of digital literacy has been enriched by the concept of digital information literacy with the inclusion of ecological and ethical factors. The ecological factors include interactions, adaptations, re-use, and radical personalization of information literacy as a holistic concept. It is embodied in complex personal, cognitive, affective and social factors with the emphasis on motivation. The driving force is the socio-technological evolution and interactions of people in digital information environment. The ethical factors include mainly ethical intuitions based on emotions (both positive, especially pleasure, and negative, especially hatred), but also attitudes to truth of information (verification, critical thinking), patterns of access and use, and development of responsibility. The ethical factors are connected with virtue ethics (universal moral values), but also utilitarian and consequential ethical concepts in different cultural contexts (use of tools, following goals and rules, e.g., copyright, plagiarism). Both ecological and ethical factors of digital information literacy are based on values of information, personal experience, but also on patterns of communication and collaboration, information behavior, social representations and constructions of meaning and truth. That is why we propose the ecological and ethical re-design of the models

of digital information literacy, including successive adaptations to digital information environment, ethical use of intelligent technologies, conceptual exploration in digital places and spaces, and creativity in human information interactions. New models of digital information literacy should include three levels, from access (including adaptations, utilities and re-use), through holistic experience and skills (including rules and responsibility), to values and emotions, including ethical intuitions. An example of the conceptual model was visualized in Fig. 1. We recommend including value analyses, verification of information and digital creativity in courses of digital information literacy, based on the three identified levels of new models of digital information literacy.

Acknowledgement. The paper was developed as part of the research project VEGA 1/0360/21 Social representations of ethical challenges of digital information revolution.

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Fear of Missing Out, Information Literacy, and Digital Wellbeing

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Abstract. Frequency and intensity of usage of Internet resources as such do not improve information literacy. Moreover, Internet users often suffer from the consequences of problematic Internet use and fear of missing out (FOMO). The study explores if there is a dependency between the level of information literacy and the scale of FOMO intensity among the respondents. It is based on the results of the quantitative survey realized on a representative sample of Polish Internet users, concerning the FOMO scale in a population. The analysis includes only the answers related to FOMO, information literacy, and digital wellbeing. It reveals that information literacy as such does not protect against problematic Internet use, on the contrary – sometimes it is a factor contributing to it. There is a need to include a digital wellbeing perspective in information literacy education – to put more attention on attitudes towards the Internet as an environment of everyday life.

Keywords: Digital literacy · Digital wellbeing · Fear of missing out · Information literacy · Problematic Internet use

1 Introduction

As more and more human activities have been realized online, we all experience the need for taking care of our information literacy and digital wellbeing. The frequency and intensity of usage of Internet resources as such do not improve information literacy [1, 2]. We often observe that Internet users not only cannot use digital information resources properly but also suffer from the consequences of problematic Internet use. Fear of missing out (FOMO) is one of the manifestations of the latter, characterized by the fear of being isolated from communication with others. Therefore the question arises whether information and digital literacy cover the standards and competences required for our digital wellbeing.

The article discusses partial results of two waves of the survey of a representative sample of Polish Internet users aged 15+, concerning their FOMO status, information literacy, and behavior regarding digital wellbeing. Literature background is presented first, followed by a short introduction to the survey, presentation and discussion of its results, and finally the conclusions concerning the place of education to digital wellbeing as a part of the information and digital literacy.

2 Theoretical Background

Marco Gui, Marco Fasoli, and Robert Carradore define digital wellbeing as “a state where subjective wellbeing is maintained in an environment characterized by digital communication overabundance” [3, p. 166], while digital wellbeing skills in a more practical way, as “a set of skills needed to manage the side effects of digital communication overabundance” [3, p. 163], indispensable in coping with information overload or information overconsumption.

Digital wellbeing or digital wellness [4] can also be defined as a healthy balance between being online and offline, limitation of usage of digital devices and resources in a way agreed with general human wellbeing in its five aspects: mental, physical, sociological, environmental, and material [5]. Taking care of digital wellbeing requires knowledge of potentials and threats of the virtual environment, as well as competences in its optimal usage.

Digital wellbeing is also the Google initiative of 2018 [6] and a set of tools being developed for “monitoring, understanding, and limiting technology use in their operating systems, to promote a more conscious use of the smartphone” [7, p. 386]. Google determines the following elements of digital wellbeing: time spent online, being plugged/unplugged, minimizing distractions, and finding balance with one’s family. However, as Roffarello & De Russis [7] found out, although digital wellbeing apps support self-monitoring, they do not develop permanent healthy attitudes and habits regarding online-offline balance. People are alerted to their risky or addictive behavior, but they do not take responsibility for it. On the contrary, they expect the apps to have more and more responsibilities to make their life more comfortable and not to reflect on their smartphone usage. Gui, Fasoli, and Carradore [3, p. 162] support this problem with the list of the following characteristics of the digital environment: an overabundance of choices, switching among focuses, attention economy, a convergence of activities in the same device, and persistence of the former throughout a day.

Digital wellbeing has been a topic discussed regarding digital literacy [3, 8], the latter referring not only to technological, but also information efficiency (“students can not only use digital tools but also critically consume and create a variety of content” [8, p. 1]). Feerrar [8], referring to the Jisc Digital Capabilities Framework [9], offers a list of 7 competency areas of digital literacy, among which there is also Identity & Wellbeing. The other 6 consist of Discovery, Evaluation, Ethics, Creation & Scholarship, Communication & Collaboration, and Curation [8, p. 11]. Therefore, digital wellbeing is either competency or an outcome of digital literacy and can be analyzed in technical, critical thinking, and social aspects.

Since its publication in 2013, the fear of missing out (FOMO) scale developed by Andrew Przybylski et al. [10] has been the most popular tool used worldwide to define the FOMO level in different projects. The authors defined FOMO as “a pervasive apprehension that others might be having rewarding experiences from which one is absent (...) the desire to stay continually connected with what others are doing” [3, p. 1841]. It has often been applied to the studies on the FOMO phenomenon resulting from separation from the Internet, and social media in particular [11–13]. As [14] states, social media usage compensates for our gaps and deficiencies regarding values, emotions, and interpersonal relations.

Fear of missing out can be related to information literacy defined as “the ability to think critically and make balanced judgments about any information we find and use. It empowers us as citizens to reach and express informed views and to engage fully with society” [15]. FOMO can be both a manifestation of lacking information judging skills and a limitation of full engagement in societal and civic life. Regarding the above digital wellbeing is mentioned as a status requiring our attention and care [3, 16], to decrease the scale of FOMO.

3 Objectives and Methodology

The study’s aim is to explore the relation between FOMO, information literacy, and digital wellbeing. Therefore two research questions were posed: RQ1: How is information literacy associated with FOMO? RQ2: How is FOMO associated with digital wellbeing? The following subquestions can also be discussed. Are the high-FOMO people information literate? Is there any relation between being information literate and problematic Internet use? If so, what kind of such a relation can be observed? The results contribute to the discussion concerning ways information literacy and digital literacy education could concern digital wellbeing.

The study is based on an analysis of the results of two waves (2018 and 2019) of the quantitative CAWI survey realized on a nationwide probability random-quota sample of Internet users aged 15+ ($N = 1060$ in 2018, $N = 1066$ in 2019) selected from one of the research panels in Poland (Ariadna). The quotas on sex, age, and the size of the place of residence were based on how the population of Poland is represented among Internet users [17–19].

Questionnaires for both editions included the A. K. Przybylski et al. [10] original set of 10 questions concerning FOMO, and other sets were included in separate waves, that is, concerning different aspects of online activities, like information literacy, online self-presentation (in 2018 wave), digital wellbeing, phubbing, and nomophobia (in 2019 wave). Other themes that are not included in this study were already published elsewhere [19]. The analysis presented below includes only the answers related to FOMO, information literacy, and digital wellbeing. The scope of particular questions and answers to them are presented in detail in the Results section.

The answers to the questions related to information literacy are presented below. The competences were verified indirectly, as questions concerned respondents decisions and behaviors as resulting from their skills, not the skills as such. The most fundamental online behavior was selected here, related to personal safety, frequency of selected activities, protection of one’s image, and usage of communication tools.

All statistical tests were performed using SPSS Statistics version 23.0.

4 Results and Discussion

There were about 26.9 million Polish Internet users in 2018. In the first wave of the survey (2018) approximately 16% (approximately 4.3 million people) of the Polish Internet users 15+ appeared to be high-FOMO people (hereinafter also: fomers). Most of the respondents (65%, approximately 17.5 million) reached a mid-FOMO indicator, and

19% (approximately 5.1 million) of them were low-FOMO people (this group consisted mostly of the oldest generations). The high-FOMO indicator decreased by 2% in the 2019 wave (N = 1066; high-FOMO - 14% of respondents, mid-FOMO - 67%, low-FOMO - 19%). However, this amount is within a statistical error. The age is a discriminating variable (younger respondents - aged 15–34 - reached higher FOMO indicator). Some differences are also observed regarding the place of living (19% of high-FOMO people lived in large cities), but not that significant.

4.1 Information Literacy vs FOMO

High-FOMO people were far more active on their profiles than other respondents. The difference between them and other groups increased as the material to be published required more processing and engagement, namely - higher information literacy skills. That referred either to already recorded films or to live transmission. The results for high-FOMO people were 10–20 times higher than those for low-FOMO respondents. Differences for materials easier for processing and publication were much lower (Table 1).

Table 1. What forms of content do you publish on your social media profile(s)? (N = 1060, wave 2018, accumulated “often” and “always” responses)

Respondents groups	Previously recorded films %	Live transmissions %	Photos/graphics %	Text %
Top FOMO	26.3	21.4	53.7	50.8
Mid FOMO	8.6	4.7	31.7	30.2
Low FOMO	2.6	1.0	19.1	16.7

The respondents were asked about the goals of social media usage, and its frequency. Searching for current news and knowledge in the first place, but also relaxation and rest. The size of differences in searching intensity among the FOMO groups differed, however; low-FOMO people reached a higher indicator than high-FOMO people in one case only, which was searching for others’ opinions concerning interesting topics. How does this relate to information competences? First, one should have understood the specifics of social media as an information source. Which kind of information was worth looking for in them, and which was not. This was not an easy task, considering the fact that more and more people and entities from different areas were active on social media. Despite that, more than 70% of high-FOMO and almost 50% of low-FOMO people declared searching for knowledge in social media. Both groups searched there also the others’ opinions just as frequently (Table 2).

Table 3 presents selected attitudes and activities realized on social media to protect one’s identity, image, and to manage relations with others. Knowledge and skills related to publishing information about ourselves belonged to information literacy. Differences among respondents groups were not that large as for the questions discussed above.

Table 2. How often do you use social media for the following goals? (N = 1060, wave 2018, accumulated “often” and “always” responses)

	Top FOMO %	Mid FOMO %	Low FOMO %
For news	72.7	56.9	49.9
To escape from everyday life	64.5	40.9	27.3
For inspiration	64.1	45.6	33.3
For relax and rest	69.8	57.5	50.2
For entertainment	69.2	51.7	41.9
For knowledge	71.6	52.1	46.8
To search for options	45.4	35.0	46.4
To express my opinion	48.9	27.7	19.7

Table 3. How often do you run these activities on social media? (N = 1060, wave 2018, accumulated “often” and “always” responses)

	Top FOMO %	Mid FOMO %	Low FOMO %
I care for who I accept as a friend	62.8	56.5	60.8
I care for what I “like”	67.2	46.1	47.5
I care for how I write reviews	56.0	39.3	36.5
I care for how I write comments	56.8	40.8	37.1
I select content to be published on social media	58.3	45.8	48.8
I run profile(s) on social media systematically	43.1	15.8	10.0
I observe the rules of content	52.6	41.3	45.0

Nevertheless, the high-FOMO people realized them more often than those with low-FOMO in each aspect. The largest difference was observed in the intensity and regularity of managing one’s profile. Most of the respondents cared about who they accepted as friends, and what they marked as “liked”. They declared careful selection of the content to be published, thoughtful writing comments and opinions, observing the rules of content management in social media.

4.2 Digital Wellbeing vs FOMO

Questions concerning skills related to digital wellbeing were included in the second edition of the survey. Respondents from all groups often strived to realize healthy habits in technology usage (Table 4), although one-third of the fomers and mid-FOMO people did not know how to answer this question. These results presented the fomers as more

explicit in their answers and they more easily admitted they did not care about healthy usage of ICT.

Table 4. Do you try to keep healthy habits during ICT & Internet usage? (N = 1066, wave 2019)

Respondents groups	Top FOMO %	Mid FOMO %	Low FOMO %
Yes	58.6	57.7	68.0
No	26.4	13.0	4.6
I don't know	15.0	29.3	27.4

Table 5. What do you do to keep healthy habits during ICT & Internet usage? (N = 1066, wave 2019, accumulated “often” and “always” responses)

	Top FOMO %	Mid FOMO %	Low FOMO %
I use apps measuring time spent online	20.4	5.5	2.2
I learn the topic of digital wellbeing	13.5	8.9	3.2
I impose the rules of ICT usage on myself	28.9	33.0	31.1
I control time I spend online	25.9	41.5	56.0
I care for interpersonal relations offline	38.1	50.9	43.4
I care for my development offline	59.4	55.5	48.6

These healthy habits consisted mostly of controlling the time spent online, caring for one's development, and interpersonal relations offline (Table 5). The respondents less often used apps measuring time spent online, nor did they learn about digital wellbeing (there was a big difference between high- and low-FOMO users here).

There were two opposing attitudes among respondents towards pointing out somebody due to his/her unhealthy habits online (Table 6), and the opposition line was not between high- and low-FOMO people. The former group a bit more often (by 10.9%) did not point out anyone, and was more definite in their choices (those who answered “I don't know” were half as many as low- or mid-FOMO).

Table 6. Have you ever pointed out anybody due to his/her unhealthy habits in ICT usage? (N = 1066, wave 2019)

Respondents groups	Top FOMO %	Mid FOMO %	Low FOMO %
Yes	41.2	39.0	40.8
No	42.5	45.3	51.7
I don't know	16.3	15.7	7.5

Talking to people about their risky or unhealthy online behavior, the respondents focused mostly on controlling time spent online and spending more time together with other people offline instead. However, the fomers slightly less often offered different forms of digital wellbeing-related activities than two other groups. That is in line with the answers to the question above. One can interpret that as the fomers, although aware of their unhealthy online behavior, are less bothered about the others in this aspect (Table 7).

Table 7. What did you offer to a person, whom you pointed out due to his/her unhealthy habits concerning ICT usage? (N = 1066, wave 2019, accumulated “often” and “always” responses)

	Top FOMO %	Mid FOMO %	Low FOMO %
Support in regard of digital wellbeing	13.5	5.4	2.3
Usage of apps measuring time spent online	9.2	9.5	6.4
Common usage of ICT and Internet	10.0	10.7	4.2
Imposing the rules of ICT and Internet usage	16.9	24.3	27.3
Care about one’s offline development	29.8	42.9	36.3
More meetings/spending time together	42.3	47.4	36.3
Control of time spent online	63.0	57.1	57.9

5 Conclusions

According to the respondents’ declarations, the high-FOMO people are information-, ICT-, and media-literate people. They possess knowledge, skills, and experience in publishing texts and photos/graphics, less in films and live transmissions. They also care for their online behavior (on social media in particular), while commenting, liking, reviewing, or publishing more than those from mid and low-FOMO groups. They also declare their efforts in undertaking activities for their digital wellbeing, in particular controlling the time spent online. However, control of time does not necessarily mean its limitation, and the results of declarative survey should be analysed cautiously.

That means that knowledge and skills in information processing and dissemination may not be enough to protect against FOMO and problematic Internet use. Digital wellbeing, that is, healthy online behaviour, calls for specific attitudes, users’ decisions and consequently following a healthy online lifestyle. Attitudes are the third aspect of competences, next to knowledge and skills, as defined for education and learning purposes. Therefore the question arises as to whether or not to include a digital wellbeing perspective in information literacy education – to put more attention to the third – next to knowledge and skills – component of competences, that is, attitudes towards the Internet as an environment of everyday life.

Attention to digital wellbeing requires awareness, knowledge, decisions, and activities regarding digital hygiene, taking care of online/offline balance. Critical thinking is

a basic skill here, concerning both decisions on entering the online world or not, making (or not) virtual relations with the unknown, protecting privacy and data. It seems that attention to digital wellbeing requires also developing attitudes and awareness. While information literacy focused at the beginning on practical skills, now it rather aims at the development of attitudes and knowledge supporting information-related decisions. Information literacy is to support people as citizens of the world, the nation, or the local community. The awareness of all the specifics of the virtual sphere is indispensable here; therefore digital wellbeing should be a part of information, digital, and media education. That is also suggested by Gui, Fasoli, and Carradore as a ‘digital wellbeing culture in terms of the development of awareness and care about people’s quality of life when engaged online’ [3, p. 169].

Different applications can also be used for that goal, as stated by Roffarello and De Russis [7]. They should focus on positive reinforcement techniques rather than controlling behavior (e.g. time spent online), to develop new habits rather than break old ones, to promote self-regulation and social learning.

Finally, the modern definition of information literacy, often intertwined with digital literacy, refers to attitudes and competences to act in an information space (virtual included), indispensable to be a lawful citizen of modern society. It includes also social norms and cultural competences, including “attentional, strategic, or metacognitive” digital wellbeing skills [3, p. 163]. Therefore information and digital literacy education should focus more on attitudes related to digital wellbeing, including care for health and safety of oneself and others. As revealed by the results of the FOMO surveys, information literacy and knowledge of threats do not guarantee protection against problematic Internet use, nor its negative consequences, like FOMO. All the more reason that attitudes development as potential protection against risky behavior needs to be recognized for those living networked lives in the post-truth era.

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Other Literacies



Copyright Literacy of Cultural Heritage Workers in the Czech Republic with a Focus on Librarians

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Abstract. Memory institutions try to balance authors' rights and "public good" in making information accessible. Cultural heritage workers must have sufficient copyright literacy to deal with challenges growing from these conflicting interests. Todorova initiated international research describing copyright competencies and attitudes of cultural heritage workers. This study transfers it to the Czech Republic. We got 313 responses from all types of memory institutions. Respondents evaluated their copyright literacy rather positively (especially in a national context), but almost half of them had some knowledge shortcomings in copyright exceptions for cultural heritage institutions. They preferred web pages as information resources about copyright. 74.3% of respondents thought that institutional copyright policy was necessary, but only 22.4% of the institutions had a special worker assigned to deal with the copyright agenda. Most respondents felt that copyright literacy education was necessary both at the university level and further professional education.

Keywords: Cultural heritage institutions · Information literacy · Copyright literacy · Research · Czech Republic

1 Introduction

Libraries, museums and archives, called memory or cultural heritage (CH) institutions, try to protect as well as make accessible different types of collectables. Copyright (CR) law protects many of them, especially the majority of library collections. All CH workers need CR literacy which "include[s] identifying copyright-protected materials, navigating fair use and fair dealing, obtaining permissions and licenses where necessary, and recognizing infringement of copyright law" [1]. This concept is strongly connected with information literacy [2–4]. CR literacy is anchored already in information literacy standards (e.g., the frame "Information Has Value" in the Framework for Information Literacy for Higher Education [5]).

This created a few challenges for CH workers. First, they should use copyrighted works following the law (not only for the collections but also for pictures used in event marketing, for example). Second, they should lead users to do the same. And third, they should help users with different CR issues (which means more problems to solve). The

question is how prepared are Czech CH workers for these tasks. The goal of this study was to map just this. To reach this goal, we followed the international research group coordinated by Todorova [6]. We focused on the CR literacy of Czech CH workers and the differences among institutions.

The importance of CR literacy in memory institution is rising with new challenges, mainly due to information technologies. International recommendation for these institutions, such as the IFLA Statement on Copyright Education and Copyright Literacy [7], reflects that. Practice forms habits of both CH workers and users, but they should know why that practice conforms with CR law or is against it. For example, in a period of restrictions during the COVID-19 pandemic, Czech libraries offered many new services to their users. They made many protected works accessible online for university students and staff thanks to an agreement with the collective rights management organization. To ensure the literature experience with closed libraries, librarians started using YouTube to read for the public (and a few weeks later, after the warning of experts, they began to gain the agreement of authors). Many enterprises provided their products for free to schools. The question is, what will happen after this period, what will users want, who will explain what is allowed and what is not in ordinary times. Using habits without CR knowledge can be a problem for CH users and workers.

2 Literature Review

In the Czech Republic, the Ministry of Culture and the the Ministry of the Interior registered 145 archives (including private), 479 museums (including galleries as museums of fine arts), and 5307 libraries open for the public in 2019 [8]. There were thousands of workers in them (total numbers are not available). The number of libraries was very high, but 84.85% were so-called nonprofessional libraries (with a librarian's workload within 15 h a week; mostly one worker with only a short library course). The National Library conducted a survey of Czech librarians in 2016 completed by 4330 librarians (plus other library workers) from about 748 professional libraries [9]. Only 53% of the librarians had education in library science (33% secondary and 20% university level); their ratio to graduates from other disciplines significantly decreased compared to 2011, 2004 and 1998. Although CR was part of all LIS curricula in the Czech Republic [10], CR literacy of librarians (and other cultural heritage workers) was only minimally formed by that.

Librarians faced the need to address CR tasks, both in their work and when helping users. A Canadian study of CR officers found that the majority of them had a library or information science degree and no formal legal training, and 37% had no formal CR education or training at all. At more than three-quarters of the surveyed institution CR officers fell within the library [4]. 40.2% of U.S. academic librarians knew that their university had a designed CR expert, and 64.3% of them were located in a library [11]. The academic community usually solves more diverse and sophisticated questions than the general public. CR literacy and CR librarians increasingly appeared in advertising of academic libraries and institutions in general [12]. 93.3% of U.S. academic librarians involved in the research reported this need, but only 49.0% felt prepared to provide CR information [11]. A U.K. study identified four groups of academic library staff according to their attitudes toward CR issues [3].

Research of CR literacy often focused on librarians or users (and a few compared these two groups), but each group showed shortcomings in CR literacy and practice [2, 13, 14]. Studies found problems in both traditional topics (e.g., exceptions or libraries) and those connected with technology development (e.g., copyleft). Librarians should be able to help their users (especially at universities) with CR issues [15–17].

The research series “Copyright Policies of Libraries and Other Cultural Institutions” initiated by Todorova described librarians’ readiness to deal with the CR issues more extensively. Thirteen countries and their comparison in librarians’ CR literacy were researched in a multinational survey [6], followed by other countries [18–20]. Besides this series, we found some other studies of CR literacy of librarians. Gujarat librarians had high self-assessment (71%) and objective assessment (75%) in CR. Among them were 71.2% of men, and more than 80% studied legal issues during their professional education [21]. Compared to that, only 57.1% of U.S. academic librarians reported some CR training. Despite that, only 39.8% expressed interest in more education [11].

3 Methodology

This paper describes the CR literacy of CH workers in the Czech Republic, as part of an international study. We explored: “To what extent are professionals familiar with copyright-related issues; to what extent are they aware of copyright policies and practices within the country and institutions for which they work; what are their opinions with regard to the inclusion of copyright-related issues in academic education and training; and to what extent are there differences in self-reported literacy levels of professionals across countries” [6]. We achieved the last goal by comparing our results to those published in the same research series. We used the original questions with a few changes. We added one question about working position, adapted the categories of institutions to Czech conditions, and used four-point Likert scales in self-evaluation questions. The questionnaire was translated into Czech by the author of this paper.

Five managers of national professional organizations distributed the link for the online questionnaire in Google Forms to their mailing lists. We addressed directors and employees of libraries, archives, museums, and galleries from public and private spheres involved in professional communities to gain as many responses as possible. We did not use any sampling. The questionnaire was opened between 16th November and 18th December 2019. No question was compulsory; therefore, we got a different number of answers for each question. We got 313 completed responses. The results were processed using IBM SPSS software.

4 Research Results

The typical respondent was a female 40–49 years old working in a professional public library for 10–14 years ensuring internal professional processes (e.g., cataloguing), who had a master degree in library science (more about demographics in Table 1). Respondents were often directors and other executives. Our research involved all types of memory institutions, but libraries prevailed (64.3%). We combined institutions with a small

Table 1. Demographic information about respondents

		n	%				
Gender	Female	235	75.3	Institution	Professional library	106	34.4
	Male	77	24.7		Museum	74	24.0
Age	<30	21	6.7		University library	48	15.6
	30–39	71	22.8		Archive	36	11.7
	40–49	109	34.9		Scientific library	27	8.6
	50–60	79	25.3		Other libraries	17	5.5
	>60	32	10.3	Working experience (years)	<5	68	21.9
Degree	Secondary	56	18.1		5–9	47	15.2
	Bachelor	30	9.7		10–14	44	14.2
	Master	178	57.4		15–19	47	15.2
	PhD	46	14.8		20+	104	33.5
Studied speciality	Library s	164	52.6	Working position	Professional processes	159	53.4
	History	71	22.8		Direct work with user	70	23.5
	Archive s	44	14.1		Institutional processes	69	23.2
	Museology	26	8.3				
	Cultural heritage s	26	8.3				
	Other	55	17.6				

representation into the category “other libraries” (National library, eight, nonprofessional libraries, six, and school libraries, three responses).

Respondents self-evaluated their awareness of intellectual property as rather good. 55.1% chose “somewhat aware”, only 1.3% feel highly aware, and 20.8% moderately aware; on the other hand, 3.8% self-evaluated as not at all aware, and 18.9% as slightly aware. We did not find statistical differences ($p > 0.2$) according to gender, age, working experience and position. On the contrary, we found statistical differences in degree ($D = -0.120, p = 0.012$) and institution ($H = 15.803, p = 0.007$), the highest rate was for scientific libraries, the lowest university libraries, followed by archives and museums.

A more detailed view of self-evaluation was revealed by a set of questions focusing on selected CR topics (see Fig. 1, both institutions and issues were ranked from the best evaluated). Respondents usually placed themselves in the middle of the scales with only several more significant deviations. The Kruskal-Wallis test showed statistical differences among institutions in all issues ($p < 0,05$) except six: CR law – both national

and international, CR institutions – international, Copyleft, CR and orphan works, and Clarification of CR status of materials. These were the most general topics and exceptions and limitations in CR that allow using materials.

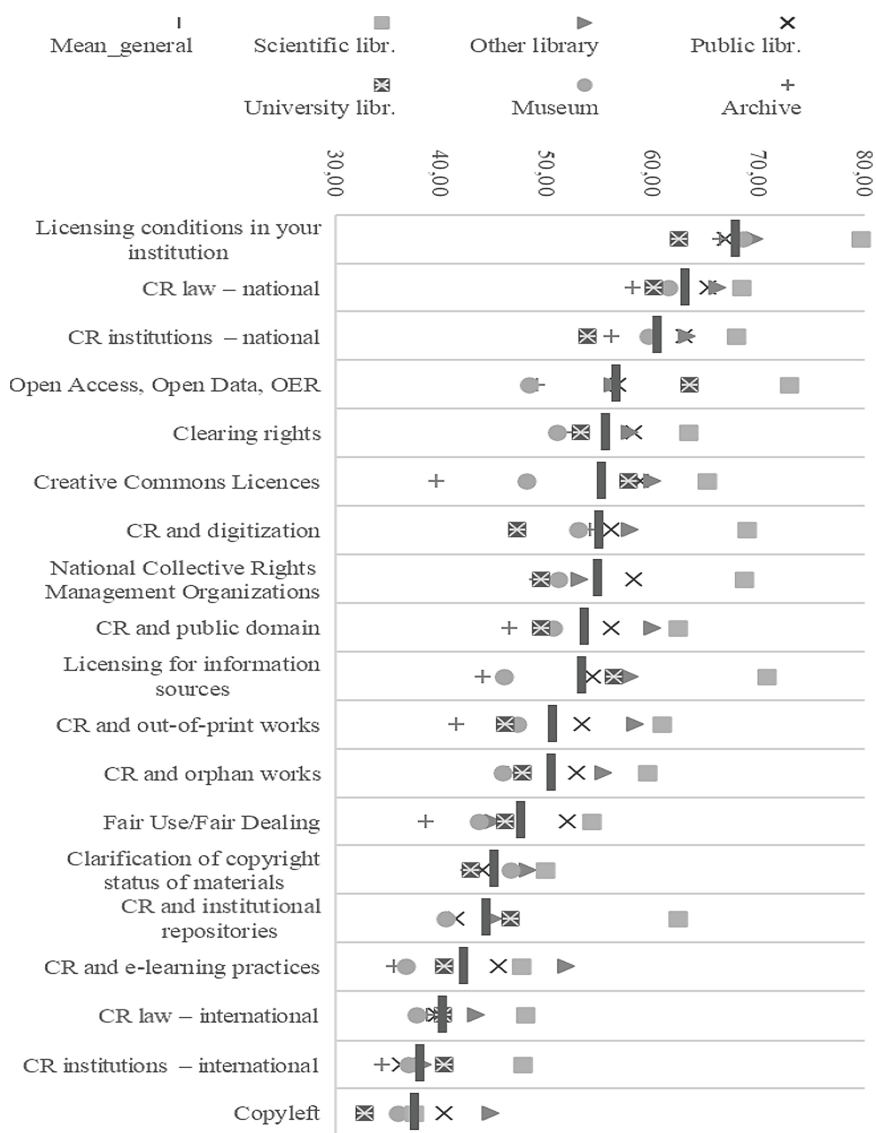


Fig. 1. Self-evaluation in CR issues according to institution types (the percentage axis has been shortened on both sides for better readability of institutional differences)

Scientific librarians ranked the best in almost all topics (the most compared to the mean in institutional repositories, licencing for information sources, and Open Access).

On the contrary, university librarians self-evaluated the worst among all librarians (the worst in copyleft, international law, e-learning, and international institutions). Compared to the mean, they had the worst position in digitalization, National CR institutions, National Collective Rights Management Organizations, and Licencing conditions in institution. Museums and archives received a similar average rank, lower than all types of libraries (from the worst to the mean: Creative Commons Licences; Licencing for information sources; Open Access; Fair Use; out-of-print works; and e-learning).

We did not limit the evaluation to opinion. Respondents were provided a list of five topics and asked to choose those covered by the Czech Copyright Act (the correct answer was all). Most correct answers included the duration of CR protection (however, 20% chose “no”), followed by exceptions for CH institutions (74% correct), exceptions for private use, educational, scientific and research purposes (71% correct), orphan works (55% correct) and exceptions for needs of visually impaired patrons (52% correct). We found differences in two types of exceptions ($p < 0.03$). The best result was for university libraries (85.4%); the worst was for archives (55.6%) in exceptions for defined purposes. Other libraries were the best (76.5%) and museums the worst (43.2%) in exceptions for disabled patrons. T-tests found agreement of self-evaluated awareness in intellectual property and objective evaluation ($p < 0,05$).

We asked about respondents’ attitudes to advocacy in CR. Here, institutions did not differ statistically. Respondents were only slightly interested in initiatives of professional organizations (87.5% “not so much” or less interested). More than half of respondents were unaware of initiatives for cultural institutions (77.8%) and national strategy for CR (51.9%). They strongly agreed that CH services require compliance with CR legislation (80.1%) and the importance of the WIPO Treaty to help disabled users to reach information (71.0%). But they were more neutral in exceptions in CR (51.6% agreed with the necessity of worldwide harmonization of exceptions for CH institutions, and 53.2% agreed that WIPO should define better exceptions in the digital environment). But for none of the statements, more than 7% disagreed.

Respondents expressed a positive attitude to the necessity for CR policy in memory institutions (74.3%). 80.9% of respondents declared that their institution had resources protected by CR and related rights. However, only 41.4% said that there was CR policy in their institution. 20.2% of respondents never thought about the necessity of CR policy in their institution, and 22.1% were not aware of that policy. Only 22.7% of respondents could say that there was a person in charge of dealing with CR issues, and 64.4% were sure that their institution did not have such a person. This position was most common in university libraries (33.3%), least in professional public libraries (15.2%).

To find help with CR problems, CH workers used different resources (see Fig. 2). Respondents preferred websites (77.6%), books, articles, etc. (70.8%), and colleagues (63.8%). Again, we found differences among institutions ($p < 0.05$): books, articles, etc. were popular in scientific libraries, professional discussion lists, National Library, and professional associations in professional public libraries, and experts from the scientific community in university libraries. International institutions had too little representation to the statistical test, but we saw higher numbers according to specialization (ICA received 16.7% from archives and ICOM 28.4% from museums).

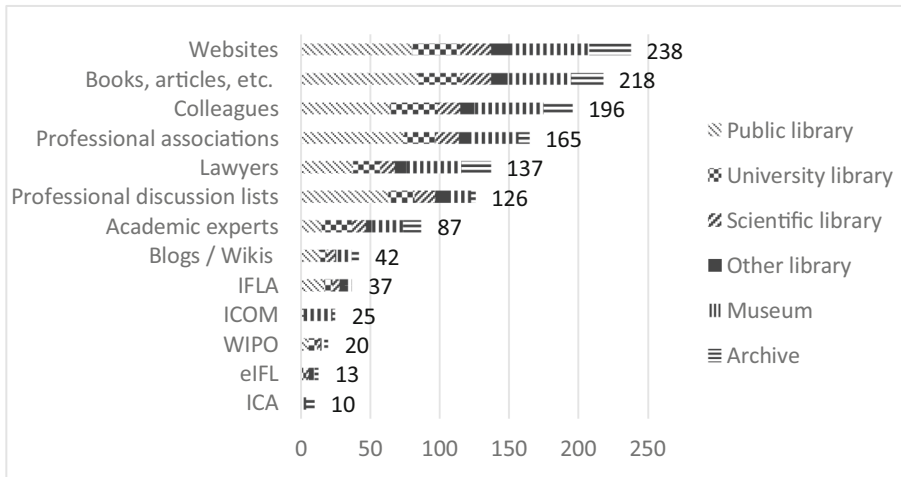


Fig. 2. Information resources in CR issues

Respondents agreed with the necessity to include CR issues in continuing professional education (78.6%) and in the curriculum of sciences connected with CH (64.6%). The negative attitude expressed less than 2%. Archives were the most neutral in both levels of education (only 57.1% agreed with continuing education and 38.2% with university education). 62% of respondents said that CR education was appropriate at all levels of university education, another 25% would situate it at the undergraduate degree. Only 3% chose the answer “none”. Figure 3 showed preferred forms for continuing education. We found differences only for distance learning popular in professional public libraries (62.3%), and training courses popular in archives (38.9%).

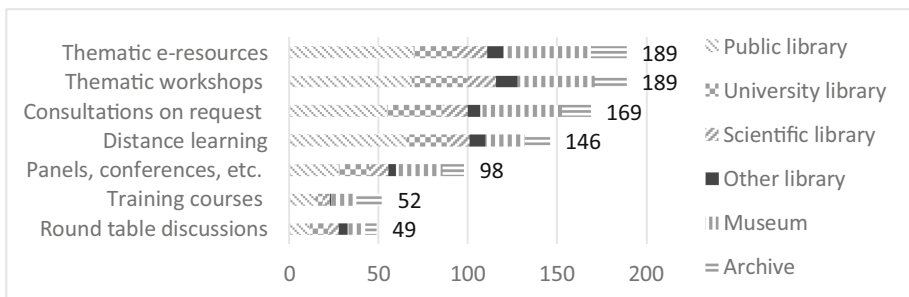


Fig. 3. Preferred forms of continuing education in intellectual property

5 Discussion

Reading our results, we needed to reflect on respondents' demography. Compared to the library employee population [9], our sample contained more men (although only 24.7%

of respondents), a little older, with a significantly higher degree, more often educated in library science and working in internal professional processes. We could expect worse knowledge evaluation and weaker attitudes to CR issues in the population. However, our demography was similar to the international comparison [6] except for more archives and museums in our sample.

Our respondents preferred the middle of the scales for self-evaluation. By deciding to use four-level scales, we forced them to lean in one direction or another. Narrower issues were more relevant for some workers (repositories, e-learning) and international aspects received the worst results. Compared to the international findings [6], Czech respondents self-evaluated highly both in general awareness and in subtopics. However, there were a lot of similarities in the rank of issues. Self-evaluation of institutions differed in general awareness and most subtopics. Archives and museums received the worst results. We could expect a better result if the questionnaire covered topics closer to their work. But we found a similar trend in the objective evaluation despite issues relevant for all CH institutions. The low self-evaluation of university libraries in both general awareness of intellectual property and copyright subtopics was an exciting finding because publications emphasized the importance of CR issues primarily for this type of CH institutions [3, 4, 11, 12]. We recommend further research of university librarians. University librarians might be aware of many problems and needs in CR issues and their knowledge limits, leading to lower self-evaluation.

Broader topics received better results also in objective evaluation. Our findings were similar to the international ones [6] except for orphan works (Czech respondents were more aware of this topic but not as much as in the UK [3]). It showed that CH workers had some CR literacy, but its development should focus more on practical, specific topics. The exceptions supporting making works available under special conditions also deserved more attention than restrictions. A list of issues created by UK librarians [3] can also be a guide. Still, there is a possibility of differences between the countries because UK results were much higher in knowledge evaluation, attitudes, and practical solution of CR. Respondents were convinced about the importance of the development at both the university level and further professional education, although significantly less than in other countries [6, 18–20]. In continuing education, respondents would prefer thematic electronic resources and workshops, followed by consultations on request. Training courses received less interest compared to other countries [6, 18–20]. The preferred form of education corresponded to resources for help with CR issues, where static and easily available resources predominate. They support a declaration of one procedure rather than active (and interactive) problem-solving.

Our respondents agreed with connecting the work of CH institutions and CR. But all mapped attitudes were significantly lower or more neutral than in the other countries [6, 18, 19]. Respondents were not too interested in initiatives of professional organizations in CR and not too aware of a national strategy for CR and international initiatives in exceptions for cultural institutions. These attitudes and attitudes toward education in CR suggested that respondents did not want to participate in activities connected with CR and related issues. Nevertheless, they considered it essential to orientate in the settings of CR issues, primarily which influence their work. We found positive attitudes to solving CR issues on the institutional level, but the actual practical situations were much worse.

We found only the limited existence of CR policies and workers dedicated to deal with CR problems. The Czech Republic did not have the worst result compared to other countries [6], but it ranked among weaker countries.

6 Conclusion

This study described knowledge self-evaluation, attitudes, and practical solutions in CR issues of Czech CH workers. We received a sufficient number of responses from different libraries, archives, and museums to compare them. Although the Czech Republic ranked in comparison to countries with high self-evaluation in CR topics, in the Czech Republic, attitudes and practical solutions were lower than in other countries. More general topics received better results. Museums and archives had weaker or more neutral results in almost all areas studied. Activities for CH workers should focus more on specific practical CR problems and possibilities to make works available.

Support and the active role of CH workers at the institutional and national level should be significantly strengthened. Superficial knowledge and fear of sanctions for law violations might be reasons for finding passivity, weak attitudes, and conviction about the importance of education in CR issues, and the preferred form of further professional education and use of information resources in CR issues. Especially university librarians should increase their activity and confidence in CR issues, which we found low. These institutions should be the most progressive in solving CR tasks for their own and their users' needs, and help their institution set regulations and procedures following their primary role – making information available.

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Visual Literacy Development Through Infographics

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Abstract. This study explored technological tools for the creation of infographics and educational practices of using them in university studies. The results showed a great diversity of web-based tools. While the first group of tools is primarily designed for the creation of infographics, the second group offers a wider range of visualization forms. For the visual appeal of infographics, the use of such tools does not require any prior training as the process is semi-automated. The third group of tools is universal graphic editing tools that require prior knowledge necessary for the creation of visual material. From the reviewed educational practices, it was found that the most common ones were those that engage students in the analysis of the ready-made infographics and then continue with their own hands-on experience of creating infographics. These tasks not only facilitate learning but also help students to develop personal, career readiness and visual literacy skills.

Keywords: Digital tools · Higher education · Educational practices · Infographics · Visual literacy

1 Introduction

In most cases, infographics merge three types of elements: visual (graphics, colors, icons, signs), content (texts, facts, data), and knowledge [1]. The design of infographics can range from a simple layout of illustrations to complex sets of interactive animations. They have the potential to fulfill the function of stand-alone tools of communication, which allows comprehending all necessary information without additional search of sources [2]. Also, infographics reduce cognitive overload for learners by eliminating unnecessary portions of information and knowledge. In today's fast-paced world, they also ensure both transmission and comprehension of information faster. As a result, infographics have become a very popular form of modern communication.

The use of infographics may yield many benefits within the higher education sector. Educators agree that students are highly satisfied with the tasks of analyzing and creating infographics [1]. When the course material is presented in the form of infographics, it is easier for students to learn and memorize it [3]. Infographics may facilitate learning of subject-related material and the development of many useful skills and capabilities

in learners [3, 4]. Learning from both ready-made infographics and the processes of making them may enhance visual thinking and the ability to learn by using visuals; it can also teach how to search for and select proper visuals, as well as to adapt them to specific purposes, and thus, to become more influential in communication.

Considering the educational perspectives of using infographics in higher education, an important benefit is that they can enrich learning environments with more diverse learning artifacts created by the learners themselves. Relying on the tenets of reflexive pedagogy, [5] stated that educators should be moving from an emphasis on individual cognition and memorization, use of conventional textbooks summarizing just the voices of textbook writers as well as a narrow range of learning artifacts and traditional knowledge testing procedures. Instead, they should engage learners in the creation of more diverse knowledge artifacts, while also emphasizing the processes of their making. These ideas imply that, for example, the process of reading some subject-related material provided by an educator can be replaced with the process where learners have to find this material themselves and create multimodal infographics based on it. Moreover, the process of creating infographics could eliminate the need for traditional test-taking procedures that mainly focus on the learner's long-term memory.

Engaging learners in the process of creating infographics well aligns with student-centered environments, which have been proved to be effective in higher education [6]. Building on the tenets of student-centered learning, [6] concluded that learning should become "*more social, conversational, and constructive*" (p. vii). When learners create their infographics, they turn into active constructors of their meaning-making instead of being offered summaries of what others think. Even though the final visualization of information or knowledge is usually short and simple, the processes of making infographics require that students think critically as they study, research, and reorganize content in shorter and more systematic ways. The development of infographics is also an open-ended activity that gives learners freedom in selecting what needs to be included in their work. Consequently, it might spark their creativity and enhance divergent instead of convergent thinking, which is still a common practice in higher education. Moreover, this might make them more responsible for their own learning.

Collective knowledge and collaboration are more valued in today's growing project-based world [5, 7]. Consequently, this points to the necessity of asking learners to collaborate when creating infographics. Whenever learners work in groups, they gain access to multiple perspectives and knowledge representations. In this way, infographics based on shared understanding may display a higher quality in comparison to those prepared by learners individually.

However, researchers and practitioners agree that there is too little research on the use of infographics as learning tools and such practices are not common in higher education [8]. Scholars note that educators are not tech-savvy regarding infographic-making tools and lack educational ideas of how to use them in the context of higher education. Consequently, learners are not properly prepared for real-life where they already encounter infographics very frequently. To address the current research gaps, this study reviews the available infographic creation tools and analyses the practices of their application to increase awareness of university teachers and other interested parties

of how to further enable learners to become more experienced in the use and creation of infographics.

The objectives of the study were to review infographics tools and analyze higher education practices on how and why infographics were employed and what outcomes were achieved. The results of this study may be important for university teachers of various disciplines.

2 Background

Contemporary literacy can no longer be characterized by just writing and reading but combines multi-literacies, including visual, digital, multimodal, and other literacies [9]. Among them, competency in visual literacy has already become crucial as visuals are ubiquitous in our technology-rich world. An important observation is that in cases when the representatives of Generation Z are unfamiliar with some phenomena, they first rely on visuals by either using the function of images provided by *Google* or by using *YouTube* videos. Most of them are usually more successful in expressing themselves by being able to use visuals. However, teaching and learning in higher education still relies too much on spoken and written forms of communication and therefore several researchers [9, 10] conclude that educators need to revisit their teaching practices to make them more visually oriented and at the same time offer more opportunities to develop visual literacy.

Researchers do not provide a unanimous definition of visual literacy and the term remains quite multi-faceted [9]. In her study, [9] examined 11 visual literacy definitions starting from the first one provided in 1969 and ending with the most recent one provided in 2013. [9] concluded that the conceptualization of visual literacy most commonly deals with three groups of visual skills – visual reading, visual writing, and other visual literacy skills. Visual reading is about interpretation, analysis, understanding, visual perception, evaluation, translation of visual-verbal-visual, and knowledge of grammar and syntax. Visual writing skills include visual communication, image production, and visual creation, as well as image use. Visual learning, visual thinking and applied image use belong to other visual literacy skills (*ibid*). Similarly, to generalize various visual literacy definitions, [11] concluded that visual literacy is about three core skills: learning and thinking with images, using images in communication, and making meaning from visuals. [12] referred to visual literacy development by simply dividing it into learning to interpret visuals or create them.

The creation of infographics might also be seen as a suitable practice to develop information literacy [13, 14]. While the creation of the visual part might be significantly facilitated by the use of digital technology or infographic tools, the creation of the content and knowledge part might be more complicated. Learners will need to think critically to choose relevant information, find and select appropriate sources of information, learn ways to cite them ethically, adapt the information to the intended audience and, most importantly, be able to provide information in very condensed forms. Although some technological solutions might also be applied (e.g., automatic language accuracy checking tools), this part could be much facilitated whenever learners collaborate and thus enhance the aforementioned information literacy subskills from each other.

3 Methodology

This paper is based on a scoping review [15] of scholarly literature and freely available web-based platforms for the creation of infographics. We analytically interpreted the researched literature, examined its extent, and summarized the research findings based on the criteria matching the overall study purpose and agreed on by both researchers. For the analysis of educational practices including the use of infographics, we searched for scholarly articles from various disciplines within higher education that dealt with such practices. The more detailed procedure is visualized in Fig. 1.

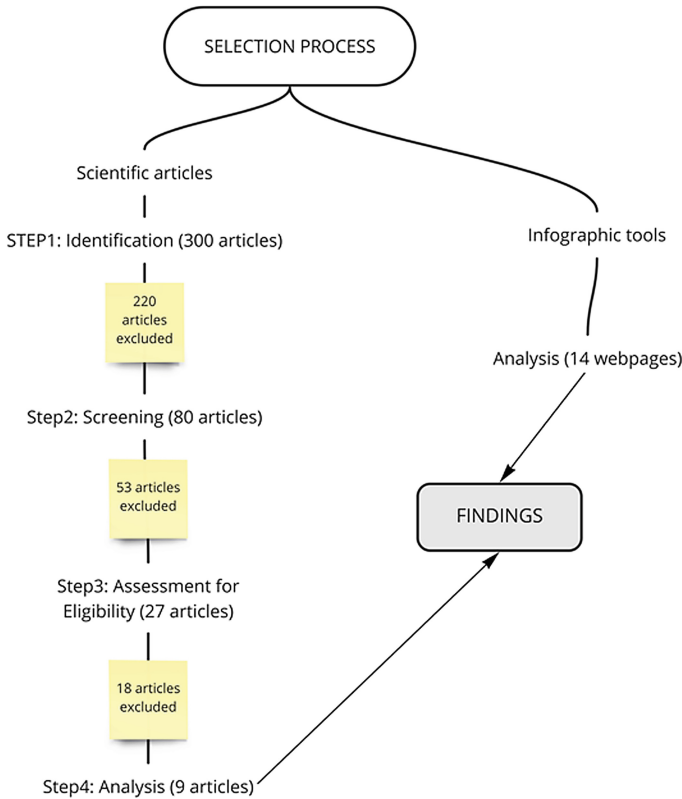


Fig. 1. The flowchart of the data collection process

Nine empirical articles were selected as matching the criteria. We analyzed these practices based on three aspects – how and why infographics were employed and what outcomes were achieved. Our scope of review also included the use of infographic tools in such practices. Also, we reviewed online infographic tools and discuss their variety and potential use in the sections below.

Following the procedure proposed by [15], we adapted the scoping review methodological framework (SRMF). We used the first five steps of SRMF: i) identifying the

research questions and the main keywords for initial online search, ii) searching for relevant empirical studies on infographics use in a higher education context and web portals presenting guidance on how to apply these tools, iii) selecting studies for the analysis, iv) charting the data, v) summarizing, interpreting and reporting the results. For the sixth step of the SRMF or consultation stage, we used the preliminary findings to be tested by both our university colleagues and ourselves. As educators working in the field of higher education, we applied the practices of using infographics in our study modules.

4 Findings

Our review showed that there is a plethora of digital tools or web-based platforms suitable for the construction of infographics. In the first section of the findings, we present the summary of these tools according to the functions they offer at the time of writing. In the second part of the findings section, we present the analysis of higher education practices integrating the use of infographics across diverse subjects.

4.1 Online Tools for the Creation of Infographics

As the review of infographic tools revealed, there is a great diversity of such tools. The first group of these tools is primarily designed for the creation of infographics. The second group is more universal as it offers a wider range of visualization forms. The third group of tools suitable for making infographics comprise general tools or well-known graphic editing tools (Table 1).

Table 1. Online tools for the development of infographics

Group	Main purpose	Prior training	Examples
First	Creation & visualization	Does not require prior training (semi-automated process)	<i>Zanifesto, Adioma, Venngage, Easel.ly</i>
Second			<i>Draw.io, Genially, Infogram, Visme, Creately, Canva, Piktochart, Infogram, Kinzaa</i>
Third	Graphical editing	Require prior training to use the tool	<i>Adobe Illustrator, Paint.NET, Adobe Photoshop, Google Drawings, Google Charts</i>

Tools for creating infographics differ in their functionality and, while trying to achieve a competitive edge, their creators are constantly introducing new modern features. For example, *Genially* is a modern tool that includes a broad range of functions. Among them, for example, is the use of learning analytics (e.g., tracking which learners and how many times studied the provided infographics) or the inclusion of different media formats, which makes infographics more interactive. *Infogram*, for example, allows the creation of infographics compatible with *PowerPoint*, *Keynote*, and *Google Slides*.

Most of such tools offer an extensive range of visually attractive graphic elements, illustrations, and templates prepared by professionals that can be used and customized even by an amateur. The templates are designed for various purposes, such as visualization of SWOT analysis, summarizing an overview of the year ahead, and a start-up agenda, as in *Piktochart*. For instance, the infographic tool *Venngage* sorts its infographic styles into the categories of statistical, informational, process, comparison, timeline, geography, charts, and tutorial. Tools such as *Canva* and *Venngage* even offer résumé writing templates to meet the increasing trend of fitting them in one page only, which allows seeing everything at a glance. The tool *Kinzaa* advertises itself as specifically designed for the creation of infographic résumés and job postings.

In most cases, tools for creating infographics have both free plans and several paid options, which offer a broader range of functions. Paid options are usually divided into some categories according to the area of application. For instance, *Venngage* offers a free plan for students, a paid business plan for organizations and businesses as well as a paid premium plan for individuals. Usually, free plans provide only a limited number of styles or templates (e.g., *Adioma*). As one of the common tricks, most tools do not allow downloading infographics until a user upgrades his or her plan to a paid one. Some of these tools restrict users in the number of infographics they can make without any payments (e.g., the free plan of *Venngage* for students allows creating only five infographics for free). Some tools offer a long list of functions and allow students to download their works for free, including at least a limited number of visuals (e.g., *Piktochart* allows to create and download 5 visuals). However, in cases where users need to download the created infographics in a wider range of formats or higher quality, they have to pay for this option by choosing one of the subscription plans (e.g., *Piktochart*). One of the most modern functions that some of these tools have is their suitability for synchronous collaboration or working together for a group of learners on the same project at the same time.

Such a wide selection of infographic tools might be the result of both the popularity of infographics and tough competition in the market of online tools. An accurate and detailed summary of the functions these tools offer is problematic and difficult to achieve as they are changing rapidly. Regarding the infographic tools used in the reviewed cases, the findings revealed that educators utilize various tools, and *Piktochart* is the most common among them.

4.2 Analysis of Educational Practices

In this part of the findings, we present the analysis of higher education practices including the use of infographics across various subjects.

During the classes of Instructional Design, [16] engaged students in the cyclical creation of infographics for four weeks that required them to create one infographic a week. The main goals of this educational practice were that students acquire theoretical knowledge of a difficult course and enhance metacognitive strategies. [16] research showed that studying combined with the creation of infographics had notable effects on students' academic achievements as it helped them to grasp the main points of the subject, learn to condense information and increased recall of subject-related material.

This study proved the suitability of infographic creation for knowledge acquisition and enhancement of self-regulation of cognition.

In the course of Business and Professional Communication, [2] gave his students repeated assignments of analyzing and creating infographics. The main goals were to make the students more skilled in the creation of infographics as well as more influential while using them in the business sector. In the first assignments, the educator asked students to analyze the examples of the well-prepared infographics accessed from websites like *Cool Infographics*, *Good Infographics*, *Visually*, or *Daily Infographic*. The students had to answer the following questions: “*What are the purposes of the infographics? Who do you think are the intended audiences? What makes you say so? How informational are the infographics? How persuasive are the infographics?*” [2, p. 452]. Afterward, the students were asked to discuss the salient features of infographics. The last assignment was related to the production of their infographics based on the newly acquired know-how knowledge. In this educational practice, an important instructional aspect was the students’ inclusion in sharing each other’s initial projects and using peer feedback for their refinements, which helped considerably to improve the final infographics. The author concluded that the designed tasks broadened the learners’ understanding of both how to use and create infographics. This study is important as it demonstrated that students’ peer evaluations were beneficial and necessary steps when learning to create infographics.

During the classes of Mass Communication, [17] asked their students to create research-based infographics. First, the learners had to visualize a key trend representing the culture of digital media. The second assignment required them to illustrate a concept related to web analytics. Also, the students were asked to write 300-word feedback on the processes of both creating their infographics and analyzing the ones created by the other group members. The results showed that such tasks were especially beneficial for the development of digital competency and visual literacy. The ability to filter information during the process of critical content analysis was indicated as the most important aspect related to digital literacy that was developed by students. This study confirmed the usefulness of students’ engagement in the reflections on their learning and active participation in the assessment of their peers.

Researcher [18] utilized infographics in the classes of Principles of Curriculum. First, the educator used infographics to provide the material of the course, which was then followed by students’ reflections on the use of infographics. Second, the students were immersed in the creation of their infographics. Before the latter activity, they were asked to watch tutorials on the use of the infographic tool *Piktochart*. The research was conducted in two groups with the experimental group receiving the assignment to create an infographic, while the other one did not do this task. Significantly, higher academic achievements were observed in the experimental group. Its members confirmed that infographics had both facilitated the learning of the course material and increased its retention. 92% of the participants expressed a positive attitude towards the use of infographics as a tool for learning and their intellectual development. The study proved that the acquisition of subject-related content knowledge increased with the help of infographics.

In health science, [19] aimed to develop their students' research skills, especially their abilities to critically review scientific articles. The students had to learn the Evidence Analysis Process, conduct their research accordingly, and present its results in a form of an infographic. The application of this educational practice proved to be instrumental for the enhancement of students' research skills and refinement of their capability to create infographics.

During the Marketing classes, [20] aimed to foster students' self-learning and collaborative learning alongside the learning to create infographics. The goal was to replace traditional instructor-led lectures with a team project where students had to acquire complex knowledge on their own. As students were unfamiliar with visualization techniques, the educator introduced them to data visualization trends and provided them with examples of infographics. Even though the students were surprised by the nature of such tasks and expressed negative emotions at the start of them, they demonstrated progressive curiosity and expressed positive attitudes in the end. The task appeared to be beneficial for the development of research skills, the ability to synthesize and evaluate information as well as the enhancement of collaboration. This study illustrates the fact that some students still expect traditional lectures and might need extra preparation for more active forms of learning. It might also imply that not all students are ready or willing to accept tasks that require more cognitive and collaborative efforts.

In Sports Management classes, [8] engaged their students in the creation of a specific type of infographic, that is, infographic résumés for learning to transmit personal information through a visually attractive and engaging format. It was hoped that such educational practice would assist them to better realize their strengths and areas of improvement. The learners had to construct and compare their résumés. The authors concluded that this practice helped them not only learn how to create an infographic résumé, but also to differentiate themselves from their peers, self-promote and develop a set of new skills, such as communication and critical thinking.

During the Introduction to Sociology classes, [21] gave learners the repeated tasks of analyzing and creating infographics. The first step taken was a pilot study which showed that the students lacked both experience and understanding of making infographics. Therefore, initially, they were instructed about the design and organizational strategies necessary for the creation of infographics as well as about the available tools for their creation. It then proceeded with three types of assignments. In the first assignment, the learners were provided with some excellent and poor examples of infographics and later asked to compare their design and data presentations. In the second assignment, they had to choose infographics themselves and critically analyze the same aspects. During the third assignment, the students were given a newspaper article and asked to visualize its story in three essential data points. Afterward, they discussed their infographics to assess their abilities to communicate information visually. The fourth assignment was the creation of their final infographics. The main finding of the study was that the quality of students' projects could be increased by immersing them in the iterative processes of drafting and revising their projects. In addition, this study outlined the importance of students' voices in the processes of learning to create infographics and refining their quality.

During the Introductory Organic Chemistry course, [22] gave students the assignment of creating infographics so that they learn to connect chemistry concepts with real-world contexts. More specifically, the students were asked to prepare the infographics that presented information about at least one organic molecule available in a consumer product. The instructors wanted students to relate course material to their daily lives as well as gain experience in explaining scientific concepts to a general audience. For style and content ideas, the students were referred to the website of Compound Interest. They were additionally provided with a more detailed list of the required information for infographics. The results of this study showed that students considered the creation of infographics as an engaging course task that helped to better master and apply course material. For more successful integration of infographics, the instructors advised that learners should be given additional information literacy training for more professional identification of reliable and suitable sources. In addition, they suggested increasing students' motivation by making final infographics public.

5 Discussion

From the reviewed educational practices including the use of infographics, it can be seen that most frequently educators first engage learners in the analysis of ready-made infographics and later ask them to proceed with their infographic creation tasks. While one part of educational practices is explicitly stated to be designed for the development of infographic creation capabilities, the second posits different educational aims and employs infographics as learning tools to achieve them. For the former, educators include various measures to make learners more skilled in the creation of infographics. Hands-on experience in the creation of infographics dominates in the reviewed cases. Educators outline the need for immersing learners in the iterative practice of their making (e.g., [16]). Regarding additional explicit measures, the reviewed educational practices vary and exemplify a different level of guidance. These measures include the provision of properly prepared examples of infographics (e.g., [20]), inclusion into their analysis (e.g., [2]), self-reflection on the processes of their making and refinement (e.g., [17]), use of peer evaluation for their creation and improvement (e.g., [17]), instruction on design and organizational aspects (e.g., [21]) and introduction to visualization techniques and trends (e.g., [20]). Except for [18], the rest of the educators do not emphasize the need to give students extra time to master new digital tools for the creation of infographics.

Allowing learners to gain hands-on experience in the creation of infographics is not only beneficial for learning to create this form of visuals but also illustrates active learning, which might increase academic achievements. Educators (e.g., [16, 18]) conclude that this practice helps learners to acquire subject-related knowledge and increases its retention. The study of [18] is especially significant as it proves that learners receiving the same learning material accompanied by the creation of infographics are more successful in remembering it than those learning without infographics. [16] study proves the suitability of infographic creation for the development of the metacognition strategy, which aids self-directed learning. These findings are consistent with those of [5] who confirm that the cases when learners are active creators of their own knowledge yield better learning outcomes.

The majority of the educators opt for engaging learners in the creation of infographics in collaboration, which allows them to merge diverse perspectives and conceptualizations. Whenever infographics are prepared in groups, such tasks also help to develop collaboration skills [20]. As observed by [2] and [17], collaboration in the form of peer review helps learners to become more skilled creators of infographics. Tasks that involve collaborative infographic creation also ensure more social and conversational learning [5, 6]. The educators [2, 17–19] conclude that collaboration increases learners' satisfaction with the tasks including infographics.

Overall, students are satisfied with tasks that involve creating infographics. The most likely cause for this is that university students prefer using visuals and condensed forms of communication. Another explanation might be their boredom with traditional class assignments. Although the most common goals of integrating infographics in the reviewed cases are to increase learners' awareness of the creation of them as well as to teach subject-related material, there are more creative ways of using them. For example, [8] teach learners to create their infographic résumés to make them more successful in the future when looking for a job. [20] replaces traditional lecture-led classes with the creation of infographics. At the same time, her study shows that some students may still prefer traditional learning methods.

Most importantly, the practices of creating infographics ensure holistic learner development. They merge the development of a group of real-life and career readiness skills and capabilities, such as creativity (e.g., [2]), visual and digital literacy (e.g., [17]), problem-solving and critical thinking (e.g., [17]), communication skills (e.g., [21]), learning management (e.g., [16]), research skills (e.g., [19, 22]), peer-to-peer learning (e.g., [2]), and reflection (e.g., [18]). These findings are in line with those obtained by [4] and [3].

6 Conclusions

As the reviewed cases revealed, infographics might be used to develop all types of skills related to visual literacy. The cases when learners are provided with infographics created by someone else seem to be the most useful for developing learners' visual reading or interpretation of visuals skills. On the other hand, engagement in their creation focuses more on the enhancement of visual writing skills. Both ways of using infographics are also related to the development of other visual skills. Learning from both ready-made infographics and the process of making infographics may enhance visual thinking, the ability to learn by using visuals, learning to search for and select proper visuals, and even learning to cite visuals properly. As infographics usually include various combinations of textual information, sound, or video, learners are given opportunities to create multimedia forms of communication, which can make them more influential in contemporary communication.

Overall, infographics are a promising educational tool across various subjects in higher education. Engagement of learners in their creation serves both for better acquisition of subject-related material and develops hands-on experience necessary for creating this form of communication. Students' satisfaction with the tasks of creating infographics shows their preference for active learning methods through the use of visual

communication forms. As visuals and communication in the form of infographics are ubiquitous, learning to create infographics also bridges the gap between what is being taught in higher education and what learners might need in real life. This study offers practical educational solutions to promote more active learning and engage students in the creation of more diverse learning artifacts for which they feel ownership.


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Sustainability Literacy Approaches in LIS Education: Epistemological Beliefs, Teaching and Learning

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Abstract. This paper intends to discuss critically the pedagogical experience of developing and implementing a sustainability literacy approach within the Master of Information Management and Curation's curricula at Universidade NOVA de Lisboa (2018–2019) addressing student's epistemological beliefs. It pursues two objectives: (1) to identify the relevant key competences in sustainability literacy and, (2) to synthesize the transition from competencies to learning objectives/outcomes linked to information literacy. Qualitative methodologies have been used in this study to investigate learning impacts, using a narrative approach to provide access to beliefs and the meaning students ascribe to specific pedagogical experiences. The main outcomes emphasize that this approach prepares students for sustainability intervention areas: (1) information literacy trainers/facilitators for internal and/or external audiences; (2) advocacy – evidence gathering and promotion of information services contribution to sustainable development; (3) Research on Sustainable Information Behaviour (SIB) and greening libraries to embed the concept of sustainability into our everyday life information practice.

Keywords: Sustainability literacy · Competences framework · Epistemological beliefs · LIS education

1 Introduction

Achieving sustainability literacy requires multidisciplinary approaches and exploration of interconnectedness of various themes within sustainable development [1]. Even though definitions of sustainability or sustainable development abound, the most cited definition is the one proposed by the Brundtland Report in 1987: sustainability is development that meets the needs of current generations without compromising the ability of future generations to meet their own needs and aspirations. Thus, everyone in society should be sustainability literate, that is, someone that can mobilise the competencies needed to respect the present and simultaneously face the challenges of the future.

According to Décamps et al. [2, p. 141], sustainable literacy is “the knowledge, skills, and mindsets that help compel an individual to become deeply committed to building a sustainable future and allow him or her to make informed and effective decisions to this end. (...) As Sustainable Development is by nature complex and transversal, achieving sustainability literacy requires multidisciplinary approaches and exploration not only of various themes (for example, soil quality, forest health, and social inclusion) within sustainable development but also the interconnectedness of these themes”.

Serpa and Sá [3] listed eight categories of components of Sustainability Literacy:

- *Consider Ecosystems in their complexity, unpredictability and uncertainty;*
- *Analysis, prediction and adaption to climate change awareness;*
- *Behaviour modification in individual terms, within groups, organisations and communities to ecological approaches;*
- *Psychological skills to understand that satisfaction differs from consumerism;*
- *Information technology with critical sense;*
- *Community participation;*
- *Collective, collaborative and multidisciplinary action;*
- *Sense of community and social justice.*

Hence, these authors give sustainability literacy a prominent place in civic and educational participation posing profound and specific challenges to professions and education curricula, among them library and information studies (LIS).

2 Literature Review

It is generally accepted that competences acquired from education are a key driver of social and economic transformation. As to the concept of sustainability, its introduction in education worldwide goes back to creation of the UNESCO-UNEP International Environmental Education Programme in 1975. Since then, the international recognition of Education for Sustainable Development (ESD) as the key enabler for sustainable development has kept a steady path of growth [4]. In November 2019, UNESCO adopted the new global framework on ESD for the period of 2020–2030 (ESD for 2030¹) [5]. “The overall objective of ESD for 2030 is to build a more just and sustainable world through the achievement of the 17 SDGs. ESD for 2030 therefore proposes to strengthen ESD’s contribution to all SDGs, with a particular focus on helping the SDG 4 – Education 2030 agenda place greater emphasis on the contribution of learning content to the survival and prosperity of humanity” [6, Annex I – pp. 1–2].

Higher education must play a key role for competence development for sustainability “enabling people to not only acquire and generate knowledge, but also to reflect on further effects and the complexity of behaviour and decisions in a future oriented and global perspective of responsibility” [7]. Created in the run-up to the United Nations

¹ This framework was officially launched at the UNESCO World Conference on Education for Sustainable Development in Berlin on 17–19 May 2021. Though initially planned for June 2020, this conference was postponed due to the COVID-19 pandemic.

Conference on Sustainable Development (Rio+20, 2012), the Higher Education Sustainability Initiative (HESI) aims to get institutions of higher education to commit to sustainable development through research and teaching. By joining HESI, higher education institutions “agree to teach Sustainable Development concepts, encourage research on sustainable development issues, make their campuses greener and more sustainable, support sustainability efforts in their communities and share results through international frameworks” [8]. According to McCowan [9], universities have been assigned a central role in the Sustainable Development Goals (SDG) set by the 2030 Agenda.

Although there has been considerable progress in the incorporation of sustainable development into the curricula of higher education institutions in Europe, particularly on competences for sustainable development and on pedagogical approaches, there has been limited research on the connection between how courses are delivered (pedagogical approaches) and how they may affect sustainability competences. In addition, the lack of emphasis on the direct measurement of how universities are producing sustainability literate graduates is a continued shortcoming in the examination.

The academic debate discusses sustainability key competencies with a variety of research and teaching approaches, but they are rarely operationalised as specific learning objectives for different educational levels [10]. A recent study [11] shows that *Critical thinking and analysis* and *Interdisciplinary work* are the competencies most widely covered and recognized, followed by *Systems thinking*, *Interpersonal relations and collaboration*, and *Assessment and evaluation*. Lecturing, case studies, and project- or problem-based learning, inter-disciplinary team teaching and mind maps, are the most widely used pedagogical approaches, all being considered the most effective ways to develop the competences.

The available literature shows some convergence in the identification of *Systems-thinking*, *Futures thinking*, and *Normative, Strategic and Interpersonal competencies* as key competences [12]. These competences are focused on problem-driven and solution-oriented to plan, conduct and engage in sustainability research. According to Wiek [13], they can develop distinct and recognizable profiles to help them carry out their professional activity in the future and resolve problems, act as agents of change and adequately manage transition processes. UNESCO [14] presents eight key competencies for achieving the SDGs: (1) system thinking; (2) anticipatory, (3) normative, and (4) strategic approaches; (5) collaboration, (6) critical thinking, (7) self-awareness and (8) integrated problem-solving. So far, incorporation of sustainability competencies into curricula has been slow, with different proposals regarding how content and competencies linked to sustainability can be incorporated [15]. In this respect, we reflect the views of Amador Hidalgo and Arjona Fuentes [16, p. 455], who maintain basic skills training in three areas:

- 1) *Cognitive*: the cognitive competencies related to knowledge and linked to a critical understanding of global and local environmental issues.
- 2) *Methodological*: the methodological skills related to know-how, the acquisition of skills, strategies, techniques, and procedures for decision-making and action-taking related to the environment and sustainable development.
- 3) *Attitudinal*: attitudinal skills related to know-how and evaluating, where the development of sustainability attitudes and values are essential.

Three pedagogical approaches appear more likely to develop the most competences: eco-justice and community, Project- and/or problem-based learning, and community service learning. This indicates that pedagogical approaches that are more practical and linking to the community appear to have a better likelihood to improve the development sustainability competences. However, there is still no agreement on the competencies that are considered essential (key competencies) for integrating sustainability in curricula and courses, as well as no consensus about the best practices needed. Despite this, awareness and knowledge are considered the main outcomes and may be the first step to engage individuals on the path to build a sustainable future [2].

Our reading of the current literature about sustainability in libraries indicates that there is an increasing interest in this field [17, 18]. What specifically concerns the intersection of LIS studies with Sustainability and Competences Management is the main research focus on sustainability literacy [19] and on a green Information Services (IS) research agenda [20, 21] that includes information sustainability practices and “sustainable information science” [22, 23]. Complementary research developed by IFLA has also been exploring this interdisciplinary field, bringing together ideas and approaches from different areas and promoting attitudes and competencies of librarians towards the 2030 Agenda, mainly through its Special Interest Group on Environment, Sustainability and Libraries (ENSULIB). Thus, this paper discusses the strategic approach to sustainability literacy in LIS studies followed by NOVA University of Lisbon anchored in the creation, in 2015, of the Master in Information Management and Curation. This new masters program is a joint venture between NOVA FCSH (Faculdade de Ciências Sociais e Humanas) and NOVA IMS (Information Management School), a member of iSchools. Considering that assessing the impact of these initiatives is critical, this paper intends to discuss critically this pedagogical experience as an answer to the research questions, *How can LIS courses be successful in the pedagogy and learning of literacy sustainability? How do we assess their impact?* was a supplementary question. We pursue two objectives: (1) to identify the relevant key competencies in sustainability literacy; and, (2) to synthesize the transition from competencies to learning objectives/outcomes linked to information literacy. In this quest, we seek to contribute to the debate on information literacy transdisciplinary contexts and the relevance of reflecting on LIS students’ epistemological beliefs.

3 Methods

We examine the master’s interdisciplinary curricula design to identify the relevant key competences. In the analysis of the operationalization process of key competences in sustainability, we highlight the pedagogical strategy of using a model of competencies developed in a transversal and holistic way *Performance Evaluation & Sustainability of Information Services* and *Organizational Management and Organizational Behaviour* course units.

3.1 Conceptual and Theoretical Contexts and Options

We discuss conceptual and theoretical analysis through the nature and dimensions of epistemological beliefs related with pedagogical practices, reaching, and learning. This

aspect constitutes an open research area that led each individual to appropriate the knowledge of their academic and professional area (personal epistemology) [24, 25].

In academic context, students construct their views of science tacitly, from the curriculum and discourse of teachers throughout the training process, and the development of an adequate level of epistemological beliefs to be considered an essential educational objective, also helping to understanding of the scientific results obtained [26, 27]. Epistemological beliefs may influence students' cognitive processes of thinking [25] and their choice of learning approaches. They can be considered as dependent on the information resources that are available at a given moment, framing themselves in a perspective of theory in action, where various informational contexts that will allow, or not, the understanding of the meaning and epistemological complexity [28]. Within the LIS sector, several training and education models coexist, developed over several decades, that underlie different meanings and epistemological positions not always well understood by the various generations of professionals. This community of generations must be studied in view of the intergenerational and intra-generational groups that highlight different personal epistemological beliefs and the existence of a generational gap in professional practices [29].

Several authors have developed comprehensive works and models of epistemological development, using different methodologies based on the Intellectual and Moral Development Model created by Perry [30] in 1981. One of these models presents a multidimensional system of beliefs showing how epistemological issues focused on how individuals position themselves, appropriate and relate them [24, 25].

The importance of studying these beliefs, although they are implicit and difficult to verify due to their abstract nature, also resides in its close connection to quality of learning [31]. Thus, the investigation of personal epistemology aims to respond to some fundamental questions in the area of education:

“The research on personal epistemology, although not united in terminology, addresses students' thinking and beliefs about knowledge and knowing, and typically includes some or all of the following elements: beliefs about the definition of knowledge, how knowledge is constructed, how knowledge is evaluated, where knowledge resides, and how knowing occurs. Although the term “personal epistemology” has its own limitations, this is a possible umbrella term for those research programs that address individual conceptions of knowledge and knowing” [32, p. 355].

One of the reasons for studying epistemological beliefs linked to LIS curricula is related to the formation of professional identities. A study of different existing curricula will allow us to detect differences in students' discourse and their specific views on Sustainability Literacy, helping to frame the meanings and values of students, teachers, and practices of each course, with effects on professional performance. Another reason can be explained by the fact that lifelong learning is still poorly studied in LIS among professionals. Traditionally, librarian's behaviour studied in the workplace has mostly focused on tasks and less on their connections to epistemic practices [33].

In addition to these perspectives, one framework developed by Marlene Schommer-Aikins [34] was used to determine whether epistemological beliefs could, in fact, be changed in students over a significant and flexible curriculum about sustainability. In the

words of the author, “this embedded systemic model separates the beliefs about knowledge and the beliefs about learning. Although these two beliefs were originally grouped under the title “epistemological beliefs,” what is at stake here is the modelling of how these beliefs interact between each other [25]. This portrayal also allows prediction of the interrelationship between beliefs about knowledge and beliefs about learning, the influence that systems of epistemological beliefs may have on classroom performance and self-regulated learning, and the potential feedback loop in which classroom performance and self-regulated learning may lead to revisions in epistemological beliefs. In other words, it is possible that, as learners develop over time, there is a reciprocal interaction or perhaps a feedback mechanism among these beliefs.” [34, p. 25].

Despite the existence of the Schommer Epistemological Questionnaire (SEQ), a quantitative and multi-factorial instrument, we have used qualitative methodologies in this study to investigate learning impacts, using a narrative approach to provide access to beliefs and the meaning students ascribe to specific pedagogical experiences. Fifty students participate in this study: 19 males and 31 females, with an average age of 25 years old. The processes of interpretation and understanding of data collected is related to hermeneutics in that it uses the analyses of what and how reflexive questions [35] to explore differences in sustainability perceptions and competences. For evaluative purposes, we used a focus group of teachers and students. Students were also involved in post interviews, personal reflection, and concept mapping of key skills to analyse learning and epistemological beliefs.

3.2 Sustainability Literacy: Transition from Competencies to Learning Objectives/Outcomes Linked to Information Literacy

Since 2012, the Faculty of Social and Human Sciences at the University Nova de Lisboa (NOVA FCSH) has conducted ongoing interdisciplinary teaching and training strategy research in Information Science that intersects performance evaluation and sustainable development. Several learning experiences, such as the development and use of competencies focused on sustainability literacy competences emerged from this strategy and has been documented in articles and papers [36–39], namely:

- the co-creation of a Sustainability Assessment Structure, linking sustainability metrics to quality management;
- co-creation of sustainability indicators for the measurement of impacts on cultural organizations;
- the co-creation of an open assessment skills taxonomy; and,
- the PLS Project – Public Libraries contribution to Sustainable Development Goals: gathering evidences and evaluating practices;

From 2017 onwards, research on participatory evaluation and co-evaluation competences also explored the interconnections with Open Science and Open evaluation [40].

Sustainability competencies were operationalised as specific learning objectives in two inter-disciplinary team-taught course units – *Performance Evaluation & Sustainability of Information Services* and *Organizational Management and Organizational*

Behaviour: Instructors used a number of pedagogical approaches: videos, brainstorming, case studies, teamwork, assignments, oral presentations, project learning, and concept mapping. These approaches were effective tools in a problem-oriented education to solve real community problems, driven by the operationalization of concepts/models. For example:

- a Library Model, developed to help Portuguese librarians gathering evidence of libraries' contribution to Sustainable Development Goals (SGDs) [41] was used in the *Performance Evaluation & Sustainability of Information Services* course unit;
- the concept of Build Back Better was used in the *Organizational Management and Organizational Behaviour* course unit. Students were also able to apply for an award on “The 2030 Agenda – the Build Back Better challenge”, promoted by a business association.
- the concept of sustainability embedded into our everyday life information practice was used to understand current multi-contextual informational behaviours.

During the interviews, students were able to describe, analyse and discuss sustainability concepts and theories, the learning process, the process of creation, sharing of knowledge, and participation in communities' problems.

Next steps will be to test epistemological beliefs using SULITEST (the Sustainability Literacy Test) [8]. The Sustainability Literacy Test is an open online training and assessment tool developed as an international collaborative initiative, in the context of ESD and the Principles for Responsible Management Education (PRME). It was created by the academic community to evaluate their students' knowledge in sustainability critical areas. It assesses the level of knowledge in economic, social, and environmental responsibility for higher education students; applicable to all levels (bachelors, masters, MBAs, PhD). The Students Learning module allows students to take the test at home, either alone or in a group.

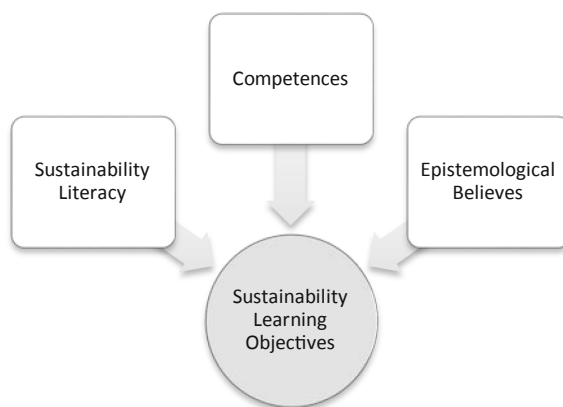




Fig. 1. Sustainable learning objectives: functional components

Table 1. Sustainability literacy, competences, and epistemological beliefs

CLASSROOM PERFORMANCE						
KEY SUSTAINABILITY COMPETENCES		EPISTEMOLOGICAL BELIEFS				
		<i>Beliefs about knowing</i>	<i>Ways of knowing</i>	<i>Beliefs about learning</i>	<i>Self-regulating learning</i>	<i>Cultural relational views</i>
Cognitive	Knowledge of concepts, history, and agents	✓	✓	✓	✓	✓
	Critical understanding of global, national, and local socio-cultural-environmental issues	✓	✓			
	Performance evaluation	✓	✓			
	Problem-solving	✓	✓			
	Risk management	✓		✓		
Methodological	System thinking	✓		✓		
	Evidence-based management	✓		✓		
	Anticipatory thinking	✓		✓		
	Development and application of indicators		✓			
	Impact assessment		✓			
	Anecdotal evidence or stories obtained informally from personal observations and experiences		✓	✓		✓
	Tests for basic sustainability literacy		✓		✓	
	Analysis of portfolios		✓			
Attitudinal	Analysis of the use of information in writing and relational tasks		✓			
	Ethics, equity, inclusion, and tolerance for ambiguity and uncertainty		✓	✓	✓	✓
	Critical thinking		✓	✓	✓	
	Critical review of one's own skills, knowledge or confidence	✓	✓		✓	
	Advocacy and personal involvement			✓		✓
	Communication and use of social media and narratives tools		✓	✓		✓
						
SUSTAINABILITY LITERACY						

4 Results

We conceived of sustainability learning objectives as the result of a combination of three aspects: sustainability literacy, competences, and epistemological beliefs (Fig. 1). They were essential for the success of the pedagogical strategies we developed.

The data collected from students' comments pointed to a process of epistemological change, from an initial state of sustainability knowledge fragmentation to the acquisition of a systemic perspective, recognizing their need for constant updating. It was possible to develop a simplified overview of the five facets of student's epistemological beliefs: *beliefs about knowing, ways of knowing, beliefs about learning, self-regulating learning,*

and *cultural relational views*. As illustrated in Table 1, LIS Sustainability Literacy can emerge from classroom performance through the development of key competences in interaction with epistemological beliefs. These competencies are listed and organized around the three basic types identified by Amador Hidalgo and Arjona Fuentes [16] – *Cognitive, Methodological, and Attitudinal*.

Transition from competencies to learning objectives/outcomes is marked with the signal ✓ that characterise student's opinions about their beliefs and the results of these pedagogical experiences. These results indicate that perceived learning outcomes relates positively to key sustainability competences, but some research areas that got fewer marks/signals (*beliefs about learning, self-regulating learning and cultural relational views*) need to be redefined to ensure that all of the key categories were sufficiently discussed and understood.

5 Conclusions

An interdisciplinary and reflexive approach to epistemological beliefs on teaching pedagogy and learning could be a key strategy for integrating a sustainability literacy perspective in LIS courses. We identified three broad competency areas, and 19 specific competencies. We assembled these into a Classroom Performance table supported by the results of the epistemological beliefs study. By presenting a relational path between sustainability competences and epistemological beliefs developed in the classroom, we are also fostering new professional profiles and preparing students for sustainability intervention areas: (1) information literacy trainers/facilitators for libraries internal and/or external audiences; (2) advocacy – evidence gathering and promotion of information services contribution to sustainable development, (3) research on Sustainable Information Behaviour (SIB) and greening libraries to embed the concept of sustainability into our everyday life information practice. This approach may also offer reference points and sources of inspiration for planning educational strategies, and may assist LIS educators in situating, analysing, and enriching theoretical choices, pedagogical practices, and promote new contributions for literacy skills discussions.

Future efforts to conceptualize a broadly applicable and pedagogy-guiding framework for sustainability literacy assessment, should use SULITEST (the Sustainability Literacy Test), an open online training and assessment tool developed as an international collaborative initiative to evaluate students' knowledge in sustainability critical areas.

Acknowledgement. This article had the support of CHAM (NOVA FCSH/UAc), through the strategic project sponsored by FCT (UIDB/04666/2020).

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The Role of Information Specialists in Reviews for Education Research

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Abstract. In the described dissertation project, the impact of information specialists in literature searches will be examined. A data corpus of current review publications in education research was generated in order to find out what role information specialists have in review processes. This data corpus forms the basis of a textual analysis which examines methodologies used in the identified reviews. Additionally, the analysis identifies if the role and tasks of information specialists are mentioned. To assess the quality of the searches in reviews, criteria for a successful literature search in education research have to be defined in an assessment model. Furthermore, required competencies for a high quality literature search will be determined to build a competence framework.

Keywords: Review · Information literacy · Information specialist

1 Introduction

Reviews enable the synthesis of the current state of research for a specific question and summarize research findings in a systematic way. For a specific problem or subject area, studies and scientific evidence are collected and analyzed in reviews. In short, reviews are studies about studies [1].

This standardized review approach aims to investigate which methods, programs, or techniques actually work and to give information about their potentials and weaknesses. Reviews provide an opportunity to point out gaps in research and, if necessary, to argue for further research. Results from reviews also contain recommendations or support decision-making in practical and political processes. In summary, reviews make an important contribution to the dissemination and usage of research findings [2, 3]. Target groups are researchers, political decision-makers as well as representatives from professional life. The overarching objective for all interest groups is to create an overview of relevant research findings [2]. The increasing number of scientific publications and information overload make it harder for researchers to look for relevant information. Here, reviews offer an adequate solution.

Given demand to identify and present the current state of research in a systematic way, specific work processes have been developed. Major aspects are the collection and the comparison of scientific evidence as well as their assessment by analysis of literature and studies [4].

Reviews have become a separate research method and several types of reviews with different approaches and goals have been developed. Guidelines on literature reviews have been published by institutions such as Cochrane or Campbell Collaboration, and textbooks exist that specify the methods for diverse types of literature reviews [3, 5–9].

Researchers apply different types of review methods in the context of their needs and objectives. It is also important to note that methods are constantly being developed and refined. The lack of knowledge about the methodology can lead to an incorrect use of the terminology. For instance, Grant and Booth have distinguished 14 types of reviews and created an analytical framework. But sometimes the exact methodology is not clear and “may further complicate terminological issues and conceptual understandings about how reviews actually differ from one another” [4]. The recommendation for all types of literature reviews is a systematic approach to literature search in order to avoid bias, to ensure the replicability of the method and to create an extensive overview of the state of research. To develop a standardized work process, guidelines just as handbooks involve detailed and structured steps for every part of the method. In their recommendations, only small differences in their description can be found [3, 5].

In education research, literature reviews have become more and more significant [9, 10]. Due to the field’s interdisciplinary research area and heterogeneous study design, reviews in education research are related to particular challenges. The interdisciplinary nature of education research has effects on literature search and research in education is based on the cooperation with other disciplines such as psychology or sociology [11]. In the interdisciplinary field of education research, literature searches have special requirements. Relevant information is published in various types of publications (journals, essay collection, grey literature) and indexed in different databases [9]. Incorrect searches might lead to bias in reviews or content. In this way, a review could be reduced in its statement and quality. Looking for literature and creating an extensive search strategy demand great effort as well as a high investment in time. While planning a review process, these aspects have to be considered [1, 12]. Additionally, exhaustive search and documentation are quality attributes for all types of reviews. This aspect of methodology represents the elementary basis for a review article. Beelmann emphasizes the high responsibility associated with the creation of reviews since such reviews can only provide reliable evidences on the basis of a complete data set [2]. Consequently, a high responsibility lies in the search of literature.

Since the search process is essential for the compilation of reviews, guidelines precisely define step-by-step procedures. All publications concerning the preparation of literature reviews recommend the consultation of information specialists. Booth, Sutton and Papaioannou close their chapter about searching literature with the following words: “So don’t forget to ask a specialist. [...] They will be able to advise you on how best to search the literature according to your topic area and the purpose of your review.” [3]. Similar advice can be found in guidelines from Campbell Collaboration and Cochrane Collaboration [13, 14]. Both institutions are specialized in the preparation of systematic reviews and give instructions for the review process. They mention the role of the information specialist in the information search process: “It is clear that international

organizations such as the Campbell Collaboration and the Cochrane Collaboration, recognize the importance and value of consulting with an IS during the (un)systematic information retrieval stage of the review process.“ [12].

First of all, it is important to determine the terminology of an information specialist. In American literature, librarians are defined as search experts as well as information specialists. In Germany however, librarians are not information specialists per se and information specialists are not only librarians. The most frequently used term is “*information specialist*” and is related to a professionalization concerning the assignment, but does not require a librarian or information science background. Information specialists have an advisory role during the search process, sometimes conduct the literature search or are part of the review team. As a consequence of their involvement in the review processes, information specialists are sometimes listed as co-authors [1].

Information specialists are considered as key partners in the search process. They are assumed to be qualified to do a professional literature search and have the competencies to know the relevant aspects in information retrieval and specified search tactics required for complex literature reviews. That is the reason for the recommendation to include information specialists in literature search [3, 15, 16].

However, the tasks and functions of information specialists in a review process are very broad, just as the explanation for their involvement is vague and is used as a sort of test seal without questioning their competencies [3, 9, 13, 14]. Moreover, reliable studies have not been able to prove the positive impact of information specialists on the quality of search methods in reviews. Additionally, it is not clear what impact information specialists have in current review publications.

The role of information specialists in review processes and their influence in the literature search has frequently been studied [16–18]. Research topics of the identified studies are the impact of information specialists on the transparency of the method of literature search (also determined as quality criteria) [15, 19–21] and the authorship of information specialists in reviews [22, 23]. All mentioned studies analyzed reviews which were published in the field of medicine and their results are not representative for other research fields.

Furthermore, the findings from the identified studies are not comparable to each other. Because of the use of different approaches to examine the role of information specialists (text analysis, interviews, survey or combination of the methods) and the focus on different disciplines of medicine (findings results from various data bases) no general statement can be made. To summarize, research on the information specialist’s role in review processes has a focus on medicine research and no studies in education research could be determined.

2 Research Question

The role of information specialists and librarians in literature reviews has already been analyzed to some extent, but not in the field of education research. This project aims at identifying the role of information specialists and librarians for reviews in education research.

The research questions guiding the project are:

- Which role do information specialists have in the literature search for reviews?
- In what ways do specialists contribute to the quality of reviews?
- What competencies are required for high quality searches for literature reviews in education research?

The method and the first results of the data corpus are introduced below, the study finished in March 2021. The following figure provides an overview of the main process steps taken (Fig. 1):

State of the art and model development

- **Collection and Analysis** of current review publications
- design a **quality assessment model** for literature searches
- analyse the **approaches in literature searches** in the identified reviews in education research and the role and tasks of **information specialists** mentioned in published reviews

User study

- Conduct a **survey with the authors** of identified reviews and current review projects
- Analyse survey results with focus on **processes of literature search in reviews** and the **role of information specialists**
- Additional **interviews** with people and experts in ongoing **review projects** to test the assessment model

Fig. 1. Structure of the process

3 Methodological Overview

3.1 State of the Art and Data Collection

In order to get an overview of the current methodology of reviews in education research, a systematic and comprehensive literature search was conducted. The results from the search generated a collection of review publications. This data corpus forms the basis for the content analysis. The analysis focuses on the search quality as well as the role of information specialists.

Data Corpus

A comprehensive literature search was conducted and the data set was created with the collaboration of another doctoral student at DIPF. The data corpus includes reviews from the field of German education research spanning the period from 2014 to 2019. Our selection of search terms is based on the definition of review types from Grant and Booth in “A typology of reviews” [24]. Figure 2 presents an overview of used search terms.

Literature Search

The following table shows details on the search syntax (usage of terms and filter options) (Fig. 3).

Since the objective was to find reviews from education research, the following databases were chosen:

Literature Search

Critical Review	Literature Review	Mixed Studies Review	Systematic Literature Review
Forschungsreview	Literaturüberblick	Qualitative Evidence Synthesis	Systematischer Literaturrreview
Forschungssynthese	Literaturübersicht	Qualitative Systematic Review	Systematic Map
Integrative Literature Review	Mapping Review	Rapid Review	Systematic Review
Integrative Review	Meta Synthesis	Research Review	Systematic Search and Review
Literaturanalyse	Metaanalyse	Research Synthesis	Systematische Übersichtsarbeit
Literaturauswertung	Meta-Analysis	Scoping Review	Systematischer Review
Literaturbericht	Metasynthese	State-of-the-Art Review	Systematized Review
	Mixed Methods Review		Übersichtsarbeit
	Umbrella Review		

Fig. 2. Search terms for types of literature reviews

Database	Usage of review terms			Limitation to education research		Filters	
	Term used as keyword	Term used in free-text field	Term used in title-field	education* Erziehung* Bildung* (Keyword)	"education* research" (Free-text field)	Content-related filter (Subject classification, categories, DDC, etc.)	Location
FIS Bildung Literaturdatenbank	x	x	x				
BASE	x + "Review" (individual search)	x	x	x		x	x
SocioHub	x		x	x			
ERC			x		x		
SSOAR	x	x	x				
Web of Science / Social Sciences Citation Index	x	x	x			x	x
DNB	x		x			x	
ERIC	x	x	x				x
Scopus	x		x			x	x

Fig. 3. Usage of search terms for the individual databases

- ERIC (Education Resources Information Center)
- FIS Bildung Literaturdatenbank (German Education Index)
- ERC (Education Research Complete)
- Web of Science/Social Sciences Citation Index
- SSOAR (Social Science Open Access Repository)
- SCOPUS
- Socio Hub (Specialist information service sociology)
- DNB (Catalogue German National Library)
- BASE (Bielefeld Academic Search Engine)

The literature search was conducted from June to July 2019. In October of 2020, we added publications from 2019 and did a second search. The results of those searches are given in the following Tables 1 and 2.

Table 1. Results literature search 2014–2018

Database	Result
BASE (Bielefeld Academic Search Engine)	318
DNB (Catalogue German National Library)	209
ERC (Education Research Complete)	1559
ERIC (Education Resources Information Center)	35
FIS Bildung Literaturdatenbank	1639
Scopus	803
SocioHub (Specialist information service sociology)	1070
Web of Science/Social Sciences Citation Index	389
SSOAR (Social Science Open Access Repository)	347
In total:	6369

Table 2. Results literature search 2019

Database	Result
BASE (Bielefeld Academic Search Engine)	721
DNB (Catalogue German National Library)	93
ERC (Education Research Complete)	768
ERIC (Education Resources Information Center)	13
FIS Bildung Literaturdatenbank	151
Scopus	241
SocioHub (Specialist information service sociology)	343
Web of Science/Social Sciences Citation Index	35
SSOAR (Social Science Open Access Repository)	34
In total:	2399

As is common in systematic reviews, we did our first screening of the data corpus to exclude non-relevant publications. Two different screening stages were carried out: *I. Screening*

First, duplicate titles were excluded by using data from bibliographic dates and the titles with more detailed descriptions were kept. Only German and English language titles were included because of the usability for the authors. After that, particular types of documents were excluded: working papers, reports, written statements and presentations.

In the generated dataset, a high amount of journal articles were identified. To include only journal articles related to education research, a list of journals regarding the subject area of pedagogy, created by the Electronic Journals Library, was used: (<https://ezb-uni-regensburg-de.ezproxy.dipf.de/fl.phtml?bibid=DIPF&colors=7&>

[lang=de¬ation=D](#)). All titles in the dataset, associated with the list, were kept. Titles which were found by the databases ERIC and FIS Bildung Literaturdatenbank were kept automatically, because these databases only record journals from education research. The titles which are not journal articles were not considered in this step. In the last step, the data set had to be reduced to German education research. As a consequence, the documents are examined according to the criterion of whether the authors were active at a German institution at the date of publication. Documents without this connection were excluded. The final data set and its documentation will be archived in the Research Data Centre for Education (<https://www.fdz-bildung.de/home?la=en>).

First Screening Results

The results of both searches were merged in one dataset (9009 titles) and screened with the method as described above. Hereafter, the different screening steps are collected with their number of excluded and kept titles (Table 3).

Table 3. Results 1. Screening

Screening process	Excluded titles	Included titles
Check of duplications	2210	6799
Language	60	6739
Type of document	32	6707
Exclusion of journal titles	3393	3314
German education research (checked by authors affiliations)	2101	1213
The final dataset contains 1213 titles, published from 2014 to 2019		

Second Screening

After the first screening process, the resulting dataset was screened using the terms of review types. Only titles were kept which contained the search terms in the field of title, subtitle or abstract. The second screening aimed at identifying the most relevant reviews. They will be analyzed with the methodological approach of qualitative content analysis.

2. Screening Results

The second screening excluded all titles without the mention of the used search terms in the field of title, subtitle or abstract. Titles without reference to the terms were excluded. In total 773 titles were removed from the collection. After that, 499 titles remain in the dataset and are the basis for the subsequent text analysis.

3.2 Model Development and Application

Quality Assessment Model

To define a high quality literature search, a model had to be developed which considered all requirements in education research. Assessment models and guidelines for the aspect of literature search exist, but only for the research field of medicine.

Models like NICE, ROBIS or AMSTAR include some aspects regarding the literature search, but are insufficient to assess the approach of literature search in a detailed way [25–27]. The PRISMA-S checklist is more specialized for literature search. This checklist includes 16 reporting items which can be examined to ensure that all parts of a literature search in a review are completely reported [28]. Nevertheless, the examples in the checklist refer more to search strategies for reviews in the field of medicine than to social science. PRESS (peer review of electronic search strategies) is another checklist concerning the assessment of search strategies [29]. This checklist is a guideline for examining the search and offers recommendations for the usage of Boolean operators or search terms. However, this tool, too, is created for literature searches in the field of medicine.

In the present project, the existing guidelines and checklists were used as a basis to synthesize the findings of the models and collect the most important elements of the literature search in reviews. Models of information behavior are subsequently added. Information seeking is an important aspect of information science and some strategies are transferable to reviews like the *Search Formulation Tactics* or *Term Tactics* by Bates, which helps to generate a systematic search strategy and a successful recall and precision [30]. One conclusion could be that the models and checklists suggest the same approaches for literature search or differences could be identified.

Following the synthesis, a quality assessment model for literature searches in education research will be modified. Recommendations from handbooks and guidelines on reviews will be included in this model.

The quality assessment model will be used for the qualitative text analysis. To examine the approaches in the literature searches of the collected data set of reviews, the model provides different categories. These categories comprise different steps of literature search based on the model of the synthesized checklists.

Competence Framework

To conduct a high quality literature search for reviews, different competencies are required. A general framework with a set of core competencies exists for librarians [31]. The framework is too general to serve as a profile of skills. Yet, information literacy and knowledge about information retrieval, the information landscape and search strategies are essential. Moreover, it is necessary to know the methodology of reviews and the work processes in this research method. Based on the results of research of information literacy, a competence model is suggested here that contains the most important competencies for the different work processes in reviews.

3.3 User Study

Assuming that not all information about the literature search process and who conducts the search are published in the reviews, a survey with the authors of the identified reviews is planned. The study of Meert in which the role of information specialists in review processes was examined showed that authors of reviews indicated the involvement of a librarian in the interviews more clearly than it could be determined in their review publications [20]. This suggests that not all authors mentioned the impact of an information specialist in the review process in their publication. The doctoral project will address this issue by means of an author survey. In addition, expert interviews are useful since some reviews in the data set were published five years ago and the reproducibility of the search method is difficult. Probably, the influence of a librarian's advice or the role of an information specialist was forgotten.

4 Conclusion

Given the results from the screening process, a valid data set for my research questions was created. It is obvious that not all existing review publications in education research could be identified in the created data corpus. Because of the mentioned interdisciplinary nature of education research not all titles are searchable in the used databases. However, the dataset gives a sound overview of the main review publications and gives an insight into the common methodology of reviews in education research. Additionally, the data corpus provides the basis for further research studies. To give researchers access to that dataset, all relevant documents are available via the Research Data Centre for Education (<https://www.fdz-bildung.de/home?la=en>). The applied strategy for literature search is also transparent and the archived documents openly accessible. This enables researchers to retrace the dataset at all times.

The next steps in the project will involve qualitative text analysis, a survey and testing of the new model. The research might thus contribute to an improvement of reviews in the field of education research. The model could be transformed into a checklist with evidence-based advice for a qualified research and improved research procedures in the field of education.

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


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Designing a Phenomenological Study on the Information, Scientific and Academic Literacies of Consolidated and New Researchers

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Abstract. This paper presents preliminary findings of a phenomenological research aimed at gaining insights into: a) what it means to be a researcher; b) the characteristics, tensions and intersections between the praxis of research (represented by the challenges and requirements of research evaluation) and researchers' subjectivities (ideals, personality, practices, habits, skills, stages of evolution) and how they affect each other; and c) the process of developing professors as researchers, emphasizing their information, scientific and academic literacies (ISAL). The data collection was conducted through in-depth interviews with 14 members from the seven disciplines of the Mexican National Researchers System on their experiences as accredited researchers and trainers of researchers. The hermeneutic data analysis performed was based on emergent categories from the interviews and the preliminary results offered in this article were limited to the stated research aims, with a particular focus on the development of ISAL in researchers. As such, the results we present in this article are categorized in the following manner: a) what it means to be a researcher; b) the praxis of research and researchers' subjectivities; and c) researchers' development and their ISAL.

Keywords: Researchers · Phenomenology · Informational literacy · Research skills

1 Introduction

The training of new researchers is a necessary and important task for higher education institutions (HEI) that are committed to forging professionals with the skills to publish quality scientific articles in high-impact journals. This research sought to identify the intersections between research subjectivity and praxis in the training of new researchers and in the careers of researchers already trained. Subjectivity is understood as a constitutive part of the person, related to their conscious and reflective dimensions [1]. Such dimensions originate in the individual's internal dynamic processes that include their emotions and lived experiences, which lead to their rational character [2]. In contrast, the praxis is understood as the practical activity of doing, a cognitive act through which

the person modifies their actions to achieve a balance between the subjective or theoretical and the objective or practical [3]. Regarding the training of new researchers, it is necessary to study this intersection between researchers' competences (ideal skills and characteristics) and their daily realities as human beings, to identify the needs related to the process of training new researchers, who should be competent in overcoming the professional challenges involved.

Regarding the subjectivity of the research process, in Mexico, the governing body in charge of research is the National Council of Science and Technology (CONACYT), which promotes innovation, research and the technological development in the country, through programs such as the National Researchers System (NRS), whose objective is to strengthen research at the national level, through the consolidation of productive researchers and the payment of a monthly financial stimulus, the amount of which depends on the level reached in the System. For this reason, the NRS sets the guidelines to be followed by those researchers in Mexico who conduct research and teaching in HEIs, through their evaluations for admission and continued membership [4].

In order to be a member at the NRS, the researcher must meet established requirements, such as the publication of five articles in indexed journals during the last three years prior to their evaluation [5]. To meet these requirements and being accredited as a researcher, the subject would ideally have skills related to information, scientific and academic literacies (ISAL), as they are closely related to any research endeavor. We use the concept of ISAL as a set of skills that are originated, but go beyond information literacy (IL), which in turn refers to the ability to search, find, interpret, analyze, manage, store and use information properly in all its forms [6]. Therefore, we conceive the concept of ISAL as the skills necessary to use and manage information, with the help of other literacies, such as academic and digital literacies. IL helps researchers have the ability to use the best sources to support their research, transform data into knowledge, and be able to communicate their research results appropriately and under ethical guidelines. ISAL would add specialized skills that support the processes of writing, production, communication, publication and dissemination of knowledge. The appropriation of such activities will ideally cause changes in the epistemic paradigms, which will be identified by a change in the way of thinking and acting on the part of the researcher [7].

The present research originated from the question: Who is a researcher? Several takes on this question are discussed in the specialized literature, for example: a researcher is one who seeks the truth, as well as solutions to the problems in their environment, and for this they must develop certain skills that are developed through constant personal effort [8]. In addition to this, it is necessary for the subject to have the relevant skills related to scientific writing, methodological issues, data collection and analysis, which may vary depending on the area of knowledge or paradigm in which they are located.

Research is also a constant process of practice and training, initially carried out through the relationship and exchanges between a consolidated researcher and a researcher in training, usually within the framework of a graduate program that conceptualizes research as a way of understanding the life, culture, and the world [9]. Regarding the process of training new researchers, the interaction with a tutor plays an important role for the apprentice to develop certain disciplinary practices, while the role of the tutor is to accompany them during the training process, evaluate their research progress and

assist them through dialogue, seminars, workshops, consultancies for the resolution of doubts, decision-making, and evaluation of their compliance with an expected scientific rigor [10, 11]. Due to this, the tutor is a key piece in the training of the researcher, where a process of mimicry occurs through which the practices and judgments that shape the profile of the new researcher are acquired [11].

To become a researcher, a subject will need to overcome an arduous training process (and then work constantly), where there are intersections between the subjectivity, which we conceive as evaluation systems' guidelines, and the praxis, corresponding to the reality faced by the researcher in their daily life and the ways they manage to handle the demands established by such systems. ISAL's development could facilitate and enrich the training processes, in addition to helping the trained researcher to deal with the subjectivities and praxis of their work.

2 Methodology

This research used a qualitative methodology with a phenomenological approach, which sought to recognize the structure of an experience, through the analysis of the personal narratives of individuals who may have lived or experienced the phenomenon [12]. The purpose of this type of study is to understand the phenomenon from the personal perspective of each subject, through in-depth analysis of the participants' experiences. We chose to use this approach because we were interested in knowing what the process of becoming a researcher meant and implied for each of the participants, in addition to determining what influenced them to train others. As such, we sought to better understand what it means to be a researcher, as well as the process of developing a research career. This allowed us to provide perspectives and elements that may contribute to developing training models for new researchers, also focusing on the ISAL that could enhance the work of the researcher in their different stages of development.

The research consisted of three phases. The first involved developing a semi-structured interview, with the help of the reviewed sources. The choice of the interview as a data collection instrument was due to the methodological demands of the phenomenological approach, since it stimulates dialogue between the researcher and the subject [13]; in addition to allowing the emergence of new questions throughout its application. For the formulation of the questions, we considered the specialized sources related to researchers' training and challenges, in addition to other phenomenological studies of different areas of knowledge, mainly those that inquired about the experiences of the subjects themselves, about how they developed certain types of skills and how they felt about them [14, 15]. The interview carried out consisted of 26 questions around the following themes, which emphasized interviewees' personal reflections on their experiences, feelings and being: a) what it means to be a researcher (this main theme was partly inspired by one of the sources available [16]), which was investigated by asking such a question at the beginning of the interview and complementing this at the end of the instrument, with the use of the reflective exercise One Sentence, One Word (1S1W) [17]; b) experiences of the individual as a researcher in their training and development processes as such, including the acquisition of ISAL, as well as what motivated them and continues to motivate them to pursue a research career, apart from how, why and

when they decided to dedicate themselves to this; c) how they perform in their research field and what they enjoy the most about the research process; d) how they adjust to research demands and how they manage the challenges involved; and e) characteristics of their influence on others, as well as their experiences and challenges in training new researchers.

The second phase of research consisted in applying the interview to 16 researchers belonging to the Autonomous University of Chihuahua (UACH, Mexico) from different fields of knowledge (humanities, social sciences, engineering, medicine, and natural sciences) who at the time of the interviews were members of the NRS (levels 1 and 2). Each interview lasted approximately one hour and thirty minutes, where they were asked about their training processes as researchers, the interaction with their tutors and their influence, the evolution throughout their research career, and the influence they have had on other researchers and their tutors. The third phase, corresponding to the data analysis, included the manual transcription of the audio-recorded interviews and the open coding of the data obtained, from which we generated the following main initial categories of analysis: a) characteristics of the researcher; b) skills; c) influence of their environment; d) training of new researchers; and e) evolution as a researcher. Subsequently, we proceeded to carry out a hermeneutical analysis of the data, the preliminary results of which we offer in the next section of this article.

3 Results

As mentioned above, the interview data was grouped into different categories. This section summarizes the preliminary results of this research, using the following categories: a) what it means to be a researcher; b) the praxis of research and researchers' subjectivities; and c) researchers' development and their ISAL.

3.1 What It Means to Be a Researcher

The first category: what it means to be a researcher, covered the data related to the meaning that the subject grants to their experience as a researcher. The answers obtained were related to having intellectual curiosity, discipline, pursuing the constant search and creation of knowledge that does not exist or is not available in the respective research area, to share it through oral and written expression and thus contribute to the development of a scientific field. Furthermore, the interviewees highlighted that doing research generally means work and sacrifice. We applied the 1S1W exercise by asking them to summarize in one sentence what it means to be a researcher and then to do the same but summarize it in one word. The first part of this exercise resulted in sentences such as:

- “Ethics, professionalism, responsibility. A series of values that together they ensure that whatever you do, either within or without research, will be something of quality” (Interviewee 4).
- “Being a researcher means following a path of searching for answers, as a personal choice, to many of life’s questions” (Int. 8).
- “Arduous work, passion for what you do and being willing to always give more than what you would think you’re capable of giving” (Int. 9).

- The sentences from eight interviewees dealt with knowledge generation, with statements such as: “the privilege of generating new knowledge” (Int. 5), “the responsibility of using your competences and skills for developing knowledge in an ethical and responsible manner” (Int. 11); and “a generator of new knowledge who is committed to their discipline, under the strict standards of scientific research” (Int. 12).
- Three sentences centered on providing contributions, which were: “provide reflections for the improvement” (Int. 2); “the most assertive, the safest way for contributing and addressing problems, achieve changes, transform contexts” (Int. 3); and “personal progress and the contributions that I may bring to society” (Int. 6).
- Two sentences involved learning: “learning from any of the branches of life” (Int. 10); and “the passion for understanding the world around you, from your own discipline” (Int. 13).

Given the sentences provided, we created six categories that can summarize them, as being a researcher means: a) being a generator of knowledge; b) doing hard work; c) having a passion for what you do; d) continuing on a path of searching for the answers to the questions that life poses to us; e) learning and understanding the world around you from your discipline; and f) providing meaningful contributions for the improvement of the context, of society and even for the researcher. The words that interviewees associated with being a researcher included commitment, creativity, curiosity, development, faith, innovation, knowledge (two researchers provided this word), learn, open-minded, provide, reality, seeker, truth, and unprejudiced.

3.2 The Praxis of Research and Researchers' Subjectivities

In the second category, on research subjectivity and praxis, we tried to understand how these intersect and how they affect the life of the researcher. We started asking participants what were the reasons that led them to become researchers, among which we found that there were economic factors, their search for recognition, curiosity, looking for job opportunities, and to influence others. As for what continues to motivate the researchers interviewed, there are those who have taken a certain liking to research work. In addition, economic stimuli play an important role, since some of them refer to the fact that they require the additional income that comes from the NRS to be able to maintain a certain quality of life. Moreover, belonging to the NRS is also related to workplace requirements. We also found intrinsic motives, such as trying to improve, achieving professional success, obtaining recognition, being able to share knowledge with others, and helping in the training of students as future researchers.

Regarding what they most enjoy during the process of doing research, responses included the publication in top-level indexed journals, which was even described as being one of the main pleasures of researchers, since it implies the culmination of a project by making it visible to the world. The training of human resources was also an important factor, because it allows sharing what has been learned with future generations of researchers. They also indicated that they enjoyed learning new things and those within the natural sciences expressed enjoying the experimentation process carried out in the laboratory to a great extent.

Regarding the adaptation to the demands of their life as researchers, participants expressed that they constantly struggle to comply both with the parameters required by their institution of affiliation and with the NRS' requirements to continue as members of the system, as they differ. Even though we have focused on the NRS, Mexican public university professors are subjected to at least two additional periodic evaluation processes. Research professors must then fulfill the expected obligations of a full-time professor, which include teaching, research, extension, and administrative duties. For those who belong to the NRS, research activities become even more demanding and having good time management skills is vital for meeting the requirements of life as a researcher, without neglecting the basic needs of the person and their family. Some of the interviewees referred to this as a struggle with the time and resources to carry out all their activities appropriately.

All interviewees commented on the ways in which they overcome the challenges that have presented to them throughout their career, noting that having patience and discipline are very important, since dedicating themselves to research has a high emotional and physical cost. Some even develop health conditions related to stress and the levels of pressure they handle, due to the demands of the evaluation systems and those of their institution. The latter often makes it difficult to have an adequate amount of time for conducting research, since teaching and administrative workloads are often too heavy. Therefore, there are factors that make research work even more arduous, forcing them to juggle with their available time to comply with all demands.

3.3 Researchers' Development and Their ISAL

Under this category we gathered data related to the development of ISAL in researchers. We consulted the interviewees about which ISAL areas, topics, and skills a researcher should excel at. Their responses were the following:

- Thirteen interviewees referred to information seeking and retrieval from specialized resources. Eight mentioned the importance of managing the vocabularies, models, and paradigms of their respective fields of knowledge. Five of them referred to planning and implementing research processes, including proposing questions and hypotheses, designing instruments or experiments.
- Two of them highlighted the importance of using specialized vocabulary for searching. One researcher stated that "if you are not good at searching for information, you are not good at posing research questions that are novel and that allow you to provide worthwhile contributions" (Int. 13).
- Seven participants highlighted the skill of using information, two of them mentioned the importance of reading and synthesizing, while other responses included: application of the information, ethical use, comprehension and consuming the contents of the sources.
- Five interviewees centered on the importance of scientific writing. One of them expressed that "starting with writing, if you don't write, if you don't publish your research, then you just wasted time and money (...) in order to publish you need to plan a sound methodology, performed a good analysis, but writing (...) if we don't write correctly, no one is going to publish it" (Int. 5).

- Four researchers referred to information management and organization, one of them highlighted the growing importance of dealing with large amounts of information, and being up to date with the information of the respective field of knowledge.
- Three interviewees mentioned the skills necessary to cite correctly, the importance for researchers to be able to disseminate their research results to society, the use of information and communication technologies (ICT, including software and hardware), being able to collaborate and work in teams, and the evaluation and identification of quality information sources. One of them stated “differentiate between valid and non-valid documents and then the capacity of digesting their contents” (Int. 1).
- Other skills that were mentioned by one interviewee per topic included: altmetrics, bibliometrics, manage researchers’ online profiles, open access, recognize where to publish.

Hence, we could organize these ISAL into six skill areas: a) mastery of the technological or digital skills required for using research software and hardware; b) use of the disciplinary language of their respective areas of knowledge; c) scientific writing skills; d) information skills for properly searching, using and managing information of quality; e) scientific and methodological skills, for example for posing research questions and hypotheses and carrying out a research process derived from these; and f) teamwork skills. Although nine researchers needed a clarification of the term ISAL when they were asked about which of these skills are required by any researcher, all of them agreed that ISAL are necessary to function in the world of research. This is in order to be sure that the work being published is supported by an appropriate theory. Researchers generate specialized knowledge aimed at meeting the needs of a certain environment or stratum, which is why it is essential to have capable and literate researchers in the aforementioned skills. Regarding their development as researchers and their acquisition of skills, the interviewees provided large amounts of information from their personal stories and from this we drew the following preliminary categories, because the final analysis will be conducted more deeply at a later stage. Such emergent categories included the following:

- The importance of the influence of a supervisor, tutor, mentor, or colleague who facilitated the development of their skills and careers; some of them taught them what to do, while others provided models of what not to do.
- Older researchers stressed that they struggle with trying to keep up with new ICTs, but they acknowledge their importance.
- Given interviewees’ stories of their own development as researchers, the evolution of the researcher may be divided into five stages: unfamiliarity, involvement, dependence, emancipation, and recognition.
- ISAL skills are among the basic training needs and requirements for any researcher in training, although they are not usually taught systematically or as part of formal educational programs at HEIs.
- Researchers in training should develop their ISAL while they are also learning about their discipline and the application of the scientific method to design research, ideally with the guidance of a senior researcher, while at a later stage, they must conduct research more independently.

- Consolidated researchers must be able to easily design and describe research proposals in a clear way and present their results concisely, both in Spanish and in English, and should be able to procure funding for their research.
- Researchers have a growing concern about disseminating their research and providing solutions to society, but this is not easy; and
- There are other important skills to develop related to social skills, resilience, perseverance, and coping with the stress and the requirements of researchers' professional and personal life, as well as between research praxis and subjectivities.

4 Discussion

Researchers' identity implies some idealism regarding their skills and capabilities, for which is difficult to think that there are enough favorable conditions to fully support their development. However, they should be seen not as mere instruments that their HEIs use for ranking purposes, but as entities with enough creative capacity and will to develop their work. Researchers must learn to develop their own identity as the result of a long developing process which involves practice and education [11]. We can identify two basic routes for this identity construction: a) cultural, in which subjects define their scientific scenarios and interests; and b) educational, with concrete actions aimed at learning and the development of research skills [18]. ISAL are important for both culturally, because they foster a scientific vocation, and educationally, within the development of scientific skills.

In these types of situations, we can see some intersection points between research subjectivity and praxis, although one of the reasons for conducting research is to contribute to a community, there is also a need to remain active in the academic world through high research productivity rates. However, this could trigger the development of lower quality research products, if only to comply with the demands dictated by evaluation systems such as those of the NRS. But if researchers have certain research-related cognitive and disciplinary skills, they could better meet those requirements [19], achieve better research results and a higher scientific impact. Some of these skills can be identified within the conceptualization of ISAL that we have proposed in this research.

The insertion of appropriately trained researchers in HEIs and their performance in academic and scientific environments is multifactorial, where we can find personal reasons behind their involvement as well as other reasons that have to do with their acquisition of certain knowledge and skills, or even with organizational characteristics of the HEIs where they conduct research, which are related to support policies such as funding, human resources development, collaboration and tenure [20]. However, the training of researchers demands the presence of formal educational programs, both curricular and extracurricular, all of which require the development of ISAL for the main three stakeholders: a) graduate students; b) highly qualified professors participating in graduate programs; and c) scientists in general [21, 22].

ISAL training programs tend to be wide regarding their description of the skills that a researcher must acquire to be competent or literate, as they generally center on information and digital skills in a general manner. Research skills are more complex, and they have arguably increased in time with developments such as open access and open

science; such skills include data analysis, study and experimental design, experimental performing, paper writing, software and tools, theory analysis, paper reviewing, data collection, supervision, funding acquisition, self-archiving, and data management [23], which might be acquired separately. However, if they are related and inserted within ISAL training programs, the educational results might be more significant.

The main reason researchers publish is to develop and share new knowledge [19], but this leads us to the need to also understand if there are other reasons why researchers conduct research and publish their findings. Studying these issues, ‘why research’ and ‘why publish’ allow us to identify that there are extrinsic reasons, such as professional recognition, obtaining funding and the infamous phrase ‘publish or perish’, in addition to intrinsic and even philanthropic aspects, such as helping others, training students, and pursuing professional growth [19].

For a researcher it is favorable and even necessary to have ISAL because they must, at least, have: a) digital skills for using computing devices and software; b) scientific and academic skills for employing the disciplinary discourse of their respective fields of knowledge; and c) scientific writing, informational and critical thinking skills. Several sources highlight the need for developing researchers with good IL levels because it represents advantages and facilitates their work [8, 24–26]. These types of skills are integrated into the cognitive tools and techniques that give them the ability to convert data into knowledge, which has been associated with concepts such as data-based reasoning [24]. Additionally, there are at least six kinds of barriers that have been identified and that may affect researchers’ activities, which were also present in the concerns of the interviewees: a) individual; b) professional; c) facility; d) financial; e) scientific; and f) managerial-organizational [27]. Although it is very complex to solve these barriers, the development of ISAL may aid in alleviating part of them, at least those elements where any given set of ISAL skills can better prepare individuals to cope with the challenges, such as the use of ICTs to be more organized, keep a calendar, manage references, or being more aware of the elements that define the quality of a scientific journal.

A researcher is a reflective entity willing to be put to the test and with enthusiasm for understanding the world that surrounds them [25]. But, for a researcher to successfully meet the requirements of evaluative entities, they need certain cognitive and disciplinary skills [8, 19, 24]. In our case, we were interested in analyzing the skills that we include under the ISAL concept. From an individual perspective, a researcher is an active, reflective entity, who likes to be put to the test and therefore is willing to overcome barriers and is also enthusiastic about understanding the topics that interest them [25]. From a collective perspective, we found that the coexistence of the researcher in training with their peers or with their tutors is of utmost importance for the acquisition of the scientific habitus and disciplinary discourse [11, 25]. For UACH teachers, being a researcher means hard work and constant personal sacrifice, as well as emotional and physical exhaustion, caused in part by working and publication demands in Mexico.

In addition, we must not forget the need for developing good social skills, such as networking skills and social intelligence, important for collaboration and socialization with others (essential for researchers’ training processes), as well as oral communication skills that allow sharing research results in front of people [24]. Therefore, researchers’ work is supported by a wide variety of skills, including the importance of coexistence

with others for their own benefit, and for the acquisition of certain research skills. It has been pointed out that coexistence between the researcher in training and their tutor is vital, since the training process implies a process of mimicry [11]. Throughout this process, the trainee acquires their identity as a researcher and a scientific habitus, which occurs through induction and co-option, known in tandem as the training processes that involve coexistence with the tutor and associated disciplinary groups, by developing research projects and publishing their results [11]. Hence, researchers' work is supported by a wide range of skills and by the conditions of their institution of affiliation, which aid and allow them to improve their scientific production and collaboration practices, something that is not possible in inadequate contexts [28].

5 Conclusion

The main intention of this article was to offer preliminary results on our research on what it means to be a researcher and which skills researchers in training need to develop, with an emphasis on what we found regarding ISAL. According to the interviewees, being a researcher requires intellectual curiosity, discipline, and the constant search for and creation of new knowledge; it means work and personal sacrifice.

Regarding the present research and the results found in the interviews applied to professor-researchers at UACH, we found that it is important to know the implications of research subjectivity and praxis in the life of university research professors, because these constructs mark the guidelines to be followed by individuals during their lives as researchers.

Training new researchers is required for a country's social, technological, and economic development. However, their development is a complex phenomenon, since being a researcher is an arduous task that requires a lot of psychological, intellectual and physical effort. According to the majority of the interviewees, the most common reasons that lead researchers to dedicate themselves to this type of work consist of obtaining economic stimulus and the ideal of obtaining personal and professional recognition.

Research is carried out to solve problems in the immediate environment, but it is also motivated by researchers' desire to better themselves and to help others become researchers, for which research endeavors are influenced by extrinsic and intrinsic reasons. We believe that to be a researcher, it is useful to acquire ISAL and therefore they should be emphasized within researcher training processes. Therefore, training programs must include the development of these skills and consider the implications of subjectivity and praxis in the life of the researcher. Likewise, the evaluation models should be rethought based on considering the availability of time, burdens, personal needs, and the negative consequences for physical and mental health brought by high levels of stress and workloads.

Based on the data analysis of this study, the opportunities to continue this line of research would include activities based on the results, such as proposing recommendations to formulate a training program for researchers. The application of such a program could give rise to a future investigation that monitors the career development of these new researchers who participate in such training, specifically in terms of their institutional achievements and indicators of scientific production. This type of research could

contemplate the application of surveys at different moments of the training and conduct individual bibliometric evaluations.

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Information Literacy in Different Contexts



New Information Literacy Horizons: Making the Case for Career Information Literacy

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Abstract. A literature review on the broad theme of information literacy and work was undertaken between January and April 2021 as part of an on-going doctoral study. The purpose of the literature review was to explore extant research on workplace information literacy (WIL) and related areas, including employability information literacy (EIL). The main findings of the analysis are that WIL is an umbrella term for the study of IL in workplace settings, and that EIL research aligns most closely with graduate entry to the labour market. The latter is formulated through three lenses, articulated here as: (1) community and library; (2) higher education; (3) employer. Published work on IL to support lifelong sustainable employability to reflect the notion of ‘career’, however, is scant. It is proposed that this gap in knowledge should be addressed in future work through consideration of career IL (CIL) as a separate stream of IL research. Here the term ‘career’ should be understood as a meaning-making device that interweaves work-related experiences into an on-going personal development project.

Keywords: Information literacy · Work · Employability · Career · Lifelong

1 Introduction

Several researchers have noted that traditional information literacy (IL) scholarship has focused primarily on the exploration of the meanings and applications of IL within the library and higher education domains [1]. In recent years, however, new horizons have been identified for the advancement of IL scholarship. Of note, IL is explored in workplace contexts [2], and researchers have called attention to the role of IL as part of complex information lives [3, p. 2]. A particular area of interest is employability IL (EIL). This applies concepts of IL to the experiences of those who are not yet employed, but preparing to enter the workplace [4, p. 79]. EIL researchers also explore means of enhancing the employability of individuals through targeted IL instruction [5, p. 66]. Outputs from EIL research add to the WIL literature through consideration of meanings of ‘work’ beyond the physical and conceptual boundaries of the workplace, and the building of narratives around unemployment, school-to-work transitions, and employability training within community contexts [6, pp. 1–15]. None of this prior research on WIL and EIL, however, deals with the overarching idea of ‘career’, nor the development and learning needs of individuals across their work lifespan as implied in the

term ‘career’, whether this be in paid employment or other life roles such as studying and caring. Instead, the focus of the extant WIL and EIL literature falls exclusively on IL for the purposes of *working* or *preparing to work*.

The primary aim of the literature review work undertaken in preparation of this paper was to explore the extent to which prior IL research has been concerned with the notion of work in its conceptual, temporal, and spatial manifestations. Attention was paid to prominent themes related to work with a view towards mapping points of divergence and agreement in the field, and identifying gaps in knowledge where more research would be valuable.

The main finding from the literature review reported here is that IL in the workplace has received considerably more research attention than IL for employability purposes, and that there are some key links and divergences between these two related areas of scholarship. The former is reserved for IL in organisational settings, whereas the latter is concerned with a defined set of employability attributes in specific circumstances, namely IL for job seeking and entry to work. Missing from this combined body of work are understandings of ‘career’ as an on-going personal development project, whereby individuals engage in lifelong career development and learning, and take action towards their long-term career development goals. This finding may be considered surprising given that career development necessitates the application of information behaviours and IL competencies for comprehension of personal career preferences and aptitudes, and the world of work at large. There is thus an opportunity to develop the notion of another type of IL related to work, and the contribution of the research presented here is to argue for consideration of career IL (CIL) as a separate area of IL research.

The remainder of this paper will be structured as follows. First, common definitions of ‘career’, ‘work’, and ‘employability’ are reviewed. Then, the methodological strategy for the literature search is outlined. Following this is an account of the findings drawn from the literature on WIL and EIL. Finally, arguments for the inclusion, and development, of CIL as an additional and distinct area of IL scholarship are presented.

2 Discerning ‘Career’ from Notions of ‘Work’ and ‘Employability’

While the terms ‘work’, ‘employability’, and ‘career’ often appear in IL publications, these are rarely defined, and interpretations of the terms for different purposes are rarely made explicit. Occasionally, the terms are used interchangeably. This may imply that they are common denominators of the same phenomenon. Their meanings can thus only be inferred on the basis of the wider thematic focus of publications and their use alongside better established IL discourses. In fields other than IL, however, there are agreed, generalist definitions which indicate that there are substantial differences in the etymology of ‘work’, ‘employability’, and ‘career’. These differences, in turn, have implications for the ways in which the terms may be approached as subjects of study across different disciplines. It is thus important here to consider their distinctiveness, both in the wider literature and that related to IL as reviewed for this paper:

- *Work* is current and temporal, and refers to the fulfilment of prescribed tasks by employees in an organisation [7, p. 7]. Work is therefore a term that is reserved for phenomena observed in workplace settings bounded by organisations.

- *Employability* is commonly framed as a set of qualities and competencies that are required to gain employment and remain in employment, whilst also meeting the changing needs of employers [8, p. 199]. Employability skills are verified using external frames of reference. They shift continuously to accommodate changes in the labour market.
- A *career* can be understood primarily as the sequence of an individual's employment-related experiences ordered through time and space [9, p. 67]. Furthermore, a career is an on-going personal development project, whereby individuals engage in life-long career development and learning, and take action towards their long-term career development goals [10, pp. 22–25].

The literature review findings to be reported here indicate that the operationalisation of WIL and EIL in the IL literature are mostly consistent with these definitions. WIL deals explicitly with experiences of IL within the workplace, and EIL is governed by external frames of reference that determine the meanings and measurable parameters of 'employability' across a range of settings. It will become evident, however, that 'career', as articulated above, has not been a significant part of IL scholarship thus far. There are two main arguments for its inclusion alongside WIL and EIL. These are to encompass the notions of (1) empowerment through meaning-making and (2) emerging gaps in the IL literature.

3 Methodology

The literature search and review reported in this paper was conducted between January and April 2021 as a preface to a larger empirical study (as part of an on-going doctoral study). The broad purpose of the work undertaken was to explore the extent to which prior IL research has been concerned with the notion of 'work' in its conceptual, temporal, and spatial manifestations, and to establish points for interdisciplinary inquiry into the broad theme of IL and work. In particular, the intention was to ascertain the extent to which IL research has incorporated discussions of employability and careers beyond paid employment settings, and the extent to which career development and learning terminology has entered IL discourse. Due to the interdisciplinary nature of the larger research study to which this literature review contributes, the focus was on research outputs.

A targeted literature search was performed on a university library catalogue that provides single sign-on access to multiple academic databases such as Web of Science, Taylor & Francis, ABI/INFORM, and Emerald (using the ExLibris Primo library discovery service). This allowed for thorough coverage of relevant sources to be achieved. Variations and combinations of twelve keywords were deployed, and results then filtered for relevance. The search terms were: *career, decision making, education, employability, everyday life, information behaviour, information literacy, information, learning, lifelong learning, library and workplace*.

For the purpose of retrieving WIL, EIL, and CIL literature, the Boolean search command AND was used to form combinations of search strings using the terms 'workplace', 'employability', 'career', and 'information literacy'. For 'workplace' the search was set

to discover any terms containing the phrase ‘work’, so that phrases such as ‘working’, ‘workplace’, and ‘worker’ would also be identified. For ‘employability’ and ‘career’, the searches were made verbatim. Search terms such as ‘education’ and ‘everyday life’ were included in searches because it was observed that some literature deals with employability IL in the context of education and everyday life, rather than the workplace per se. Search terms such as ‘information’ and ‘learning’ were included in search strings to capture possible content of relevance to IL in cases where the term ‘information literacy’ is not deployed.

The time range specified for all searches was 2000–2021. “Workplace experiences of information literacy” by Christine Bruce, published in 1999 [7] was also included. This was on the basis of the strong influence of this work on the field.

In January and February 2021, 106 journal articles, book chapters, and conference proceedings were retrieved. These were reviewed in March and April 2021. Of these, 92 were classed primarily as focused on WIL, 11 on EIL, and three on CIL. Following retrieval, duplicate items and items that were no longer available to view were removed, and the bibliometric properties of items (e.g., citation counts) were reviewed. Then, a set of inclusion criteria were applied in order to select highly relevant sources for the literature review. These were: (1) peer-reviewed, (2) incorporated relevant keywords and themes throughout (3) recent (defined as post-2000). A total of 54 IL items and 16 career development items were selected for inclusion in the literature review and are reported in this paper. The content of the retrieved items was manually coded by discipline and theme to develop the analysis presented below.

4 Information Literacy and Work

4.1 Workplace Information Literacy (WIL)

The body of WIL publications has grown substantially over the last two decades. It has more than doubled in the seven years between 2014 (when 41 papers on the topic were identified [11, p. 1] and 2021 (when the literature search was undertaken for the study reported here).

Since 2000, two main schools of thought can be identified in the WIL literature. That published between 2000 and 2008 establishes the initial boundaries of the subject. From 2008 onwards, socio-cultural WIL research is evident (Table 1). The latter expands the discussion beyond previously defined parameters through the deployment of a new research paradigm.

The main preoccupation of early WIL research is the positioning of IL as a key competency for information-intensive work environments [12, p. 8]. Linkages between IL and organisational competitiveness are apparent in case studies that include calls for organisations to develop information literate workforces [13, p. 137]. Here, two levels of analysis are applied: (1) information competencies and information behaviours of information literate workforces; (2) characteristics of information literate organisations. Both levels of analysis are approached with reference to organisational strategy, whereby the outputs, measurable benefits, and return on investment of IL are of primary interest to employers and IL partners alike [14]. Two further questions are posed in relation to the strategic value of WIL: “What does the information literate worker look like?” and

Table 1. Historical development of the WIL literature

Thematic focus	Main characteristics	Sources
<i>Initial boundaries of the subject (2000–2008)</i>	<ul style="list-style-type: none"> • Advocates value of IL in the workplace • Sets the parameters for information literate workers and organisations 	[11–14]
<i>Socio-cultural WIL research (2008-on-going)</i>	<ul style="list-style-type: none"> • Challenges the more dominant, formal, and fixed traits of IL scholarship 	[16–18]
	<ul style="list-style-type: none"> • Explores WIL practices of occupational groups, e.g., web site designers, academic librarians, engineers, legal practitioners, firefighters, frontline NHS staff 	[19–25]
	<ul style="list-style-type: none"> • Maps IL properties of different types of workplaces, e.g., SMEs and bilingual workplaces 	

“What should WIL instruction look like?”. The proposed answers to these questions largely depend on whether it is believed that information literate workers should be *employed* on the basis of IL skills obtained within formal education and community contexts, or *developed* on an on-going basis within the workplace [15].

These questions become more complex in cases when it is shown that IL skills obtained in formal education are not readily transferable to workplace tasks [16, p. 14]. Accordingly, the study of WIL post-2008 can be segmented in two main categories. In the first, IL is explored as an employability skill and is labelled EIL. In the second IL is reimagined for workplace environments and now underpins the research agenda of modern WIL research. The most important development from the earlier to later period is the realisation that the dominant conceptual and methodological paradigms underpinning the study of IL in library and higher education settings cannot be readily applied to WIL. Even in early empirical investigations into WIL, it was found that problems encountered in the workplace are less clearly defined, not so predictable, and more complex than those commonly recorded in educational settings [17, p. 367]. Since the informational requirements implicated in employees’ daily tasks are different from those commonly attached to traditional university assignments, the generalisability of existing IL frameworks and modes of instruction beyond the realm of educational settings cannot be assumed [18]. As illustration, Lloyd [19, p. 279] writes that “Information literacy is trapped between a rock and a hard place”. Here the “rock” is the epitome of the more dominant, formal, and fixed traits of IL scholarship, and the “hard place” is the attempt to reconceptualise IL at work as more than a set of generic IL skills.

Interest in manifestations of WIL remains as strong as ever. However, problems persist around the translation and reinvention of IL for work, and multiple aspects of WIL remain underexplored. Early WIL research is valuable because it identified IL as an important facet of the 21st century workplace. Modern WIL research seeks to establish the contextual parameters of IL in workplace settings by mapping the lived experience of individuals employed in different sectors, organisations, roles, and locations [17, 20–26].

Current understandings of WIL have been shaped to a great extent with reference to a body of work by a single individual: Annemaree Lloyd. Lloyd has argued that WIL be studied from a constructivist frame of reference [23, 27–29]. This constructivist, grounded approach to the study of WIL represents a shift away from a focus on IL skills assumed to be generalisable and transferrable over time and space. Instead, WIL is framed as a collective competence upheld by information practices enacted in diverse socio-cultural contexts [19, p. 278]. It is understood as a way of knowing, and of effectively navigating the information landscape at work. In the deployment of phenomenographic research approaches, nuanced narratives of workers' information landscapes and social exchanges of information can be assembled and layered to allow for the emergence of understandings of workplace IL. These understandings, in turn, allow IL researchers to circumvent the transference problem of IL and reimagine it as a multifaceted workplace construct.

4.2 Employability Information Literacy (EIL)

WIL has received considerably more research attention than IL for employability purposes. As part of this literature review, nine papers were initially classified as EIL, and seven additional papers were later identified as relevant to both WIL and EIL. All sixteen papers were published between 2010 and 2021. Very few of these include explicit reference to EIL *per se*, indicating that EIL lacks a strong research identity. Rather, EIL is used as an umbrella term for any incarnations of work and work-based IL instruction delivered beyond the workplace.

Detailed coding of the EIL papers shows that research on IL for employability purposes has been approached through three main lenses, as summarised in Table 2: 'Community and library', 'Higher Education', and 'Employer'. The strongest unifying theme across all three is the graduate employability agenda. This, however, is interpreted differently depending on the engagement of authors of these studies with students transitioning from education to work. For example, libraries prepare individuals for generic or subject-specific IL applications through distinct and targeted programmes, whereas higher education EIL instruction is the result of interlinked efforts across university departments, libraries, and services, and is governed by a broader graduate employability strategy. In contrast, employers frame 'employability' in terms of the specific nature of their work and their current skill requirements. EIL research is thus fragmented due to the emergent and negotiated sense of ownership of the term, and the variety of institutional agendas to which it relates.

EIL research has paved the way for new meanings of IL to emerge. However, IL for employability purposes is limited in its scope since it tends to be simply framed as a set of generic IL skills with only a loose connection to the world of work, and as a bolt-on to existing graduate employability agendas. In addition, in this work 'employment' is commonly confused with 'employability', with the success of EIL initiatives celebrated on the basis of higher education leaver destination statistics [36, p. 101]. In short, employment *outcomes* are mistaken proxies for employability. In response to this, there are calls (yet to be addressed) for a more multifaceted approach to the conceptualisation of EIL. This should be broader than a set of core IL skills or desirable attributes listed by

Table 2. The three lenses of EIL research and associated literature

Lens	Main tenets	Sources
<i>Community and library</i>	EIL is a set of generic or subject-specific competencies that can facilitate the employability of individuals in general and prepare individuals to commence employment in a specific sector	[4–6, 30–34]
	Libraries can assist individuals to use social media and ICT for job searching	
	Libraries can prepare individuals for employment in business occupations by providing instruction on subject specific skills	
<i>Higher education</i>	EIL provision is a university-wide responsibility that results from collaborative efforts between university libraries, student support services and career centres, and culminates in the creation of specialised library guides and modules	[35–40]
<i>Employer</i>	Employer needs and preferences for IL competencies are inferred on the basis of content analyses of job adverts, and qualitative studies of what information competencies are sought by employers in university graduates	[41, 42]

employers, and look beyond the securing of employment in the short term [34, pp. 91–93]. It should also extend the EIL agenda beyond graduate employability and adapt IL instruction and materials for adult learners and ‘adult literacies’, thus reinforcing the lifelong IL perspective [32, p. 87].

The recognition of the need to incorporate lifelong learning perspectives into EIL scholarship is relatively recent. This dates from 2012, for example in the work of Crawford and Irving as detailed above [32]. Here, a distinction needs to be made between the conventional classroom learning paradigm of EIL [5, p. 61] and alternatives that have the capacity to effect lifelong employability learning that is critical, transformative, and reflective [34, p. 90]. To that end, Crawford and Irving [4] suggest that partnerships with skills development agencies can lead to the development of EIL into a Continuing Professional Development (CPD) skill. Furthermore, De Vos and colleagues have advocated the addition of ‘career’ to advance research on employability. This should acknowledge employability as a lifelong pursuit, taking advantage of understandings of the term ‘career’ as a concept that is relevant throughout the lifespan [43, pp. 128–131].

5 New Horizons for Information Literacy and Work: Career Information Literacy (CIL)

5.1 Career Information Literacy (CIL)

Only three papers accessed for this review explicitly link the terms ‘career’ and ‘information literacy’. These are: Hollister (2005) [44]; Zalaquett and Osborn, (2011) [45]; and Arur and Sharma (*in press*) [46]. The notion of ‘career’, as well as the wider career development terminology underpinning the term, have not yet been incorporated into deliberations of the role of IL in lifelong work and employability.

The first research to bring the two terms ‘career’ and ‘information literacy’ together is Hollister’s 2005 study of university librarians working with a university career service to integrate IL into the curricula for various subjects [44]. Through modified curricula, students learnt how to conduct thorough job searches for opportunities relevant to the subject they were studying at university. While the students were reminded that lifelong learning is crucial to their career development, lifelong learning was not an integral part of their IL instruction, and the learning tasks reported in the study closely resemble subject-specific EIL instruction.

The next study to unite career and IL [45] employs the phrase ‘career information literacy’. This is a report of an IL education programme for career counselling students. The programme consisted of four components: self-assessment, career searches, career information, and job preparation. These were assessed through the performance of practical career counselling tasks structured around the usage of sample client scenarios. The assignments were designed so that students progressed through stages of information needs identification and information seeking, and then produced solutions to the problems presented in the client scenarios. Rather than being presented with subject-specific career information, the students were asked to contend with career challenges reminiscent of those encountered in the real world (which often suffer from being vague, messy and/or ambiguous), and to use information flexibly to reach a decision. This is an important development because previously career choice had commonly been assumed as congruent with university subject selection in the IL literature (and elsewhere). A limitation of this programme is that it was targeted at career counselling students only, reflecting the view of career practitioners as gatekeepers to career information. Some scholars would object to this restricted provision since it gives power and responsibility to a set of professional intermediaries, leaving little room for personal agency and self-knowledge development of the wider population [47, p. 52]. Nevertheless, this is the first instance of IL education that encompasses the notion of *career choice*.

The third study for this literature review that can be classified under the heading of CIL is by Arur and Sharma, currently in press [46]. Here, the collaborative and social justice dimensions of the term ‘career information literacy’ are explored, with particular reference made to socially situated career information exchanges between Indian students and various actors in their career information landscapes. It is suggested here that career educators should not be viewed as cognitive authorities that provide career information to students and establish normative CIL paradigms. Rather, career educators and students should instead examine tensions between different channels of

information provision and engage in critical dialogues around unequal career opportunity structures.

Collectively, these three studies lay the foundations for the incorporation of CIL alongside existing WIL and EIL work. However, lacking here are notions of lifelong career learning and career development planning as central areas of study. This suggests that CIL in its current form deals with employability rather than *career*. This issue is explored in greater detail below.

5.2 Empowerment Through Meaning-Making

Career construction theory (the dominant theoretical approach in career development) holds that ‘career’ is a meaning-making device. A ‘career’ derives meaning *from*, and imposes meaning *on*, employment-related experiences [48, p. 148]. This meaning-making pertains both to constructing one’s identity and constructing one’s career, and reflects preferred ways of living and working. Thus, ‘career’ is a lifelong self-constructed narrative where meaning and direction are sought with reference to one’s own values, preferences, and aptitudes, and to the unique characteristics of the immediate environment [49, pp. 241–244]. The main function of an individual’s career is to continuously inform and support the progression of working life in the long term through the identification of appropriate courses of action at any given point in time [50, p. 309].

An important part of the meaning-making in the context of ‘career’ is that it creates space for personal reflection and choice [51, p. 5]. In addition, ‘career’ calls for the application of a different set of skills than those found in ‘employability’. Employability skills are either generic skills for job searching, or sector-specific skills deemed important by employers [52, pp. 41–42]. In contrast, career management skills are those needed to navigate complex transitions from a position of self-creation and self-reinvention [53, p. 2]. The former are often defined from external frames of reference, while the latter also incorporate an internal frame of reference. The distinctive feature of ‘career’ relative to ‘work’ and ‘employability’ is therefore that it is a vehicle for personal agency, growth, reflective learning, and empowerment over the lifespan, communicating a sense of forward progress and volition that is not inherent in work-related experiences *per se*.

5.3 Emerging Gaps in the IL Literature

Taking heed of its deployment in the realm of career development, there is the opportunity for consideration of the notion of ‘career’ in IL research to make a contribution to the extant knowledge on ‘work’ and ‘employability’. This is particularly relevant to two information-intensive activities: career development learning and career decision-making. Career development learning is a self-directed mode of career education. It corresponds to an individual’s career construction and meaning-making (as elaborated above) and uses constructs from career development theory to build a knowledge-based frame that individuals use for self-understanding [54, p. 9]. Career decision-making refers to the processes through which individuals make choices related to training, work, and education at key points across their lifespan [55, p. 44].

These two activities are underexplored in the IL literature, and consequently little is known about the importance of IL to their operationalisation. Due to the information-intensive nature of career development learning, and career decision-making, however, it is not unreasonable to propose that they would benefit from IL inquiry. Indeed, it is already known that the assimilation of career information has an impact on the construction of individuals' career identities, and that informational support for career decision-making leads to improved career outcomes [56, p. 436], [57, pp. 24–25]. Left to be established is the role of information in career development learning and career decision-making in practice.

The practical manifestation of IL in both of these constructs calls for interdisciplinary inquiry between the career development field and IL. This is the subject of the larger doctoral study to which the literature review outlined in this paper contributes. This on-going research includes an exploration of young people's CIL for the purposes of career decision-making. Taking into account the contextual and meaning-making aspects of CIL, it will address the following research questions:

RQ1. How do young people utilise career information for the purpose of making career decisions about the varied training, education, and work experience opportunities available to them?

RQ2. Which career information literacy skills can be developed in young people for optimal career development learning and career decision-making?

6 Conclusion

Through the analysis of relevant literature, it has been possible to distinguish between the related terms of 'work', 'employability', and 'career', and their corresponding conceptualisations within IL scholarship. In particular, it has been demonstrated that WIL is concerned with the collective lived experiences of IL in workplace settings and the strategic properties of IL, and that EIL research is focused on a set of generic or subject-specific competencies to help individuals become employable in given settings. There has been some initial work in the area of CIL, but this is limited due to its close alignment to EIL instruction for graduate employability.

Each of these three areas varies in the extent to which the focus falls on immediate IL priorities, as opposed to IL as a lifelong competence. In addition, IL is framed differently in each and discussed in respect of levels of engagement (from the individual to the collective). Crucially, conceptualisations of 'career' as an on-going personal development project related to lifelong learning do not feature in extant work. It is thus proposed that CIL is an area ripe for further research, and may merit incorporation as an additional and separate strand of IL scholarship. It is anticipated that this mode of IL should prepare individuals to engage in meaning-making relative to their preferences and aptitudes, and to construct personal career narratives through self-directed career development learning. It should support them to learn more about themselves and the world of work on an on-going basis, and should align career development learning with notions of career choice and personal agency. Further research in this area will determine whether or not CIL has the power to achieve this.

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The Role of Information Literacy in the Creative Economy

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Abstract. The amount of digital information consumed in today's society directly affects the importance of information literacy skills for contemporary workers. This paper aims to demonstrate that the information literacy skills of creative economy professionals have become a fundamental necessity and should be addressed from broad perspectives. To answer, "how creative economy workers obtain information for their business activities?" we performed 40 semi-structured interviews that were transcribed and thematically analysed using qualitative data analysis software (i.e., Nvivo 12). The results show the significant role of information literacy skills of these professionals when locating relevant information for their businesses. Also, creative activities require a vast volume of information from a large variety of sources, thus intensifying the importance of information literacy skills of these workers.

Keywords: Creative economy · Information literacy · Digital information literacy · Information behaviour · Social networking platform

1 Introduction

The rising volume of digital information handled on a daily basis in society has brought to light the importance of information literacy skills for all, for example, the creative workforce [1–4]. Therefore, information literacy of these professionals has increasingly become fundamental and can be addressed from different perspectives. As a result, information literacy among creative professions has become more and more relevant and can be addressed from multiple perspectives. First, much of the content in digital environments is the result of creative labour [5]. Second, creative professionals demonstrate high capabilities in generating, distributing, and monetising their work utilising digital means [3]. Third, creative labour is tightly linked to the exploitation of individual creativity and intellectual property, being deeply impacted by copyright issues on digital platforms [6].

This paper aims to contribute to information studies research by answering "how creative economy workers obtain information for their business activities?". In particular, we investigate the creative professionals' information literacy abilities in locating and utilising information relevant to the survival and continuation of their businesses. To answer the research question, we performed a literature review and used the insights to develop

our interview protocol. Qualitative data was collected through 40 semi-structured interviews conducted with creative professionals working as small entrepreneurs or freelancers. A thematic textual analysis was performed using qualitative analytical software (i.e., Nvivo 12), in which the transcripts of the interviews were coded and thematically organised. The results show that most respondents shared the same perception about using and sharing information despite their geographical areas. Furthermore, the results show that creative workers deal with numerous issues when handling information, from the increase of the market risks to the vast volume of information required in creative activities. This work contributes to the existing literature by showing findings that reinforce the relevance of information literacy skills of the creative professionals for their work practices, as evidenced by previous academic studies [1–4].

This paper is structured as follows: in the next section, we provide the background information and present creative economy, digitalisation, and information literacy concepts. Section 3 presents the research method and data collection procedure. Section 4 provides the research results, followed by a discussion on the interview results. Section 6 concludes the research and presents the theoretical contribution and practical implications, limitations, and future work.

2 Background Information

2.1 Creative Economy

Creative economy has been a widely discussed topic in the current global economy [7]; this trendiness of the subject contrasts with its relatively new origin. The first time the concept was defined in the academic literature was by [8], as the author described it as a commercial transaction of creative products. Such definition requires a further explanation of the exchanged value of these transactions, in other words, what constitutes “creative products”. These products are supposed to carry two values: one intangible, due to intellectual propriety rooted in its conception, and one tangible, due to the physical material traded or the means of distributing its content. Its definition is still discussed in the academic field, mainly with the idea of creativity as a valuable asset that is fated to be reduced to specific products and transactions [9].

In addition to how creative economy is defined, works and activities performed by creative workers have been impacted by digital transformation and digitalisation. Digitalisation brings more complexity to the subject, as these creative transactions can now be realised from and to any point of the globe. It has facilitated production and distribution, making the transitions of creative products simpler than ever before. This new economy gained broad acceptance in the governmental and economic field, while a set of challenges was raised from the policies and regulations addressing cultural and creative activities [10]. Countries have been adopting, directly or indirectly, methods to promote creative sectors as a way of development and economic growth [11]. As for the academic literature, creative economy and related topics tend to rise with the multidisciplinary of its relations with technology, information, innovation, knowledge creation and sharing, and creativity.

For measuring the concentration of creative sectors, countries and regions have been using the standard economic indexes such as gross domestic product (GDP), employment rates, export and import values. Even though these measurements do not hold for the intangible value (e.g., literacy skills) brought by the creativity to the accounted transactions. This results in the absence of a unified classification on which creative economy could be based globally. Here is a challenge that goes beyond the limits of the quantitative methods [12].

2.2 Digitalisation in Creative Sectors

With the positive impact of digitalisation on creative activities also come the challenges of its disruptive effects [13]. Business models, value chains, consumer behaviours are some of the main challenges and changes faced by creative enterprises and their workers. Some authors, such as [14], explain these circumstances as disassembly and reassembly, where the new and old coexist until the new processes are entirely established as the new standard. In this way, many creative activities transition between old and new practices until production, distribution, and consumption are integrated into business practices and strategies.

Digitalisation provides space for workers such as small entrepreneurs and freelancers who before were marginalised in specific niches of the market and geographic regions. In this new environment, digital creative work gains speed, reproducibility, and interactivity. Consumers can now be part of the creation and are able to engage, interact, and customise their creative products and services. For that, creative professionals need to display the abilities required in the digital networking society. More importantly, these workers required information literacy skills and communication skills to process the vast volume of information, combining digital and physical data, and flexibility to interact with consumers and peers in digital environments [15].

With the blurring of the geographic boundaries and the extension in digital resources, the new business goal is not only to sell and make profits, but most of all, to be noticed and recognised among all the other creative professionals at the buyer's disposal. The overload of professionals in the creative sectors reinforces the precariousness they have always faced in the creative fields. The illusory freedom of their activities is doomed to seasonality and work regimes that are not always favourable to the professionals [16].

2.3 Information Literacy Skills

Information literacy is related to cognitive aspects of information behaviour, one's capability to search, locate, evaluate, and use the relevant information for its purposes [17, 18], and being able to exclude or ignore information which is out of the scope or irrelevant [18]. The discussions about the topic can cross barriers of many academic subjects, expressing the multidisciplinary around information literacy issues. The vast amount of data inherent in our current society makes it evident that information skills are an essential part of 21st-century skills [18, 19].

When considering the creative professionals, we are aiming at a segment of workers who are adjustable and resilient in organising, use digital technologies for creative process, and broad in creative and technical expertise [20]. Creative activities are rich in

cognitive processes, such as creating and problem-solving [21]. The future of work tends to be a combination of creative thinking and ICT skills [22]. Digitalisation promotes creative workers' knowledge gathering, knowledge sharing, and knowledge integration [2]. By analysing these professionals, we are targeting an audience inevitably shaped and defined by its digital competence and information literacy skills.

In this paper, we investigate and assess how creative professionals and workers access and use information needed for their creative works processes on a day-to-day basis. In addition, we also aim to examine creative workers' information literacy skills in assessing, evaluating, and using online copyright information and country-specific legislation to protect their creative designs and artistic works. Through the analysis of 40 interviews, we investigate how they search for information for daily basic business activities, how they evaluate informational sources and their content, how they share information related to the outcome of their work, and how they perceive the copyright laws and legislation in relation to their information literacy skills.

3 Methodology

For this paper, we draw upon an empirical approach from a set of semi-structured interviews to answer the research question formulated earlier. Other studies in the field of cultural and creative work that provide insights about moral and ethics [23], individual competence [24], and gender [25, 26] also showed the robustness and appropriateness of the method in a similar context. Semi-structured interview provides a practicable tool to engage in the reality of the interviewees [27]. The interviews were conducted from April to June of 2019 as part of a more extensive study on the work practices of creative workers. We aim to propose a broad scenario, providing affinities and variances above national delimitation.

3.1 Data Collection

To be eligible to participate in the research, respondents should meet the following criteria: (i) currently working as a creative economy professional, positioning themselves as the creator of their own work; (ii) identify themselves as a self-employed worker or a small entrepreneur that does not belong to or is part of a medium or large corporation; and (iii) professionals who actively make use of digital information to improve and disseminate work. Professionals that met these criteria were found and contacted through the exposure of their online portfolios and in platforms to promote creative work (e.g., Behance and Dribbble). For eligible respondents, invitations were sent inviting them to participate in the research. After initial contact by email, those who voluntarily replied to participate in the study received the interview questions in advance, along with a consent data use form and an interview guide. Due to the availability and divergence in time zone, the interviews were conducted by video, audio, or email as the choice of the participants. These procedures were carried out meticulously and consistent with all data collected, ensuring their uniformity.

3.2 Data Analysis

The data gathered in video and audio format were transcribed, converting all data to textual form, as such format enables a thematic textual analysis with the help of Nvivo 12 software. In total, 40 semi-interviews were conducted, including creative workers and professionals from Eurasia and North America who shared their perceptions and opinions about the role of information in their work processes. Although the interviews analysed here are part of a more extensive study about creative economy work practices, the emergence of topics related to literacy skills, information use and information behaviour during the thematic analysis were consistent. However, the emergence of the thematic cluster in our analysis does not imply the generalisation of objective truths about the ample and complex field of the creative economy but rather an interpretative analysis from insights gathered from our data [28]. Our objective was to engage in an open conversation with our participants to provide an understanding of how they self-interpret their creative work practices [29].

4 Results

4.1 Descriptive Results

Out of 40 respondents, 20 were women, and 20 were men from three continents (Asia = 11; Europe = 20 and North America = 9). The most representative country was Russia with 8 respondents, followed by Canada with 5 respondents. Out of 40 participants, 26 (65%) indicated that they have migrated to another country for better career opportunities, and the most representative country is Finland with seven participants, of those 4 migrated to Finland. Most respondents had at least a bachelor's degree (N = 38 (95%)). Regarding current employment, 25 (62.5%) mentioned they are freelancers, and others indicated that they work for a small company. We also asked respondents to indicate how long they worked as a creator/artist. The average was (M = 6.8; Std = 5.86), ranging from one year to 30 years (for more information, see Table 1).

4.2 Qualitative Results

This section presents the interview results and provides a narrative description of the main themes (i) information acquisition and access, and (ii) information awareness, which have emerged during coding of the interview transcripts. The themes will be discussed with a specific focus on the creative workers and professionals' literacy skills.

Information Acquisition and Access. The respondents were asked to indicate the common processes necessary to execute their main work activity and specifically indicate where and how the necessary information will be obtained. While the analyses revealed some interesting results, most interviewees mentioned that they frequently turn to their clients to acquire and access the initial information (N = 21 (52.5%)) or search online resources (N = 33 (82.5%)). For instance, one of the interviewees mentioned that:

Table 1. Summary of interviewees demographic data.

	Total Interviewees	Female (%)	Male (%)
All participants	40 (100.0%)	20 (50%)	20 (50%)
Continent			
Asia	11 (27.5%)	5 (12.5%)	6 (15.0%)
Europe	20 (50.0%)	10 (25.0%)	10 (25.0%)
North America	9 (22.5%)	5 (12.5%)	4 (10.0%)
Level of Education			
High school	2 (5.0%)	1 (2.5%)	1 (2.5%)
Bachelor's degree	28 (70.0%)	14 (35.0%)	14 (35.0%)
Master's degree	10 (25.0%)	5 (12.5%)	5 (12.5%)
Time working as an artist/creator			
Less than 1 year	6 (15.0%)	5 (12.5%)	1 (2.5%)
From 1 to 5 years	17 (42.5%)	9 (22.5%)	8 (20.0%)
From 6 to 10 years	8 (20.0%)	4 (10.0%)	4 (10.0%)
From 11 to 15 years	6 (15.0%)	1 (2.5%)	5 (12.5%)
More than 16 years	3 (7.5%)	1 (2.5%)	2 (5.0%)

“usually, they will send me the requirements of the project, and then I will do some basic background research”, or another mentioned that:

“for commissioned work, I start with communicating with the client to try and understand as best I can their vision for the art requested. Then I search for reference photos or inspiration and get to work”. One interviewee mentioned that:

“I usually start researching on the project topic first, then usually research on similar projects to create something more outstanding”.

We also observed another interesting observation mentioned by one of the interviewees indicating that both the client as well as the online platforms are frequently used to obtain the needed information to execute the main work activity, as stated:

“I usually communicate with my client about the view they expect, and then I start to search for the information online which may arise including the scenes or props”.

Or one interviewee mentioned that:

“I do some research on the topic and write down the main keywords and a few ideas”.

Finally, one interviewee mentioned that:

“I have a communication with the client or stakeholder that would let me understand better the context of the task. I either do research which involves competitor analysis, getting familiar with the topic, etc. and that depends on the task. For example, if I am doing an illustration, I do not spend much time collecting references from other executions, but more drawing references related to the subject matter”.

The interviewees also mentioned that sometimes they use their own knowledge or contact their colleagues or bosses to gain the needed information. In this regard, one of the interviewees mentioned that:

“usually, my CTO explains to me what to do, then I am to try on my own, always able to ask questions or Google if I get stuck. Other tasks not relating development/coding I usually do on my own. My other colleagues check the work, but I am not usually asking questions, but check Google on my own”.

We found another observation which indicated that often information is obtained from the colleagues, stating that:

“I work with other designers like an illustrator of their ideas as well”.

Information Awareness. The respondents were also asked to express their perceptions and awareness about copyright issues and local information about copyright regulations, and elaborate on them. In addition, we asked them to talk about their opinion if they think the information about the copyright issues provided by their countries is sufficient to protect their work from unauthorised use by third parties, and provide suggestions for improvement. Interestingly, while the results showed that 21 interviewees expressed awareness of such information, as many as 15 interviewees admitted that they are not aware of the copyright regulations. The most frequent answer was: *“I do not have sufficient information or knowledge to understand all the details”.*

Regarding the sufficiency of the online information, one of the interviewees mentioned that:

“I think the regulations are sufficient. Online/social media reality is however very far from these legal realities. It is very hard to enforce your rights. Awareness of the legal situation for the average social media user is often low. If I contacted a normal user of Instagram, Facebook, to take down an image or pay me, I would expect very low problem awareness. Any content on the internet is often seen as free. I think people are simply often not aware that somebody spent hours or days or weeks to create something”. In this regard, one of the interviewees mentioned that:

“while I am aware of some of it, I admit there is still a lot I am unsure of, especially regarding the web. I do not believe the rules are easily accessible to the artists, nor is the process for reporting theft/unauthorised use”.

Regarding how the presentation of such information could be improved, the same interviewee mentioned that the presentation of the rules must be improved:

“I feel like so much is purposely put in small print. There needs to be more transparency with what is going on and what can happen to one’s work once it is posted online”. Or another interviewee mentioned that:

“simplified rules, most of all. It is very hard to explain to people what they can or cannot do with images they just googled or saw on Pinterest, what is fair use, and when they should at least mention the author’s name. It is very complicated and written in a formal language that is practically impossible to understand. No wonder, there are so many instances of breaking this law”.

We also found more interesting results regarding the awareness of the information. For example, one of the interviewees mentioned that:

“I know some basic rules but not that familiar with those regulations. Telling you the truth, the copyright regulations have been the biggest questions in China for a long time. I do not think the protection of those creators, artists, and designers is done well. Until recent years, people in China start to realise the copyright regulations, but still, it does not work so well, but things are getting better, I think”.

About the copyright regulations and if they can protect the creative workers, one of the interviewees mentioned that:

“I think they are sufficient in Europe, but there are regions that are not so well guarded. We can all see that in the piracy industry”.

Interviewees provided some more suggestions as to how the presentation of information could be improved. For example, one mentioned that:

“It would be amazing to have sort of official copyright blockchain where people could register their works and then automatically claim copyright issues using that system. I know these days some sort of these blockchains started to appear, but it will take a lot of time to adapt it to masses and to make it official on the country level”. Or another mentioned that:

“maybe a simple, unified online tool where infringements can be announced and some official (EU-, US) agency would handle the rest”. Finally, we observed a very interesting comment, as mentioned by one of the interviewees:

“I think there should be more protection for the creative work in general, and for freelancers in particular. Improvements should imply regulations for the clients/agencies/editors that commission the jobs, which are the real problem. I do not mind a single person copying one of my illustrations or part of a project from my portfolio, as it is not big harm for me, but I do mind that a Publishing House holds the rights on my work forever and can distribute, reprint and sell as many copies as they like, making a bit profit of a work they paid very less for”.

Overall, the interview results showed that the main sources of information acquisition and access were clients as well as the online channels where creative workers use to find relevant information. We also observed that the creative workers' literacy skills and abilities were potentially low for assessing and evaluating online and sensitive information such as copyright law and country-specific intellectual properties legislation. In this regard, we found that 37 out of 40 respondents indicated that such information is insufficient or they do not possess the required skills (i.e., literacy) to assess and evaluate online information.

5 Discussion

This study builds on the interviews of 40 creative professionals, in which their self-report on their creative work process demonstrates the ability to locate, obtain, evaluate and put in use relevant information for their business activities. The results of the analysis of the interviews show that their main sources of information are their clients or through online searches. Other sources, as colleagues and online peers, were also mentioned for some interviewees with less frequency. These multiple sources of information could imply distinct information needs. Their ability to identify and consequently choose between different sources expresses an understanding of the features of the information required [30].

The findings are supported by recent literature on the skills of creative professionals describing information literacy skills as an important resource for this workforce [1–4], and also by recent literature on information literacy that acknowledges it as a key ability to create business value [31–33]. Creative professionals use of information differs from other small entrepreneurs, since a significant amount of the information searched and collected is used to improve their individual and unique creative output. The analysis of the interviews indicates that the information retrieved from clients and co-workers is collected to better understand the client problem. On the other hand, the information collected from online searches and online peers tends to broaden their range of skills or references to solve the problem. When dealing with information for their creative process, these professionals know how to search, gather and use the required information, indicating high information literacy skills.

An opposite result was reached when dealing with their copyright knowledge. The findings show that the creative workers have very limited awareness, knowledge and required skills to understand the general copyright regulations applied to their work. This lack of awareness holds independent of their country or geographical region. The most recent literature reveals an existing concern in the awareness of small and independent creative professionals when it comes to copyright laws, intellectual property rights, and their implications in the digital environments [34, 35]. It is not a new event for freelancers and small entrepreneurs in the creative sectors to find themselves on the weak side when dealing with contracts and negotiations on their copyrights [36, 37]. Their low bargaining power and little or no means to contribute to the necessary changes of copyrights issues in their field could be the reason for a negative information behaviour or information avoidance towards the topic.

6 Conclusion

In this paper, we investigate creative workers' and professionals' information literacy skills, as these professionals are deeply impacted by digitalisation and the significant increase in data (information) that comes with it. While the interview results reveal that creative workers rely on their clients as the primary source of information acquisition and access, their literacy skills are limited when it comes to assessing information in relation to, for example, copyright regulations. The results show that most interviewees are aware of such laws and policies, but they lack sufficient knowledge on using or interpreting the information. Our findings add to the academic literature by showing that information literacy skills are important assets for creative professionals [1–4]. In addition, the interview results reveal that the lack of sufficient literacy skills was predominantly visible when they were confronted with copyright and intellectual property laws.

Future research could explore in more detail and build on the perspective towards the choice for sources of information and information behaviour of creative workers related to copyright legislation. A practical measurement would be to provide a solution to empower and strengthen their information skills, perhaps workshops and training supplied by authorities and rulers that design copyright legislation. Our society is getting more digitalised every day, and discussions about information avoidance and overload in many fields are rising in frequency and relevance.

Finally, it is necessary to highlight the limitations of our study. Although we include interviewees from different geographic regions, it is not possible to generalise our findings. Nevertheless, our objective is to extend the discussion on the topic by increasing understanding of creative professionals' information skills rather than generalising the research results. We are also limited to the questions asked, which could be too generic for more extensive conclusions. Future research should delve more deeply into those. Lastly, the information literacy skills of creative workers are not restricted to their information sources or their awareness of copyright legislation. These are the main themes that emerged during our data analysis, but other perspectives of their information literacy skills would be better explored by future research.

Acknowledgements. This work has received financial support from Jenny and Antti Wihuri Foundation.

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Knowledge-Creating Interaction and Information Literacy in Organizations – An Empirical Study in the Context of Research and Development Project

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Abstract. The aim of this study is to contribute to the understanding of Information Literacy (IL) in relation to knowledge creation in organizational settings. IL is understood as a practice realized in the course of action, emphasizing the social and interactive aspects of the phenomenon. There is a need to increase understanding of the role of IL in knowledge processes and develop methods for empirical examination. We suggest an approach for examining IL in knowledge creation and present results of a qualitative study on interaction in a multidisciplinary research consortium. The findings suggest that knowledge creation relates to the abilities of using various sources of information and understanding the relevance of the suggested information in the discussions. The outcomes can be used in developing the methods of examining IL and in enhancing abilities to create new knowledge and collaborate in organizations.

Keywords: Information literacy · Knowledge creation · Organizations · Interaction

1 Introduction

As the work life is more and more based on collaboration and teamwork, employees' capabilities to interact with each other in a productive and professional manner is crucial. There are plenty of guides and courses on how to be a good team worker, how to contribute to the joint discussion and working processes with a proper attitude. In workplaces, collaborative knowledge creation is crucial for solving complex problems, instead of relying on already existing information [1, 2]. Here, capacities to share, use and evaluate information are important. The aim of this study is to contribute to the understanding of how information is used in the creation of new knowledge [3, 4], and how Information

Literacy (IL) contributes to the process. As such, IL has been vastly studied in the contexts of schools, health, and everyday life, and in recent years, its importance in workplaces has been acknowledged, for example, as a part of workplace learning and performing various work tasks and daily practices [5, 6]. However, the role of IL in the knowledge creation processes needs methodological and empirical examination, which takes into account the interactive and practice-based dimension.

In this study, IL is understood as a practice realized in the course of action, emphasizing the social and interactive aspects of the phenomenon [7]. Both knowledge creation and IL are often examined on a macro level, whereas the examination on a micro level, focusing on interactive working situations, is rare [4]. This study fills in this gap by examining empirically how IL manifests in knowledge-creating interaction in an organizational workshop developing new energy concepts. The research questions are: 1. How is information literacy manifested in the interactive situations of co-creation of new ideas: 1a. What kind of information is brought into the workshop discussions, and 1b. How is the information evaluated in the discussions. We focus on examining multi-modal interaction in discussions and illustrate how IL is an ongoing activity, intertwined with knowledge creation.

2 Theoretical Background: Knowledge Creation and IL

In organizations, the capacities to develop new solutions, practices and products are essential. In today's work life, this is a collaborative and information-intensive process. Collaboration refers to an activity where two or more persons are working together with a task to achieve a shared goal, to search for a solution or to produce a change in practices [8]. In developing something new, such as new working practices or products, the creation of new knowledge needed for that requires interaction and collaboration, but also use of coherent information and knowledge. It is not enough that group members just share their knowledge, they also need to jointly build on each other's understanding, by explaining, arguing, or questioning [4, 9]. Also, some basic interactional practices, such as listening to each other and giving everybody a chance to talk, enhance collaboration at work [4]. The processes and practices, especially when creating new solutions or solving specific problems, are often related to seeking, sharing and using information. In these processes, new knowledge is created. [10] In knowledge-based work, this is connected to the capacities to use information and evaluate its value in the certain context [11].

This study derives from the dialogical knowledge creation research, where knowledge creation is understood as an interactive process, in which people find new connections and meanings while encountering new information or knowledge [4, 12, 13]. Here, interaction between people is crucial, as creating new knowledge requires encountering something new and combining existing knowledge and information in a new way. This view is based on the understanding of humans as situational and dialogical actors. [3, 4, 13]. Knowledge-creating interaction can be promoted by paying attention to the circumstances of work, such as giving room for discussions and critical pondering of different solutions [14]. Being open to new ideas and the other's views [15], as well as critical to one's own prejudices and to the information gained [4, 16] foster creating new knowledge. Hence, being able to evaluate and use information in discussions is important. Here, we can see the connections between knowledge creation and IL.

IL as a concept has been developed during the past 50 years as the role of information and knowledge in the society has changed. The need to emphasize the capacities to search for correct and suitable information in various situations led to the rise of the practice and research of IL, focusing especially on teaching in schools and higher education, and many guidelines and frameworks have been developed. One of the most impactful concepts has been that of ACRL. The first ACRL standards in 1989 focused on the skills of evaluating the relevance of the information, understanding the origins of the used information sources and learning the ways to work with information sources ethically. In 2015, a new framework [17] was launched, and IL defined as: “*the set of integrated abilities encompassing the reflective discovery of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning.*” [17] In the Framework, IL is seen through knowledge processes, which describe the information literate way of acting with information through six frames, focusing on authority as constructed, information creation as a process, information having value, research as inquiry, scholarship as conversation and searching as strategic exploration. In these descriptions, a reflective and contextual view of IL is highlighted.

To promote IL at work has been one of the core goals in the IL training and conceptualizations, also in the Framework [17]. In addition, information and knowledge creation has been acknowledged as one of the core aims of an information literate person. However, the scholars in the field of IL have pointed out that focusing on information often connects the examination to the evaluation of certain information sources, published or on-line [18]. This is not always relevant in the context of workplaces, where information is more embedded in actions, skills and experienced conduct of working, not so much on seeking accurate scientific references. However, as the work in many knowledge-based organizations is based on using scientific information to develop new ideas, there is a need to understand the practice of evaluating the feasibility of information in the course of action. Here, especially the interactive nature of knowledge-work needs more attention [7].

In recent years, IL in the workplace has been examined as a social phenomenon, not defined in terms of IL as in education, but as a phenomenon manifested in action and interaction in certain contexts [19], such as in relation to organizational culture [5] and leadership [20]. In understanding the social nature of IL, the notion of IL as practice [19, 21] is of importance: IL is connected to the developing experience of various information sources and their rootedness in the world and its structures, and this experience enables people to act in their environments. Hence, IL can be understood as a fundamentally social and interactive phenomenon: “*Information literacy is constituted through the connections that exist between people, artifacts, texts and bodily experiences that enable individuals to develop both subjective and intersubjective positions. Information literacy is a way of knowing the many environments that constitute an individual being in the world.*” [21] Here, IL is connected to the premises of human beings and the development of humans and their environment as a unified system – the same premises can be found in the dialogical knowledge creation research introduced above [4, 12, 13].

As Tuominen, Savolainen and Talja [22] have noted, there is a lack of empirical studies of IL which focus on humans interacting with each other while conducting various

tasks and actions at work. In this study, we fill in this gap and use the holistic understanding [19, 21] introduced above as a basis for examination. This view is supported by the understanding of the context as Information Landscapes, which highlight the personal, but also partly shared way of being and taking advantage of the information available in certain situations [21]. That connects well to the dialogical understanding of knowledge creation introduced in the beginning of this chapter [4, 12, 13]. We focus on examining IL in knowledge-creating interaction on a micro level, bringing into examination the dialogical dimension of knowledge creation, analyzing the ways people engage in discussions and build joint understanding with conversative means by listening, questioning, and suggesting their own views. Hence, the focus of this study is, what kinds of information landscapes the participants of the workshop discussions can reach and how does the collaborative process enable them to reach something more. IL is examined as a way of navigating and expanding the information landscape by evaluating, clarifying, and seeking the most relevant information in the course of actions.

3 Methods and Data

The data of this study is gathered in the context of research and development work in a multidisciplinary research project developing solutions for sustainable energy markets in Finland. The project included researchers from five disciplines: Economics, Computer Science Engineering, Meteorology, Information Systems Sciences, and Information Studies. In addition, there were stakeholders committed to collaboration, representing private firms in the energy sector and related societies. The aim of the project was to develop a digital marketplace for clean energy trading. In this development, the concept of the Virtual Power Plant (VPP) needed to be defined. In this study, we concentrate on the analysis of interaction in one workshop, where the community gathered to develop concepts for VPP. In the workshop, there were researchers of each discipline and stakeholders present, in total ca. 30 participants. The duration of the workshop was 7 h and it had three parts: 1) Presenting key results of the studies and state of art in energy markets, 2) Developing the concept of VPP in small groups of 6–8 participants, and 3) Sharing the developed concepts with the whole group. The results of the workshop day were later written down and shared with all project members for further development.

Our approach is qualitative, and the study is conducted in the light of an ethnographic approach [23]. Data was gathered by participating in the work of the research project from 2015 to 2019, conducting participatory observation, collecting documents, discussing with the participants of the community, and videotaping all the joint events of the community. The close analysis of the multi-modal interaction is focused on the video data from one workshop, from which we have video materials from the gathering of the whole community and from working in four small groups, which were all videotaped separately. Hence, we have two sets of data: 1) main data: video data (10h in total) from a workshop organized by the research consortium, to analyze the knowledge-creating interaction on a micro-level, and 2) background data: ethnographic data (videos, documents produced in the project, observations) gathered in 2015–2019, to understand the significance of the examined discussions in the long-term development and creation of new knowledge in the community. By combining these data sets we develop means and

methods to analyze the significance of face-to-face interaction in knowledge processes. We refer to information as utterances, written texts, conversations, and other materialized and thus observable objects shared in interaction, whereas knowledge is understood as experiences or interpretations of the participants [10].

The data were analyzed on three levels: 1) the content of the discussion to find out what kind of information and knowledge was brought into the workshop discussions - also related with the previous discussions of the participants via the analysis of the background data and 2) the multimodal interaction of the discussions to find out how the information and knowledge used was evaluated in the discussions. After that, 3) the content and modality of the data were analyzed together to find out how the phenomenon of information literacy was intertwined in the interactive process of knowledge creation. The analysis of interaction was inspired by multimodal conversation analysis [24], but the detailed transcriptions (e.g., marking intonations, vowel extensions, and voice tones with their own signs used in conversation analytic tradition) are not used in reporting the findings in this paper, to concentrate on the clarity and readability of the dialogues.

4 Findings

4.1 Information and Knowledge Brought into the Discussions

First of all, it should be highlighted that in the discussion data the participants' focus was on the topic of the workshop and there were no off-topic discussions and information. All participants were committed to the discussion and worked to reach the goals of the workshop. In the analysis, three main categories of information were found: 1) *Professional information and knowledge a) from one's own field, b) from the other participant's field*, 2) *Relational information from the shared information landscape formed by the common history of the participants*, 3) *Common information and knowledge from a general perspective*. In all the categories, the interactive nature of sharing, using and elaborating information was highlighted and there were different kinds of practices to bring information into the discussion.

The participants of the workshop were all present because of their professional background – they all represented a firm, discipline, or other organization, and they were all aware of this specific context. Hence, in the discussions, they had the information of the others' background and professionalism to guide the collaboration. First, the participants used **professional information and knowledge from one's own field** explicitly as a basis for developing new solutions, which is evident. In the discussions, the professionals could draw on their scientific knowledge base and when developing joint ideas, this professional information was most often the basis of new ideas. Viewed from the interactive point of view, the style of interaction was direct and usually without evaluation from the participant's side: there was no need to question the source of information, as the other is viewed as a professional in that field. However, the professional could show uncertainty, as manifested below:

MET1: So do we know well enough the weather related production and related, can we take advantage of the insecurity, if we think (AB1 interrupts).

AB1: Would our idea be that insecurity related to the production (...), it is not utilized?

MET1: Yeah, it is not utilized, so could we always offer the best forecast, that optime situation and, maybe the first question is that what is a good enough forecast (...), could it function so, that instead of giving that forecast, we could give with some index, some figure, some way, tell what the level of insecurity is related to that forecast at that moment (1.0, looks at AB1 closely, they continue developing idea).

In this example, MET1 starts by sharing his professional knowledge on meteorology and ideates further, keeping the question open and a little uncertain. AB1 has a background in developing technological solutions for energy markets and he uses this knowledge about uncertainties in energy production and renewable energies, which is visible here as an ability to ask relevant questions. In terms of creating new knowledge, it is important that he can also show uncertainty by formulating questions and giving space to the other and his expertise. This gives MET1 a possibility to elaborate his thoughts further aloud, sharing information on the details of forecasting to AB1, so that they can together develop their idea on using uncertainty in developing VPPs. In addition, the participants used **professional information and knowledge from the other's field** to make suggestions and start conversations, asking for evaluation. The style of interaction is more insecure and reflective: the other suggests, asks or otherwise informs, that she is aware of some potentially useful topic, as in the next example:

AB2: So how is this, kind of (is writing down the ideas and stops to ask), this creates like peer-to-peer markets (writes down), but there is no blockchain, there is not?

INSI1: Yeah, yeah, we need that marketplace (shows the paper).

AB2: (Marketplace) (they start developing the idea of the technological solution).

In this example, AB2 uses his prior knowledge on blockchains and shows that he is aware of the concept and possible usefulness, but gives the role of an expert to INSI1, who confirms the suggestion and develops the idea further. Here, the uncertain nature of talking about blockchain is again connected to the fact, that the participants know each other and their strengths: AB2 gives authority to INSI1, who is expert on new technological solutions as a researcher – AB2 can, however, reveal his own uncertainties, but also the fact, that he is aware of this quite complex topic. Hence, they are able to develop their idea further. Additionally, the participants used **relational information and knowledge from the shared information landscape** formed by the common history of the participants. To be able to examine this from interaction data from the workshop, the ethnographic data from the interaction history of the participants was needed. Based on our analysis, the participants were able to use knowledge shared in previous workshops and other gatherings and refer to that common knowledge by using certain core concepts of the research community, such as flexible energy demand. This is illustrated in the next example:

AB2: Is there any sense in bringing in some electric cars' batteries or such, when they are not in use?

INSI1: Yes, there is.

AB2: Cars are not used 95% of the time, and from that time,

INSI1: Flexible energy demand-

AB2: Flexible energy demand (starts to write down) e-mobil, so flexible energy demand (2.0), so the company doesn't have its own power plants (mm) (nods and the participants continue to develop the idea on virtual power plants).

In this example, INSI1 can, by just referring to the flexible energy demand, bring the whole concept and discussions conducted around the topic of using electric cars' batteries to save surplus energy in previous workshops to this current situation. AB2 doesn't need to ask for further details but decides to write the idea directly down and this forms a basis for their joint ideation. Finally, **common information and knowledge from a general perspective** was used to refer to the phenomena and information that the participants assume are already known by the others, as citizens. This is illustrated in the next example:

AB3: ... some people are ready to pay more for-

ISSI1: (I know, I know) (nods) what do you mean.

AB3: For example, someone buys from e-bookers a flight from a to be for three euros, whereas someone is ready to buy a private jet and with that go from a to be.

ISSI1: It just requires that you can afford that.

AB3: That's right, people are different. (they continue by negotiating the issue).

In this example, AB3 refers to e-bookers as a concept, which is supposed to be common knowledge and gives only minimally further information to support his idea, but ISSI1 seems to understand the idea despite that. This phenomenon was linked with the use of certain trademarks, places, and concepts, related to energy, technology and familiar locations. Having a common knowledge base supported developing joint understanding and finding ways to communicate and draw analogues to more complex concepts.

4.2 Information and Knowledge Evaluated in the Discussions

As we analyzed the discussions to see if the features of information literacy were present in the discussions, we noticed that there were only a few occasions, where the information used was explicitly evaluated, or its origins opened up for evaluation of the others. However, as we examined the interaction and action in the events, there were several actions related to information use, which were implicitly linked with IL as clarifying and navigating in the information landscapes. Five set of actions were found: 1) *Giving some proof of the correctness of the suggested information*, 2) *Talking through the idea, giving more information*, 3) *Asking for premises and clarifications*, 4) *Showing uncertainty in the discussions*, and 5) *Showing thinking, consideration and reflection in action*. First of all, **giving some proof of the correctness of the suggested information** was done by referring to the sources of information, by explicitly showing something from a computer or other tools. In the next Example, INSI1 highlights his views by referring to his computer:

INSI1: We need that marketplace, these guys need a marketplace, it is either a blockchain or (starts to look at something from his computer for the first time in this workshop).

AB2: (writes something down in the paper).

INSI1: (shows something to AB2 from his computer) this same can be done with a mobile network (shows his computer and makes eager gestures), we have IPC coming from the software, we have megas in the software, we can do this as a virtual service (continues to ideate, based on the complex technological information).

In this example INSI1 giving some background for the information suggested, by using a computer and showing some details on this mobile solution. Here, the reference to the exact, technological information is done more reliably, and also accessibly, by showing the information from the computer, helping AB2 to understand. These kinds of actions were however not very common in our data, as the participants relied much on their status as professionals of their own fields, as illustrated in chapter 4.1. The correctness of the information was elaborated in more subtle ways, such as by referring to an authority or a jointly shared information source. The possibilities of evaluating the premises of given information was in some cases enhanced by doing illustrations of the argumentation and the basis of the information, as in the next example:

MET1: That, well let's say it is a developmental issue for next ten, five years, that we can already better limit the insecurity, I can draw that to that paper, how-

FAS1: You can also write directly-

MET1: Well yeah, I do this kind of a concept to this paper first (takes a post-it and starts drawing, looking at AB1 simultaneously), so the situation is, that we have the time here, and here some figure, like energy or whatever, and we give a forecast, it is something like this (draws further a diagram to the post-it, sometimes looking at AB1 for confirmation), and let's say in two day you can see, that it is here!

AB1: Yeah. (they continue ideation, using the drawing as a tool in explicating thoughts).

In this example, MET1 needs to support his ideation based on more complex information on forecasting by drawing an illustration of his idea. In this way, the information is also more understandable and accessible to the other participant. In this example, the action of giving some proof of the correctness of the information is intertwined with the second action, **talking through the idea and giving more information**. This kind of activity also often caused the talker to change one's own opinion - this was highlighted in our data and the borders between knowledge sharing and creating were ambiguous. To reflect, critically evaluate and develop one's own thoughts by talking aloud could be seen as a valuable part in creating complex knowledge, as seen in the next example:

MET1: So, is there something, like what do we know before about the predictability of the forecast? So, there are some methods, (...), these are like weather models, we can with some disturbance stimulate uncertainties (...) We can run several different, like-

AB1: Yeah.

MET1: scenarios, and they then disperse into a flock. And this, kind of-

AB1: Yeah.

MET1: in some weather conditions the flock is smaller, and we can rely on it, and in some conditions the atmosphere is chaotic, and a small disturbance disperses into different scenarios, so there is a kind of like built-in uncertainty-

AB1: So, this is like, you could compare this with finance markets, where sometimes the uncertainty is higher and no-one knows, where the markets are developing?

MET1: Yeah, yeah (they continue developing the idea of using uncertainty as a basis).

In this example, AB1 shows his understanding by answering “yeah” every now and then, and by finally referring to his previous knowledge on stock markets, and abilities to draw conclusions and combine information gained from the other. In this example, we see how the silent or minimal participation of the other, encouraging the other to ponder the problem can also be an important knowledge-creating element. Here, MET1 can take his time to evaluate, reflect and clarify his own thoughts. **Asking for premises and clarifications** was related to the previous knowledge of the participants. Here, the need to further explain and evaluate the value of the given information came from the other participant and could even have some features of questioning or challenging the other’s knowledge. This is illustrated in the next example:

ISSI1: If we start with this my idea (puts a post-it ready on the table).

AB3: Yeah, yeah, let’s start with that!

ISSI1: I can almost say, that then it solves the problem, that the investment is small, a risk-free investment, you don’t buy a big wind turbine. The user doesn’t need a big sum of money-

AB3: Yeah, before you write anything there (shows the paper), I mix up your thoughts a bit, that I have an opinion, that some people are willing to pay a bit more-

In this example, ISSI1 proposes that they would start to develop an idea based on his previously suggested theme, and AB3 immediately agrees with that. However, as ISSI1 gives an evaluation of what problem the idea would solve, AB3 explicitly questions him by telling his own opinion. In addition, he gives his own opinion and emphasizes that by giving some further information and an example, which is understood also by ISSI1. In this discussion, AB3 continues to ask for more premises of ISSI1’s views, and they end up having a joint understanding of the best solution. These kinds of interactional situations could be related either to the need to get more information to be able to evaluate its suitability in this context, or to a need to bring forth one’s own, challenging point of view. Here, the ways in which the participants were able to discuss and clarify the possible misunderstandings and form a joint understanding in the end was essential. Next, **showing uncertainty** was related not so much to the correctness of the information, but its usefulness in this context, or the possibility of connecting two fields or information sources, as in example 3 in Chapter 4. The knowledge-creating power of showing insecurity is illustrated also in the next discussion of MET1 and AB1, where also MET1 shows the limits of his knowledge and asks for more information from AB1 in a subtle way:

MET1: So how, is this somehow, like it (makes movements with his hands, searching for words), in a big picture, I don’t know how it, in this context, does it have any role? (1.0), does it solve anything from the point of view of the user (looks at AB1).

AB1: (looks concentrated and listening, writes down something to his own papers),

MET1: Of course in the long run (taps with a pen on the paper and looks at AB1 closely, AB1 starts to look MET1 into the eyes), it reduces costs (1.0), or? (MET1 continues to elaborate the problem and finally AB1 confirms, that the idea is good).

In this example, MET1 shares his professional knowledge, but also questions his own capacities to evaluate, if the solution and the chosen path is correct and useful. AB1 shows that he has listened to the informative turns of MET1 and understands the problem and is also capable of posing a relevant question to MET1, which suggests a way to a solution. Hence, the knowledge creation process is connected to the capabilities of using existing background knowledge and also knowledge gained in interaction with others. Finally, **showing thinking or consideration** could be seen as a manifestation of IL in interaction. This feature was seen in interaction as taking some time for thinking and considering the shared information, or its usefulness in the context. In our data, this was not common, as the discussions were quite hectic, and the participants were well aware of the limited time they had. However, there were some moments, where the participants stopped to think of the best way forward, as in the next example:

INS11: The question is, if I put the panels on the roof, can I even sell (looks at INFO1 defiantly) (1.0).

INFO1: You can sell to the electricity company and (...), you pay huge taxes.

(5.0, all the participants sit silently thinking about the problem).

INS11:(scratches his head), so this is like playing against the existing players resisting things, the markets don't support renewing at all.

AB2: There are no markets. (the participants continue to develop a solution to that).

In this example, the participants first are eager to develop their joint idea, but, unlikely for them, end up sitting quietly for a while, thinking and considering a good solution to a tricky question of breaking the monopoly of the big electricity companies. This is evoked by an informative turn of INFO1, who shares her understanding of the current policies in energy pricing and tasks.

5 Discussion and Conclusions

In this study, we have examined how knowledge creation situations include manifestations of information literacy, and how information literacy is performed in interaction, when developing solutions to complex problems in researcher-stakeholder collaboration. Our findings illustrate how decision making on the relevance of information is intertwined in the interactive process of knowledge creation. Interaction between the participants was crucial in creating new ideas, and the participants were able to bring into the discussions new insights, take the other's ideas into account and combine existing knowledge and information in new ways [cf. 3, 4, 13]. In terms of creating new knowledge, the participants together developed their ideas for VPPs by suggesting, asking for evaluation of their ideas, revealing uncertainties and with many interactive means built joint understanding, and found ways to communicate and draw analogues to more complex concepts.

In knowledge creation, the abilities to bring into the discussion new insights is crucial [cf. 17, 21]. Our analysis indicates, that in working context, this information can be based on participants' professional knowledge, but also the mutual history and shared previous experiences matter, helping the evaluation of the relevance of the information. In our data, the ideas were based on three kinds of information: professional information and knowledge from one's own field, or from the other participant's field, relational information from the shared information landscape formed by the common history of the participants, and common information and knowledge from a general perspective [4, 10, 17]. It was noteworthy, that with different actions, the participants were able to create novel ideas based on that information by evaluating it and combining it with other information resources. This can be understood as manifesting IL in interaction: giving some proof of the correctness of the suggested information, talking through the idea and giving more information, asking for premises and clarifications, showing uncertainty in the discussions, and showing thinking and consideration [3, 4, 13, 17]. In general, the analysis indicated that IL can be a shared and interactive phenomenon. Furthermore, the analysis indicated that IL was manifested both in words and in action. Interactive processes, such as explaining, questioning, and arguing, were related both to the content of shared information, and developing new ideas, which highlights the interconnected nature of the phenomena of knowledge creation and IL. Here, the relation to research on knowledge-creating interaction [13–16] and IL, both in the Framework [17] and in organizations [6, 20] is clear.

The findings indicate that IL can manifest in interactive, embodied ways [7, 21], and is intertwined with creating new knowledge, as evaluating, changing one's views and enlarging one's information landscape is inevitably creating new stances and thus new knowledge [4, 15, 16]. The development of skilled knowledge workers can be seen in their abilities to quickly adopt new possibilities related to information sources, connections between fields, using knowledge and information gained from others as a starting point of knowledge creation [11, 15]. Such IL abilities display openness to new ideas and viewpoints [15], unprejudiced reflection of ideas and skills to critically evaluate gained information [4, 16] foster creation of new knowledge. As our findings indicate, this can be supported, too, by using material tools (such as whiteboards, papers, computers) and circumstances to share information, be more precise and to give others a more clarified view of the ideas [1]. Here, the concept of information landscapes and focusing on the environment should be further elaborated [18].

In the background of this study has been a striving to find ways to examine how information and knowledge are present in human action and interaction, not just as an explicit element in the form of documents or information sources, but as an inseparable part of every human action, perceived and experienced in the course of actions. Hence, we develop theoretical, conceptual, and methodological premises of information studies [18, 19, 22, 25]. This can be continued by examining the theoretical premises of understanding humans acting and interacting with information, for example, related to a phenomenological approach [25, 26]. Furthermore, by developing methods to examine discussions as part of longer knowledge processes, we create paths to understand how

single moments of action can be viewed as parts of a wider system of information practices, processes and infrastructure in future studies, to develop organizational environments and tools, which support IL and knowledge creation as action. This also provides practical implications for developing supporting environments, tools, and organizational practices, which take into account the interactive and embodied nature of working with information [14].

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Temporal Aspects in Museum and Library Professionals' Work in the Context of Acceleration of Social Time

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Abstract. This article explores how the acceleration of social time shapes the everyday work of museum and library professionals in Estonia and Sweden. Informed by theories on social acceleration and principles of constructivist grounded theory, 34 semi-structured in-depth interviews were carried out. The 'symptoms' of the acceleration of social time create several temporal tensions in organizations, therefore, various tactics can be applied to cope with the time-related issues in work. Moreover, focusing on the multiplicity of temporal aspects in work enables a better understanding of potential time-related problems between various professionals within and in relation to museums and libraries.

Keywords: Libraries · Museums · Acceleration of social time

1 Introduction

This paper discusses time-related issues in everyday work, perceived by library and museum professionals in Estonia and Sweden. Considering the theory of accelerating social time [1, 2] and the multiplicity of temporal aspects in psychology and organizational studies [3] as vantage points, I explore both the 'symptoms' of accelerating social time in the museum and library work processes and professionals' tactics to cope with these symptoms. I, thus, encourage discussions on temporal aspects relevant to information literacy in the workplace. The quantitative temporal demands to work [4], such as work-life balance, work pace, and especially work autonomy, have previously been separately approached in the context of memory institutions [5–7] or knowledge institutions [8, 9]. However, the variety of and interplay between temporal aspects needs further analysis to address the potential time-related tensions in museum and library work. Although the recent COVID-19 pandemic is not under scrutiny in this paper, accounts of previous research [10–12] outline temporal acceleration was also due to the pandemic situation, thus making the necessity to study time in the information-intensive work contexts even more acute. This article aims to explore time-related issues in the work and information practices of museum and library professionals in the context of social acceleration [1] in two similar yet also different countries, Estonia and Sweden.

I conducted semi-structured in-depth interviews with museum and library professionals, in my search for the appropriate approach to study the usage of time in organizational settings. Time as a phenomenon has various dimensions, involving objective and measurable *clock time* and subjective *event time* [1, 3]. As information professionals are working in socially networked organizations, the practice-based approach to time enables analyzing time through “peoples’ recurrent practices that (re)produce temporal structures” [3, p. 689]. Capturing the acceleration of social time thus needs attention focused to accounts on and explanations related to temporal practices. I complemented the interviews with a projective technique I specifically developed for the current study to provide in-depth accounts about time and work pace in museums and libraries. Therefore, this study also contributes methodologically, providing a means to map and reflect on information professionals’ workday.

2 Theoretical and Empirical Background

This study considers the acceleration of social time as a ubiquitous phenomenon, extending from societal developments to the organization level and individual lives. In general, the acceleration can be detected in terms of technologies in the increase of speed of information transfer; in the acceleration of change and thus, the “increase of the rate of decay” of information; and in the acceleration of pace of life, through the increased number of ‘action episodes’ [1, pp. 72–78]. Since social relationships are interwoven in the society, the inability or unwillingness to keep up can quickly cause social desynchronization [1, p. 84] – hence, the implicit pressure to remain synchronized. In the work of library or museum professionals, critical aspects of the social acceleration of time have been discussed in numerous publications: first, in terms of the technological acceleration especially in libraries [13]; second, in the need to keep oneself up-to-date with various developments as life-long learners [14] to keep pace with user needs [15], and third, in the attempt to increase the pace of work [8, 16–20].

It is difficult to ‘measure’ the social acceleration of time. Thus, the effect of the increased pace of our daily life has often been described through various ‘symptoms’ of acceleration of social time [1, 2, 21]. These ‘symptoms’ have increasingly been explored also in the context of knowledge work – concerning the intensification of work [10–12, 16], constant disruptions, or multitasking [8, 16–18] contributing thus to the illusion of work autonomy [8, 9] and flexibility [19, 20].

Alongside developments in time usage, changes in the professional landscapes [22, 23] and the professionalism of library and museum staff [22, 24, 25] occur. One such change was the introduction of logic of marketing and consumerism in libraries at the end of the 1970s and in museums in the 1990s [26]. This change was accompanied by the need to communicate the activities of the memory institutions to various target groups. We then saw a change “from professional competence as standardized credentials to a focus on results and performativity” [24, p. 482], and development from professional discretion to bureaucracy, management, and technological competencies [24]. However, these changes focused on results and the application of bureaucracy as parts of the rationalization processes we followed to explain the need for change [1, p. 50]. This rationalization process was one of the starting points for social acceleration. These

changes in museum and library work can create new expectations at the institutional level [24], but also in terms of usage of time of professionals [5] and organization of their work [24].

At the same time, despite the changes related to the acceleration of social time and professionalism, museums' and libraries' unique positions and responsibilities as memory institutions [27] create a specific context. Collecting and describing objects in the museums to create "representations of a culture's collective memory" [27, p. 421] and providing access to the library collections via various information tools and services [27, p. 416] are tasks demanding time and focus on quality. As is the case for information work, "there is always more work and everything could be done better" [16, p. 81]. Hence, the *raison d'être* of memory institutions creates a tension field between the quality and controversial time-related demands for museums and libraries, and especially for their staff. These potential tensions inform us of time-related changes in work and information practices, linked to the almost hidden [28, p. 136], yet pervasive [29] information literacy skills required in the workplace. Thus, applying theories and previous research on the acceleration of social time helps to scrutinize the time-related issues in the work and information practices in these institutions.

In this study I focus on museum and library professionals in Estonia and Sweden. Both countries share secular-rational values [30] and are well-connected in information society [31]. However, Estonia and Sweden present significant or even contrasting cases concerning perceptions of time and pace of work. While Sweden represents a stable Nordic welfare state, Estonia can be seen as a post-transitional country guided by the rhetoric of "catching up" [30] "with the modernization processes in the West [32]," from "returning to the Western World" [33] to becoming one of the "Returned West [34, p. 162]." Despite many similarities [35], the position of trade unions and their capabilities to support the employees' welfare differ substantially in these two countries [36]. The differences in the pace of developments and the employees' possibilities to maintain work-related well-being are employed as time-related contextual aspects to provide the analysis with depth for the emerging grounded theory.

The research questions are informed by the theory of acceleration of social time and the variety of temporal aspects, coupled with methodological principles of constructivist grounded theory [37]. First, I explore how library and museum professionals in Estonia and Sweden perceived the acceleration of social time through their everyday work processes. Second, I outline the temporal tensions revealed from the emerging constructivist grounded theory analysis. Third, I ask what kind of tactics do library and museum professionals apply to cope with the tensions of a fast-paced work life. I briefly discuss critical temporal aspects that need to be considered in terms of information literacy in the workplace context hand in hand with the perceptions and tactics related to the acceleration of social time.

3 Methodology of the Research

This article is based on the constructivist grounded theory analysis [37] of 34 semi-structured individual interviews with 18 Estonian and 16 Swedish library and museum professionals. They worked in various libraries and museums: public and scientific

libraries, municipality and state museums in towns of various sizes and in rural settlements. Amongst the interviewees there were different specialists occupied with the core functions [38] of both museum and library work including the tasks of developing, and describing or cataloging collections, providing desk and virtual services, outreach activities, and user training. Managers of various levels were involved in this study. Memory institutions of all sizes were included from small libraries with just one employee to big museums with over 270 employees. At the time of the interview, interviewees' work tenure ranged from 2.5 to 30 years. During the analysis, I invited professionals who presumably were more or less autonomous in their daily work or involved with different tasks to bring more variety into potential daily tactics of planning the work and, hence support saturation of theoretical categories [37, p. 199].

Considering the relatively small size of practice communities in both countries, detailed descriptions of interviewees would hinder their anonymity. However, the results of this study can be interpreted in the light of work tasks that interviewees perform. Therefore, I refer to interviewees by relying on research participants' descriptions of their work. I assigned a label to each interviewee's transcript containing the code for the country (EST or SE), the number of the interviewee in the respective country, type of the institution ('L' as a library, and 'M' as a museum), and the main field of work (for example, Collections – Coll., Service / Communication – Serv. / Comm., Manager – Man.). As it is not uncommon that some librarians can be occupied with multiple tasks during their days [39], I labeled the main field of work for librarians in these situations as 'Multi.'

I conducted the interviews in the period from January 2020 to April 2021. I carried out 18 interviews on site as this was most suitable for the interviewees. I conducted the rest of the interviews via Skype or Zoom. The COVID-19 pandemic impacted this study since March 13 2020 when the emergency situation was declared in Estonia. While in Estonia and Sweden the COVID-19 pandemic 'waves' have not occurred in synchronicity, the pandemic has affected libraries and museums in both countries. I emailed the ten interviewees who participated in this study before the emergency situation some additional questions to gain some additional insight into their work pace under COVID-19 circumstances and they also replied via e-mail.

Following the principles of conducting semi-structured interviews, I used a list of interview questions as an aid during interviews, but in general, I asked additional questions to garner a more thorough understanding of interviewees' experiences both before and during the COVID-19 pandemic. Whenever applicable, I used a projective technique to complement the interview: the interviewee could use a sheet of paper, pen and text highlighters to write down various work tasks conducted during the last full working day, and then highlight and mark different work paces, instances of multitasking, and disruptions. The projective technique was developed for the purposes of this research project, considering the various temporal aspects that were potentially affecting the workday.

Later, I transcribed the interviews with the help of the speech recognition software for Estonian speech [40], and organized e-mail responses to additional questions into separate files. After I conducted open coding, I categorized the codes into groups of codes by comparing codes with other codes and data [37, p. 140] with careful attention to the preservation of the context and relations between topics and categories. I analyzed

the manifestations of theoretical axes concerning work pace and social acceleration [1] to understand the professionals' perceptions of work pace. As the interviewees perform multiple tasks during their workday, the tactics to organize their day hint at specific patterns that also reflect the acceleration of social time in library and museum work. Focusing on these patterns during the axial coding [37, p. 149] allowed me to analyze the conditions, responses to the conditions, and the consequences of the acceleration of social time [37, p. 148].

4 Results

In this results section, I characterize the workday of museum and library professionals through three interconnected axes containing various aspects of time, the multiplicity of tasks and task-related information, and the social relations with colleagues, visitors, and partners. Each axis then involves 1/ certain habits related to the acceleration of social time; 2/ potential tension fields that are met by 3/ applying corresponding tactics – more or less reflected practices that support the control over one's workday. Although the various temporal pressures are often external, some temporal pressure may emerge from professionals themselves from the professional identity, career path, or emotional factors.

Interviewees often imagined time in work in both museums and libraries as tranquil: “just give and take [the books]” (EST1L_Multi), so that having “this romantic idea of everything in the museum was like extremely slow paced” (SE5M_Coll.) was not uncommon. Apparently, activities in these institutions embrace both speed and slowness in terms of pace. That variable pace also influenced people working in museums and libraries, putting them to test to cope with the varying paces of work. While the planning of work and various collections related tasks can be slow-paced and focused for quality, work with visitors, involving responses to queries or organizing events, can be very fast-paced. “Because this is... can be chaos, it's very tense. It's a lot of things happening on the same time” (SE11M_Comm.) as the memory institutions need to show their relevance in the society and also keep themselves updated with current trends. The quantitative and qualitative demands to museums and libraries also echo in the interviews as, despite the sometimes hectic pace of work, the quality cannot suffer: “Quality is my tool in my work. I try to do the best I can every time” (SE10M_Coll. & Research).

Library and museum professionals encountered various time-related tension fields in their work. These included the pressure of immediacy, the pressure to work more effectively, and the pressure to sustain the institution's relevancy. The pressure of immediacy is pervasive in our contemporary society, leaving memory institutions untouched. Users may expect a quick response, colleagues may need a reply to some quick question. The pressure of immediacy can also be internal when reacting to various issues immediately, as we sometimes do. Because of the multiplicity of tasks we face, it can be easy to forget that we often have a choice: “I do not postpone, I do not think that I'll do these tomorrow or a day after that, because I'm afraid that they get out of my mind. So that I forget about these, so I am that kind of type who does things now if necessary” (EST6M_Coll.). The pressure to work more effectively is very closely related to the budget of memory institutions: most of the interviewees mentioned that, in the time being, the number of

personnel within their institutions has decreased, or their institution has taken new tasks or functions without the increase in staff. Therefore, the people already working in the museum or library are called on to perform the new tasks as well. The pressure to sustain the institution's relevancy reflects memory institutions' position both in the highly competitive information landscape and field of cultural economy. The users to museums and libraries live in their own temporalities. Consider the academic year at the university, the possibility of finding a free moment for a visit to the museum, or the interest to come and donate significant items to the museum. In all these cases, the libraries and museums are open and sometimes even have to stress their openness to the public.

To safeguard the quality of work despite the speed under which completed tasks are expected, museum and library professionals can apply various tactics to take time during the workday. Finding time outside "core hours" [19] of work to ensure minimum distractions, closing the office door, or working from home even before the COVID-19 pandemic can help creating distance between oneself and potential distractions. Within organizational limits, the skill of creating an appropriate workflow for oneself evolves individually over time. This involves learning about certain hours to work most efficiently and reserving time for demanding or creative tasks, discovering routines that help to restore energy during the workday, or organizing one's work with time-consuming tasks. Sometimes, the pace of work can be increased by using technologies or delegating some tasks to colleagues at least during busy moments. Filtering the work-related information (EST10L_Serv.) or dealing with the same email just once: "It's like a paper, never pick it up twice. But you pick it up and you handle it and then you are done with it." (SE1M_Coll.) are among strategies helping to save time in work-related information overload.

Sustaining both museums' and libraries' relevancy amidst changes in the institutional landscape [24] means that the variety of tasks conducted in these institutions has expanded and impacts the workday. In addition to 'classical' professional tasks like developing or describing collections and providing information services to the visitors, both library and museum professionals can be involved with administrative or practical tasks even if they are not working as top-level managers. Writing projects to provide new services (EST14L_Serv.), taking care of bills (EST1L_Multi, EST3M_Coll., EST17M_Coll.), handling practical issues like broken lamps, toilets, ventilation (EST4L_Man., SE5_Coll., EST17M_Coll.) are but a few of the duties that need attention. Furthermore, the library and museum professionals were actively available for their visitors by keeping an eye on new needs of increasingly more target groups (EST14L_Serv.) and providing both onsite and mobile, and increasingly virtual services (for example SE9L_Serv., SE16L_Serv., EST7L_Serv.). They were also responsible to spread the news about the services (EST14L_Serv., EST10L_Serv., EST18L_Multi) as not all libraries or museums cannot afford a communication specialist. The professionals needed to be updated with new technologies and communication channels. Moreover, since it can be a matter of professional pride to be among the innovators (SE2L_Multi., EST5L_Man.) or early adaptors of new technologies (SE16L_Serv.), such early adoption requires time for planning, training, and testing.

The multiplicity of tasks and task-related information in work is accompanied by specific tension fields that are often taken-for-granted in the work of library and museum

professionals. Tension accompanies the demands for flexibility and multitasking and the adaptability to cope with constant disruptions throughout the workday. Minor disruptions distracting attention from the tasks at hand are an inevitable part of work. Professionals involved with collections as well as managers presented multiple accounts of cases when someone, such as a colleague or a user to the museum or library, stepped into the room, made a phone call, or wrote an email to ask something. As this happened, the library or museum worker were also involved with ensuring the quality of the information in the museums and libraries. They needed to take uninterrupted time. For professionals involved with services, the time dedicated to serving the visitors in the reading or study rooms was in itself a time for flexibility and constantly helping out the visitors for the visitors *are* the priority. Therefore, other tasks conducted during service desk hours were secondary or extra activities for the quieter moments when no one needed serving. Usually these tasks contained activities that did not demand deep focusing and could easily be paused in case someone needed help. In line with earlier research [7], the interviewees defined multitasking in multiple ways. Multitasking can be very ‘short-term’, involving interruptions and disruptions like receiving a sudden phone call. Multitasking can be ‘mid-term’ as when one is switching between various tasks like checking emails or putting books back on shelves during the time of providing services to visitors. And multitasking can also be ‘long-term’ when there are multiple long-term processes or projects simultaneously at hand and they need to be checked or dealt with from time to time. An example of long-term multitasking is working with various tasks during the work of exhibition preparation.

The professionals applied a variety of tactics to cope with multiple duties. Collecting work into ‘bundles’ was one of these tactics: “I try to do... all the mails that I need to write during the day, I keep those kind of tasks in like a cluster or keep them together... I also order mails... together in some way. And then, if I know I have to out in the storage, in the collection storage, to get stuff or look at stuff, I actually kind of gather those stuff as well” (SE17M_Coll.). In some cases, the same tactics can work in dealing with email. When, for example, one reserves specific times, such as the first hour in the morning, to read and reply to emails. However, very often, the necessity to help colleagues solve their problems or reply swiftly to emails from visitors is one of the priorities in work, so restricting time dedicated to emails can only cause issues. The variety of duties could also result in forgetting about some tasks. The museum and library professionals often use various aids to solve this problem from post-its to to-do lists and from paper-based to shared electronic calendars. Also, the temporal rhythms in work can make it easier to remember things. Checking the calendar or meeting colleagues as the first things done in the morning, or creating a to-do list for the starting day or week are some of the means that help make sense of forthcoming tasks.

The multiplicity of tasks was closely related to the third essential characteristic of the workday: the social relations with colleagues, visitors, and partners are subject to agreements and very often to deadlines. Even the tasks conducted individually, such as cataloging books, describing museum objects, or writing an article may rely on social relations. As museums and libraries are in the service of society in general or in some particular institution in a narrower sense, following the temporal patterns of those being served is a natural part of work. As part of various networks, the libraries and museums

also need to consider the temporalities of their stakeholders including partners and funding agencies. For example, library and museum workers need to keep in mind when the high seasons in tourism typically occur or what deadlines are to apply for funds for a new project. At the same time, relationships also leave some space for the autonomous work. The goals and deadlines can be set, but the way how the goal is reached is up to the professionals. This also means planning appropriate time: "the priority is when do I have to hold this lecture that the PowerPoint is for, and I can plan myself." (SE1M_Coll.).

Besides deadlines, an essential temporal aspect related to the social nature of work is the rhythm. The rhythm contributes a certain predictability in work and thus reminds us that work involves balancing the high demands of flexibility with the unexpected or uncontrolled essence of work. The work in libraries and museums is characterized by various rhythms or cycles. There are the daily rhythms. Morning hours are when groups from kindergarten or schools tend to visit the library or museum. 'Core hours' are when meetings are typically held and most of the colleagues are available. Meetings can follow 'traditions' such as when we always start with some activity at the same time: "maybe a sort of tradition that a good time for the meetings was 2 o'clock in the afternoon... Everyone had had lunch, others had completed their busy duties. So, this time for meetings from 2 to 4, so cozy." (EST2L_Man.). The weekly rhythms involve offering certain activities on certain weekdays: "on Fridays I sing for the children" (SE9L_Serv.). Weekly rhythms also relate when working with colleagues. Surprisingly, several interviewees in both countries mentioned they had meetings on Tuesdays. The monthly rhythms are not so common, but in some libraries the last Friday of the month is usually when the library is closed for cleaning. Eventually there are the yearly rhythms that involve 'high and low seasons' of visitors, duties related to fiscal year planning and reporting, and typical times for holidays. Holiday time are also 'low seasons' in meetings. As can be seen from these examples, although the rhythms stem from the *clock time*, their social nature simultaneously binds them to the *event time*, weaving the rhythms into museums' and libraries' 'temporal fabric.'

The social nature of work can be characterized by the constant interplay between autonomy and synchronicity. Various moments range from fixed to unexpected when the work pace can be controlled or not. The fixed moments where the pace of work cannot be controlled are usually related to tasks bound with other people such as meetings, training programs, and service desk hours. "The schedule is made a month before" (EST10L_Serv.), thus the fixation starts already long before the arrival of the actual workday, and the "meetings dictate the day" (EST2L_Man.), setting thus temporal boundaries also to other tasks conducted during the day. As noted above, these fixed moments can often be related to the rhythms in the library or museum work. On the other hand, there are tasks that 'pour' into the workday – unexpected and uncontrolled, like a sudden request from the manager to check statistics (SE2L_Multi) or a quick question from a researcher who needs help with the database. Both fixed and sudden tasks where the pace of work cannot be controlled need time but at the same time, some tasks need to be uninterrupted, allowing one to focus at one's own pace. These kinds of tasks are cornerstones of the credibility of museums and libraries., Fixed moments are related to long-term decisions with sometimes irreversible consequences about the collections, the quality of information provided in various kinds of databases and information systems,

and polite and user-friendly ways of representing the organization. For tasks that range from more time-consuming, such as writing a book or preparing a presentation for a class, to small bits, including answering a question from the user, the professionals need to take time in their filled and sometimes hectic workday.

Good relationships with colleagues, visitors, and partners are essential in the museum and library work; just as the social aspects of work create temporal tensions, they can also be beneficial. Forwarding emails with queries to more knowledgeable colleagues or just asking for help is just one possibility to reduce one's workload while doing similar favors for colleagues. The various tactics to synchronize workday are also common. Shared calendars allow finding out about times when colleagues are busy. Shared calendars sometimes also act as manifestations of tensions as they enable us to "block in my calendar. So I put in, like the whole afternoon is... just for writing a different kind of text or things like that. Because otherwise, the day fills up with meetings" (SE14L_Coll.). On the other hand, other colleagues may need to 'win' time back "because everyone has so much blocked time, so then you have just overrun it and send an invitation to a meeting that you think that this one is more important" (SE4L_Man.).

5 Discussion and Conclusions

The theoretical approaches to the acceleration of social time [1, 2, 7–9] provide us with analytical lenses to focus on time-critical aspects of information work and literacy practices in a specific context of museums and libraries. Several aspects, like setting deadlines or meeting times, can be agreed upon in contracts, work schedules, or shared calendars. However, in the constellation of time itself, the multiplicity of tasks and the social relationships, there are also 'loose' temporal aspects that at least to some extent contribute to the relatively high temporal autonomy of museum and library professionals [5]. Furthermore, the professionals in memory institutions experience several time-related tensions or paradoxes. The autonomy paradox can be explained in the framework of flexibility and predictability of work, occurring amid disruptions and multitasking [8], yet in the work of museum and library professionals, it is also bound to the pressures of immediacy and efficiency to sustain the institution's relevancy.

To cope with these tensions, time-related tactics can be applied to ensure the long-term sustainability in work, the feeling of staying on top of things in the abundance of tasks and work-related information, and maintaining good relations with colleagues, visitors, and partners. In the work-related context, recognizing the potential temporal barriers and tensions are essential not only to use information effectively but to do it within the context of social relations affecting the use of time. The ability to find ways to overcome these temporal barriers can thus be linked to the work-place specific information literacy [28, 29]. Furthermore, the various faces of information literacy, including problem solving and information seeking, [29] are in practice often time-sensitive and linked to choices of using time appropriately. Considering the multiplicity of time-related tensions thus allows looking beyond the 'classical' contributor to information overload, time scarcity [21, 41]. The tactics to increase the pace of work, take uninterrupted time to ensure the quality of work results, find out about individually-suitable preferences of uses, and manage time in complex organizational relationships can all help to cope with demands from information-intensive work.

Approaching the perceptions of acceleration of social time can be puzzling [1] in organizational settings. This study has benefitted from two methodological tools. First, the projective technique applied during the interviews helped the interview participants to recall and reflect upon their workday with more ease. Secondly, the application of the principles of constructivist grounded theory [37] enabled me to map the various temporal tactics that further inform us of the acceleration of social time in the memory institutions. The results indicate that some concepts, such as 'multitasking', can have several common-sensical meanings. This kind of analytical approach enables gaining a rich understanding of the acceleration of social time in specific contexts such as museums or libraries. As is the case for qualitative inquiry in general, this study does not aim to generalize the results over the studied population of museum and library professionals. Instead, it benefits from creating more nuanced accounts of the acceleration of social time in Estonia and Sweden in the context of memory institutions.

In this study, I conducted interviews primarily with people working in small or medium-sized institutions. This meant most of the interviewees had at least some colleagues they could rely on during the day. However, there are rural public or school libraries and specialized museums with just one full-time employee who is supposed to handle all tasks during the day without any immediate colleagues. The statements from the interviewees indicate that, in smaller museums and libraries, the employees are indeed dealing with a larger variety of tasks throughout the day. However, it is unclear whether there are also qualitative differences regarding the work pace in memory institutions of different sizes. In addition, this study mainly involved experienced and qualified library and museum professionals, often with a strong professional identity. As memory institutions are also interested in finding volunteers or interns, and sometimes also employing people without professional education, we may hypothesize there are differences in ways how professionals and non-professionals in museums and libraries prioritize their work tasks. Furthermore, we may need to ask how different professions, depending on the professional background, are discursively constructed even within museums and libraries. The potential to expand the theoretical sample of museum and library employees under scrutiny can provide beneficial suggestions to professionals in memory institutions, and students, volunteers, and other newcomers in the library and museum work as the temporal tensions often remain implicit only until revealed in problematic situations.

Acknowledgements. This work was supported by the Estonian Research Council postdoctoral research grant (PUTJD838) "The work pace of memory institutions' professionals in the context of acceleration of social time." The author also thanks the interviewees who found time in their busy workday to participate in an in-depth interview. Last but not least, I thank my colleagues and the reviewers of this article for their helpful comments and suggestions.

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Personality Traits as Drivers of the Scientific Production: Information, Scientific and Academic Literacies Implications

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Abstract. This paper summarizes a quantitative research that aimed at determining the relationship between professors' prosocial personality traits and their research output and achievements. We surveyed a representative sample of 120 professors from the Autonomous University of Chihuahua (Mexico) (7% standard error, 95% confidence interval), which was stratified per area of knowledge, by considering the total number of professors in the university as a whole and per Faculty. The survey included demographic questions and 78 items that used a five-point Likert-type scale for participants to rate their personality traits, which were classified under six dimensions: a) intrinsic motivation; b) extrinsic motivation; c) self-esteem; d) empathy; e) self-regulation; and f) prosocial behaviors. A richer dataset for the surveyed professors was generated by grouping data from the survey together with data from Scopus, Dimensions, Publons, and from the institution. We present general descriptive and inferential results related to this study's aims. Drawing from such results, we conclude with a list of training areas that may help in alleviating detected needs from the perspective of information, scientific and academic literacies.

Keywords: Researchers · Information literacy · Research skills · Personality traits · Scientific production

1 Introduction

This article is related to a quantitative research that aimed at studying the psychological aspects that can inhibit, promote, or facilitate the scientific productivity of professors from the Autonomous University of Chihuahua (UACH). Despite certain controversies regarding the subject of researching scientific productivity and competitiveness, the need to increase the number and quality of researchers in Mexico has been pointed out [1], which is also required in the city of Chihuahua. In addition, there are great concerns within the universities about how to enhance professors' research capacity and thus increase institutional competitiveness. Psychological aspects are among the least studied in specialized literature, which mainly concentrates on scientific writing and its formal aspects, both in terms of format and content. Investigating the psychological aspects

influencing scientific production may be important, since behavioral issues can affect scientific production and communication [2]. Researcher support programs seek to make them more productive, and such productivity has been associated with the psychological point of view, specifically on motivational, prosocial, and behavioral issues in general. Educational and research institutions have established incentives to promote scientific productivity, but the psychological strategies necessary to motivate professors may not be implemented, at least not explicitly or intentionally. Therefore, there is an area of opportunity for inquiring about psychological issues' influence on scientific production. This was the focus of this research, where we sought to examine researchers' prosocial characteristics, by setting six prosocial behavior dimensions (PBD) as an analytical framework, under which the 78 items of the survey that we employed were organized, and which are detailed in the methodology section: a) intrinsic motivation; b) extrinsic motivation; c) self-esteem; d) empathy; e) self-regulation; and f) prosocial behaviors. Research such as the present, if it determines that there are indeed relationships between these two aspects (prosocial personality traits and research output and achievements), it will imply that strengthening psychological opportunity areas would allow for identifying other means for increasing scientific production, and may also positively affect the training of new researchers.

In this article, we summarize our research findings and from these results we have highlighted some training areas and initiatives that could alleviate certain needs detected, and that are related to informational, scientific, and academic literacies (ISAL), namely: a) scientific publication; b) scientific communication, promotion, and dissemination; c) bibliometrics and altmetrics; d) peer review and journal editing work; and e) ISAL in general. This exercise of using ISAL as an analytical lens for examining the results of research that was mainly about psychological and bibliometric issues was aimed at:

- highlighting that some of the challenges found may be alleviated through the development and improvement of researchers' ISAL.
- exploring the possibility of using such results to understand the needs of researchers given their information practices [3], and, because information literacy has been connected to workplace performance, at least conceptually [4].

2 Methodology

This quantitative, exploratory, and non-experimental study used the following five data sets, which merged to perform the analyzes: a) results from a survey designed for this study; b) data provided by UACH's Human Resources Department, with professors' data such as name, sex, faculty of origin and their level in the National Researchers System (NRS), which was used by permission, anonymized and not disclosed to other parties, but was the dataset that allowed merging the other datasets in an unique database; c) bibliometric data obtained from Scopus for each professor, including their number of publications, year of their most recent publication, number of citations and their h-index; d) altmetrics data, downloaded from Dimensions, from which we gathered only the number of documents with altmetric score and the sum of such scores per professor; and e) Publons data, from which we drew the number of peer reviews per professor and

the number of manuscripts managed as editors. These data were collected for the period from 2013 to 2018. To inquire about the relationship between prosocial characteristics and scientific production, we formulated the following hypotheses:

- H₁ Professors with higher scientific productivity have better scores on their PBD.
- H₂ Professors with a higher number of citations have better scores on their PBD.
- H₃ Professors with higher altmetrics have better scores on their PBD.
- H₄ Professors who are peer reviewers have better scores on their PBD.
- H₅ Professors who scored higher in the science and society items also have better scores on their PBD.

2.1 Sampling and Survey Design

The survey was applied to a stratified and representative sample of full-time professors at UACH (N = 754), considering the total number of professors and their distribution among each of the 13 faculties located in the city of Chihuahua. The professors were divided into two groups: a) Scopus group: professors with publications indexed in Scopus during the period studied (2013 to 2018); and b) non-Scopus group: professors without publications for this period. Regarding the calculation of these samples, stratified by faculty, we used the criteria of a 7% of standard error, a confidence level of 95% ($Z = 1,645$) and a probability of success of 90% and 10% of failure, meaning that we assumed that in 90% of the cases, professors' prosocial characteristics do influence their scientific production. The final calculation of the samples resulted in 63 individuals for the non-Scopus group and 57 for the Scopus group ($n = 120$). To define the number of respondents per faculty, these totals per group were distributed proportionally among each faculty, given the total number of professors per faculty and the sum of all the professors at the 13 faculties.

The survey was applied online to the selected sample between January and April 2020 and was divided into seven parts: i) general data; ii) prosocial attitudes; iii) reasons behind carrying out research activities and scientific production; iv) factors that affect research and scientific production; v) self-regulation; vi) comparison with their peers; and vii) science and society. The first section contained questions related to the profile of the respondents, including sex, age, educational background, years of experience doing teaching and research, in addition to determining the national awards and recognitions obtained by each professor (including if they were members of the NRS, which implies periodic evaluations of researchers' productivity and actions, a symbol of prestige among Mexican scholars, which also provides members with a monthly stipend to reward their research activities). From the second to the seventh part of the instrument, 78 items were presented for the respondents to rate their agreement with each statement, using a five-point Likert-type scale. These parts are described below.

The second part of the survey sought to measure respondents' prosocial attitudes, which is recognized in the literature as a particularly difficult aspect to measure, especially in adults [5], so we decided to employ an instrument of 16 items proposed by the cited source, which had already been validated by its authors and provided in full within their article. The third part included an inventory of 15 items that we derived from the specialized literature and related to possible reasons that may explain an individual's

wish for carrying out research activities, some of these reasons are related to intrinsic motivation, while others have to do with extrinsic motivation, empathy, self-regulation, self-esteem, or prosocial attitudes. These reasons were the following:

- For the advancement of my discipline [6–8].
- For the advancement of society and humanity [6–8].
- To improve my institution’s reputation [7].
- To train new researchers [9].
- To share new knowledge with my peers [8].
- To advance in my career, be positively evaluated and enriching my curriculum [2, 7, 9–11].
- Claim my work for myself and document my research results for the posterity [7].
- Due to working requirements or obligations [7].
- To get feedback from my peers and the academic community [7].
- To find greater opportunities for networking and collaborating with my peers [12].
- To obtain funds and support to continue researching [2, 8, 9].
- To gain influence and leadership in my field of research [9, 12].
- To obtain greater prestige and reputation [11].
- To obtain financial compensations, in addition to my salary [8].
- For personal satisfaction, interest, and enjoyment [7, 10].

Similarly, the fourth section included 12 factors that may affect research and scientific production, also extracted from the specialized sources, with which respondents had to assess how frequently each factor has affected their research and scientific production: i) incentives for carrying out research; ii) recognition of research activities by my institution; iii) autonomy and freedom for organizing and conducting my work; iv) provision of resources (funding and equipment) for carrying out research; v) availability of creative environments; vi) availability of colleagues with whom to collaborate; vii) time availability; viii) health and safety conditions; ix) workloads; x) my institution’s administrative organization; xi) availability of research-related training; and xii) objectivity of researchers’ evaluation systems [3, 8, 13].

The fifth part of the survey sought to assess respondents’ self-regulation because, successful researchers must have a sense of purpose, self-efficacy, self-control of their progress, as well as a good level of job satisfaction [14]. This section included questions related to self-efficacy and self-regulation [10] but oriented to scientific research and production endeavors. Self-efficacy questions invited the subject to respond, according to their beliefs, regarding their performance in the following activities: i) I can do whatever is necessary to conduct research (coded in the results section as ‘whatever it takes’); ii) I can conduct scientific research (‘conduct research’); iii) I can publish my research in a peer-reviewed and indexed scientific journal (‘publish’); iv) I am capable of conducting research (‘capable’); v) I still have much to learn about conducting research (‘learn’); vi) I can decide on a research topic (‘research topic’); vii) I can formulate a research question (‘research question’); viii) I can get a positive evaluation as a researcher (‘positively evaluated’); ix) I can overcome the external obstacles that affect my research work (‘overcome obstacles’) [10, 15, 16]. The statements related to self-regulation included in this same section of the survey were: x) I can establish

research plans and goals, which I can fulfill in a timely manner ('plans and goals'); xi) I can monitor and evaluate my research progress ('monitor milestones') [17]. Other statements included: xii) I can sacrifice my free time to research (sacrifice time); xiii) I can prioritize my research activity over my family and/or personal relationships (research over family); xiv) I can conduct self-diagnosis of my skills to improve them (skills self-diagnosis); xv) I can persevere despite difficulties and focus on achieving my research activities (persevere/goal-oriented) [13]. We kept in mind that with this type of instrument we were asking about respondents' perceptions of their own skills and traits, which is subjective; however, it has been pointed out that researchers may ask subjects to rate their abilities and compare them to others' when dealing with aspects related to individuals' self-regulation, self-efficacy, and self-control [10]. Therefore, in the sixth section, we asked respondents to rate their performance again, but in comparison with their peers, using the same list of 15 statements as in the previous section, but slightly adapted in their wording to this section's objectives (to have them compare themselves with others).

The seventh and last section included five items related to the presence of certain links between science and society in their research endeavors, given that, apart from a growing international interest toward the social value of research, the current scientific research plans in Mexico from the National Council of Science and Technology (CONACyT, the organization governing national scientific activity), are also granting more importance to researchers' social contributions. Such items were the following: a) I have included the participation of citizens in my research projects ('include'); b) I have developed scientific dissemination initiatives ('develop'); c) I promote my publications with their final beneficiaries ('promote'); d) my research addresses or seeks to solve social problems ('solve'); and e) I transmit my research results to the social groups that can benefit from them ('transmit'). To analyze all the data gathered, the 78 items from the second to the sixth section were classified in the following six PBD, as categories of analysis: a) intrinsic motivation; b) extrinsic motivation; c) self-esteem; d) empathy; e) self-regulation; and f) prosocial behaviors.

3 Results

The Cronbach's alpha value of the 78 main items of the survey (from the second to the seventh section) resulted in 0.968, which indicates a high value of reliability for the instrument. Regarding PBD's descriptive results, Table 1 shows the minimum, maximum, sum, means and standard deviations of each dimension.

The highest-scored dimension was self-esteem and the lowest was extrinsic motivation. The standard deviations were around a little more than half a point, which indicated some data dispersion. However, since a five-point scale was used, the mean scores were not so high. Table 2 presents the statistics corresponding to professors' scientific production indicators for the period studied (2013 to 2018). Depending on the variable, the number of professors with a given indicator decreased, meaning that, while 61 professors had publications in Scopus, 46 had citations, 54 had an h-index different than zero, 32 had altmetrics indicators, 7 conducted peer reviews and only one acted as a journal editor (see Table 2).

As variables with a non-normal distribution, there were large gaps, evidenced by the high standard deviations, so medians were calculated, which resulted in 4 publications

Table 1. Prosocial behavior dimensions (n = 120)

Statistics/dimensions	Intrinsic motivation	Extrinsic motivation	Self-esteem	Empathy	Self-regulation	Prosocial behaviors
Minimum	0.56	0.12	0.62	0.43	0.61	0.34
Maximum	4	3.92	3.98	4	3.98	4
Sum	344.19	304.81	349.42	353.48	344.5	344.09
Mean	2.86	2.54	2.91	2.94	2.87	2.86
Standard deviation	0.60	0.68	0.56	0.56	0.57	0.55

Table 2. Scientific production indicators

Statistics	No. of publications (n = 61)	Year of most recent publication (n = 61)	No. of citations (n = 46)	h-index (n = 54)	Documents with altmetrics score (n = 32)	Sum of altmetrics scores (n = 32)	Peer reviews (n = 7)	Edited manuscripts (n = 1)
Minimum	1	2009	1	1	1	1	3	8
Maximum	37	2019	224	15	11	95	275	8
Sum	379	123,069	1,302	186.5	83	341	524	8
Median	4	2018	6.5	2.75	1	2	31	8
Standard deviation	6.967	1.849	55.802	2.906	2.894	21.976	1.159	n/a

for the evaluated period (2013–2018), the most recent year of publication was 2018, 46 professors had a median of 6.5 citations to their articles, and the median h-index was 2.75. For the number of documents with altmetrics and the altmetrics score sum, the medians were 1 document and 2 points, respectively. The median number of peer reviews was 31 for seven professors and the only one who worked as journal editor had managed 8 manuscripts written by others. Regarding why they conduct research, professors scored higher the following reasons: a) for personal satisfaction, interest, and enjoyment (mean = 3.34); b) for the advancement of my discipline (3.17); c) to share new knowledge with my peers (3.09); d) to train new researchers (2.98); and e) to advance in my career, be positively evaluated and enriching my curriculum (2.96). Meanwhile, the five worst-rated reasons were: a) to obtain funds and support to continue researching (mean = 2.45); b) claim my work for myself and document my research results for posterity (2.27); c) to obtain financial compensations, in addition to my salary (2.26); d) to obtain greater prestige and reputation (2.08); and e) due to working requirements or obligations (2.07). The highest-scored factors that positively stimulate scientific production, that is, those factors that positively and more frequently stimulate research, were: a) autonomy and freedom for organizing and conducting my work (mean = 2.95); b) availability of colleagues with whom to collaborate (2.59); c) incentives for carrying out research (2.55); d) time availability (2.50); and e) health and safety conditions (2.5). In contrast, the worst-rated factors, those that positively stimulate research less frequently, were: a) recognition of research activities by my institution (2.28); b) workloads (2.16); c)

objectivity of researchers' evaluation systems (2.11); d) my institution's administrative organization (2.07); and e) availability of research-related training (2.05).

Regarding the self-efficacy and self-regulation aspects oriented to research work, in terms of their own performance and the comparison with that of their peers, we found that respondents rated their own performance below that of their peers. Figure 1 presents the means comparison for each item of the two self-efficacy and self-regulation sections (the section that asked them to evaluate their own performance and where they had to compare their performance with their peers'). The highest rated aspects included basic research issues, such as: carrying out research, considering themselves capable of doing research, learning what they do not know about, selecting a topic, posing a research question and, to a lesser extent, publishing in peer-reviewed and indexed journals, as well as monitoring and evaluating their research progress. In turn, overcoming external obstacles, self-diagnosing their skills to improve them, sacrificing free time, prioritizing research over family or social relationships, and doing what was necessary to do research were the lowest rated aspects.

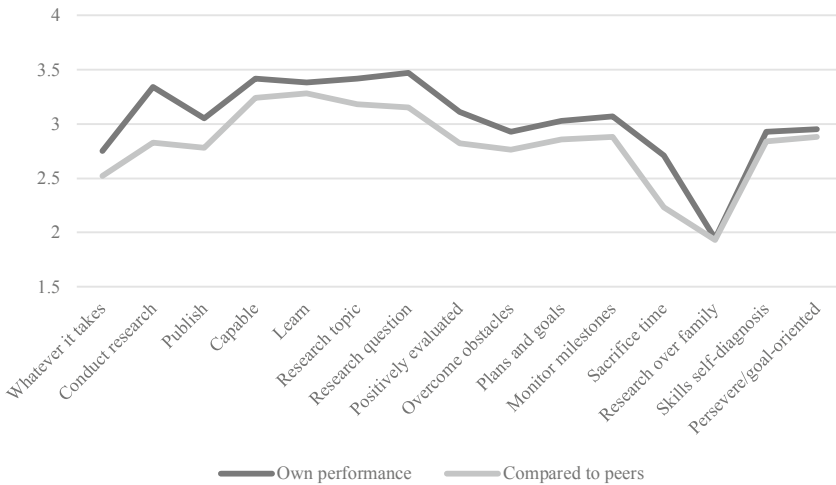


Fig. 1. Comparison of means between professors' own performance vs. others'

Regarding the science and society section of the survey, the means were relatively low; the highest-rated item was solve (mean = 2.80), followed by promote (2.44), develop (2.37), transmit (2.34) and include (2.11). Table 3 summarizes these results.

3.1 Correlational and Inferential Analyses

The correlational analysis showed very significant correlations and at very high levels of association among the six PBD. However, these trends were different when examining correlations between the PBD and professors' general data (sex, age, educational background, years of experience in teaching and research, and national awards and recognitions), as well as between the PBD and professors' bibliometric indicators. In

Table 3. Science and society (n = 120)

Statistics	Include	Develop	Promote	Solve	Transmit
Mean	2.11	2.37	2.44	2.80	2.34
Standard deviation	1.407	1.283	1.114	1.074	1.119
Minimum	0	0	0	0	0
Maximum	4	4	4	4	4

these cases, although we obtained significant correlations, they had low and very low levels of association. This would indicate that there is not a very strong level of influence between PBD and the other variables studied that were related to professors’ profile and scientific production.

At the inferential level, at least one of the variables involved in each hypothesis did not present a normal distribution, so non-parametric tests were performed to test them. From hypotheses H₁ to H₄, non-parametric tests for two independent samples were applied and for H₅ an analysis of variance (ANOVA) was performed. Hypothesis testing is summarized as follows:

- H₁. The sample was divided into two groups, Scopus and non-Scopus professors, the first was the group of scholars with publications (hence, higher scientific productivity). The hypothesis test was applied for each PBD as well as for the sum of the dimensions (a new computed variable per professor that added the scores of the six PBD and divided the result by six). The hypothesis was confirmed, so professors with the highest productivity also scored higher both in the sum of their PBD (sig = 0.003) and in each dimension separately.
- H₂. We used the variable ‘number of citations’ to divide the sample into two groups (cited and non-cited). This hypothesis was confirmed, both for the sum of the PBD (sig = 0.001) and for each PBD, except in the case of the prosocial behavior dimension (sig = 0.058). Therefore, the academics with the highest number of citations also scored higher in their PBD, except in the case of the mentioned dimension.
- H₃. We used the variable ‘altmetrics score’ to divide the sample into two groups (professors with altmetrics scores and without scores). However, this hypothesis was rejected, implying that there was no relationship between altmetrics score and a better PBD score.
- H₄. For this hypothesis we divided the sample in two groups (those who performed peer reviews and those who did not), but this hypothesis was also rejected, that is, those who act as peer reviewers did not have a better PBD scores.
- H₅. This hypothesis was confirmed, both for the sum of PBD (sig = 0.017), as with each individual PBD, except for the extrinsic motivation dimension (sig = 0.099). Therefore, except for the cited dimension, professors who better integrated science and society issues into their research also scored better in their PBD.

4 Discussion

The surveyed professors rated similarly five of their six PBDs, except for the extrinsic motivation dimension, which was scored lower. Such result could indicate that professors feel that moral, financial and resource support, as well as the recognitions they get for their research activities, are currently limited, which was reflected in their responses to specific items of the survey. This is also evident in the budget cuts that Mexican public universities and scientific activities have suffered in recent years, including incentive programs for professors and the research support initiatives [18, 19]; the latter includes issues such as scarce funding for research projects and reductions in subscriptions to scientific databases and other information and research resources. However, their self-esteem, self-efficacy, self-regulation, and intrinsic motivation seem to be the main engines that drive professors' scientific production, which is evident in their answers to the reasons why they conduct research, since the highest-rated items were mostly those related to intrinsic and prosocial reasons, such as personal satisfaction, the advancement of their discipline, sharing knowledge and training new researchers. In contrast, the lower-scored reasons were mainly extrinsic, including support and recognition such as obtaining funds or because of work requirements. Something similar could be appreciated regarding the factors that positively stimulate scientific production, since for intrinsic motivation to function and for the individual to exhibit better prosocial behaviors, they require autonomy to carry out their tasks [14]. Moreover, a high motivation has been pointed out to positively influence and maintain high self-efficacy [13].

Results also indicated that it is important for professors to have minimal extrinsic conditions, including being immersed in environments that favor collaboration with their peers, the availability of incentives to carry out research work, having an adequate amount of time to investigate, as well as good health and safety conditions. Support weaknesses are reflected in the worst-rated factors, such as institutional recognition, which has a certain relationship with the promotion, dissemination and acknowledgment of professors' research activities, which, at least in Mexican universities, is scarce and does not necessarily follow adequate standards (for example, websites promoting research must be presented in a specific manner, so they are recognized by the systems measuring altmetrics), despite the fact that research indicators (both bibliometric and altmetric) are part of national and international evaluations of educational and research institutions (e.g., SCImago Institutions Rankings). Other factors that professors rated low included the institution's administrative organization and the availability of relevant research-related training. In addition, professors indicated that having an adequate amount of time to conduct research is frequently important, which relates to their answers regarding that research is rarely favored positively by workloads, which would seem to indicate that these are high, and it is a challenge to spend time on research given the workloads related to other activities. It is relevant to note that high workloads, deficient information infrastructures, lack of support and resources have been highlighted as the main barriers for research, also in other countries, as well as the tensions we found between researchers' high motivation and low extrinsic factors [3]. Professors' strong intrinsic motivation and how they value their autonomy conform a delicate equilibrium that has allowed them to have a certain scientific production. However, such equilibrium might be undermined by the extrinsic elements that they rated low; because, if there

are problems with their extrinsic motivation, they could eventually harm their intrinsic motivation [20].

Where the sample was more heterogeneous and where the widest gaps were present, was in the scientific production indicators, since, within the group of 61 professors with indexed publications within the period studied, 54 had an h-index different from zero, 46 had citations, 32 had altmetrics scores, seven had performed peer review work and only one professor had served as an editor in scientific journals. Given that peer review is a voluntary task, often without financial recognition and little moral recognition (even by the NRS), therefore, one would think that it must be a task carried out by the academics with the greatest prosocial attitudes. However, and curiously, this was not necessarily the case, as our inferential analysis indicated.

It was curious that professors rated their performance lower than their peers', which could indicate a general level of modesty in their responses. Regarding basic aspects related to conducting research, professors evaluated themselves with relatively good scores, although the means were distant from the maximum score used on the scale. Professors pointed out that training was among the factors that infrequently stimulate research, that is, they might be having a certain need for it, which would imply that the available training may not be relevant to develop research skills. Additionally, the responses showed that professors were willing to learn what they do not know about conducting research, which is why a training plan that enhances some of the aspects that we have detected in this research (summarized in the conclusion section) need to be further investigated. The results of the science and society section indicate broad areas of opportunity for professors and their institution to enhance the aspects that may increase research's social relevance and contributions, as well as the institution's.

5 Conclusion

Results allowed highlighting some areas of opportunity for the different stakeholders that, within the university, may have the interest or function of generating and developing staff's research capacities. In this case, such capacities would have to do, firstly, with the review and improvement of the prosocial aspects studied, it would be particularly necessary to further inquire about the weakest dimension: extrinsic motivation, which could end up having consequences on professors' physical and mental health, as well as being detrimental to their productivity at work. Other capacities to improve would be directly related to issues surrounding scientific research, production and infrastructures, which have been associated to ISAL [3, 21]. The stakeholders that could be involved and act upon these needs are diverse; it would include teacher training programs, research units in the institution, other professors, as well as libraries and information professionals. This research allowed us to detect certain needs that could be common in other Mexican institutions and even in other countries, and that could be alleviated through the development of ISAL initiatives. Likewise, future research could delve further into the informational aspects that may have an impact on the variables studied, since learning and the development of competences involve processes that, if properly channeled, can boost motivation and self-esteem. With the results of this research, we detected that the training needs that could help improve professors' situations, through ISAL initiatives, are the following:

- Scientific publication. Training on where to publish, identifying journals' quality levels and meeting their requirements. These topics are always important for novice researchers, and even some veterans may need to delve deeper into these topics.
- Scientific communication, promotion, and dissemination. A greater knowledge of the actions that a researcher can take to develop these three processes would allow them to explore and exploit in greater depth at least three of the five areas of science and society studied, namely: develop, promote, and transmit. Apart from training professors, the establishment of a specialized unit at the university would also help, as it could work for promoting and disseminating professors' research, which could also be seen as moral recognition from the institution for their research endeavors.
- Bibliometrics and altmetrics. One of the weaknesses detected in the professors corresponded to monitoring and evaluating their research progress and achievements, which is related to the issue of managing bibliometric and altmetric indicators. Training on bibliometrics and altmetrics would allow researchers to know how to monitor and evaluate their research progress and careers, through examining and understanding the citations they receive, how to make their research more available, visible and hence more susceptible to get scientific attention (bibliometrics), as well as social attention (altmetrics).
- Peer review and journal editing work. Very few of the surveyed professors carried out these activities, this could be because they are not very attractive to them, because they do not know how to conduct them, or because they do not know how to look for such opportunities. But these activities are somehow related to getting to higher levels of academic and scientific achievements for scholars.
- ISAL in general. Given that another area of opportunity is to be able to self-diagnose their own skills, it could be relevant to begin carrying out training on the basic skills of searching, accessing, retrieving, evaluating, and managing information. Then, such training may continue with the development of more advanced skills and their relationships with other contents cited above.

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Information Literacy in Video Games' Affinity Spaces—A Case Study on Dota 2

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Abstract. This paper examines which aspects of information literacy are applied in the use of digital services within the affinity space of the multiplayer online battle arena (MOBA) video game Dota 2. For this purpose, we conducted interviews and an online survey to find out about the services Dota 2 players use to find and share information and their perception of information literacy regarding those activities. Results show that almost all participants use information sources outside of the game and that a variety of information literacy skills are needed to deal with the amount of information and to manage communication with other players.

Keywords: Dota 2 · Information literacy · Gaming · Affinity space · Esports

1 Introduction

Studies showed that video games provide opportunities to foster skills that are fundamental to information literacy, like reading, writing, and critical thinking [1]. However, while there are numerous efforts to promote media and information literacy through gaming and the creation of games, there is not much empirical research on how gaming activities improve information literacy [1, 2]. At the same time, there seems to be a clear awareness of the growing importance of games and gaming communities in our daily lives and the need to study their impact. One goal of this research is to find out more about how gamers participate freely in a modern way of learning in “social online spaces” [3, p. 355].

The range of skills that gamers need in a video game is complex and, to succeed, they often need to consult secondary information sources. Affinity spaces are defined as informal learning spaces that offer the possibility to find, create and share knowledge about a specific topic [4]. They are closely connected to research on video games and learning. Gamers enter these affinity spaces through portals. Portals are a means of accessing and interacting with content in an affinity space. In an online gaming environment, these portals often appear as online discussion boards, social live streams, or video tutorials.

This paper deals with the question of whether engaging with video games challenges and promotes information literacy. Engaging with the game means not only playing it but also the movement within the affinity space. Therefore, we aim to observe and understand the affinity space surrounding a game to make sense of the information and

communication practices of gamers, their different roles, and their activities within these portals. Furthermore, we want to find out which aspects of information literacy gamers apply and possibly improve while in that affinity space.

1.1 Case Study “Dota 2”

“Vast amounts of diverse information are created for and circulated through such sociotechnical environments [i.e., gaming communities]. It should be no surprise, then, that such spaces are ripe for analysis of the forms of information literacy that characterize them, providing provocative new models for what it means to be fully literate in today’s information society.” [3, p. 355]

As proposed by Martin and Steinkuehler, we want to take the first step and analyse the different information literacy activities in an affinity space, based on a case study of the free-to-play multiplayer online battle arena (MOBA) Dota 2 by Valve. The wide distribution of Dota 2 results in a large, extensive, and multi-faceted affinity space, which makes it a good object of investigation. Dota 2 is a game with high complexity and a steep learning curve. To master the game and succeed in the gaming community, a high level of information and communication is necessary. Dota 2’s affinity space is also influenced by the eSports scene with professional tournaments being viewed by millions of gamers worldwide [5].

In this paper, we present the results of qualitative interviews and a survey among German Dota 2 players. Before we move on to the methods and results, we will first present the results of a systematic literature review of research that is focused specifically on information literacy in video games. It should be noted that we excluded research reports on so-called serious games or products of edutainment (education and entertainment). We focus on commercially released video games primarily developed for entertainment as they show “practices as they happen not just in those environments specifically designed to foster such literacy work but also in those every day and informal spaces” [3, p. 363].

1.2 Literature Review

Hartley, McWilliam, Burgess and Banks [6] presented and explored three case studies as “site or practice of digital media from which digital literacy might be, or is already being, propagated” (p. 70) – one of them being the Massively Multiplayer Online Role-Playing Game (MMORPG) *Fury*. They concluded that in “each environment, participants learn by doing — often through a collaborative learning network of peers” (p. 70). Martin and Steinkuehler [3] analysed data from a two-year ethnographic study on the MMO *World of Warcraft* regarding information literacy practices and similarly concluded that “online information literacy is collective” (p. 363). They recommended further research into “voluntary, naturally occurring, online indigenous community practices” (p. 363) to enable the creation of realistic and robust information literacy models. Another study by Steinkuehler, Alagoz, King, and Martin [7] presented a “cross-case analysis” of two out-of-school learning programs that utilise virtual environments (i.e., *Teen Second Life* and *World of Warcraft*). Their analysis of field notes, chat logs, blog posts, and interviews

showed evidence of information literacy activities such as information seeking, evaluation, interpretation, and synthesis among other instructions goals. Appel [8] conducted a survey with 200 adolescents from Austria and found that participants who used their computer at home for gaming and social media showed more computer knowledge. However, the study focused on computer literacy and not information literacy. Stone et al. reported on the “World of Warcraft (WoW) experience” [9, p. 38], a case study of graduate students playing WoW to learn about and develop their own digital literacies. Sourmelis, Ioannou, and Zaphiris [10] examined the literature on MMORPGs and 21st-century skills. They concluded that information literacy in the context of video games is understudied and stress the importance of further research on this topic. Arduini argued, that “[d]igital gaming, in particular, offers unique experiences that allow students to experiment with multimodal composing strategies that are common in the twenty-first century, as players interact with video, text, audio, and kinesthetic media” [11, p. 100]. They investigated gaming literacy as a set of transferrable technological and communicational skills among general studies students – through a survey with 42 participants and three one-on-one interviews.

In summary, after examining the available studies, it can be said that the potential of video games’ affinity spaces and online communities is being recognised regarding the promotion of information literacy and related literacies. However, we can confirm that empirical research in this area is still insufficient.

2 Methods

2.1 Interviews

In April 2020, we conducted qualitative interviews with five active players from the German Dota 2 community. The interview partners were enlisted through Dota 2-related online forums. The interviews were carried out via Skype, Jitsi, and Discord, lasted between 30 and 60 min, and were documented by written protocol. The results were then summarised and analysed qualitatively. The five interview partners had all been playing Dota 2 for several years and engage in its affinity space. Three participants were also active as streamers, commentators, or content creators for Dota 2.

The goal of these interviews was to get a better understanding of the information habits of Dota 2 players and their behaviour in the Dota 2 affinity space. They were also used to check if the survey tool yielded the desired information. Therefore, the interviews were semi-structured by the questionnaire we created beforehand (see Sect. 2.2). Questions occurring on both sides during or after the interview were encouraged and could directly be clarified.

2.2 Questionnaire

The items of the questionnaire can be divided into four main areas. Besides the gathering of demographic data such as age and gender, the participants were questioned about their computer and video gaming behaviour in general and specifically regarding Dota 2 (part one). The second part of the survey focused on which portals (e.g., special Dota sites,

video portals, streaming portals, etc.) are consulted within the Dota 2 affinity space. In part three, the participants are questioned about the specific types of activities that are performed on the given portals (e.g., watching videos or streams, commenting on forum posts, creating their own content). The last part contains questions directly related to information literacy (part four). Participants were asked how important they considered different aspects of information literacy in relation to their Dota 2 activities. Similarly, they were asked in which information literacy areas they felt they were improving while engaging with Dota 2. This part of the questionnaire is based on the information literacy indicators created by Beutelspacher [12]. Among the most frequently mentioned definitions, standards and frameworks are the "Information Literacy Competency Standards for Higher Education" [13], the "Information Literacy Framework" [14], or the definition of the Information Literacy Group of the Chartered Institute of Library and Information Professionals [15]. However, we decided to use this list of indicators because the areas of competence are clearly defined and formulated and therefore easy to communicate to the participants of the survey. The 62 indicators were condensed from contemporary information literacy definitions, models and standards and can be divided into seven areas, which are:

1. Identifying information needs	5. Organizing information
2. Searching and finding information	6. Communicating and publishing information
3. Evaluating information	7. Responsible handling of information
4. Using information	

In the creation of our survey tool, we relied on these seven information literacy areas and, therefore, the items regarding information literacy correspond to the seven indicator areas listed above. All indicators were represented with one question. Furthermore, we split competence area 7 into two questions as it became clear that the aspects of interpersonal communication online and in-game are important issues in the Dota 2 community.

After the interviews and pre-tests (eight participants) were conducted, some adjustments were made to the questionnaire. For example, the selection list of Dota 2 services and the activities possible were supplemented. The questionnaire results from the pre-tests are not part of the overall results discussed in Sect. 3.

The questionnaire was accessible via the umfrage-online.com website, between March 18th and April 3rd, 2021. The link was distributed via social media, online forums, and streaming services in the German Dota 2 online community.

We analysed the collected data from closed questions quantitatively, using SPSS and Microsoft Excel. We analysed the answers to open questions qualitatively via content analysis. We would like to show the most important results from the questionnaire and the interviews in the following section.

3 Results

Overall, 98 participants (92 male, 5 female, 1 not specified) took part in the survey. The average age of the participants was 29.31, while the youngest was 16 and the oldest 54. Eighty-two participants (78 male, 4 female) completed the questionnaire in its entirety. We decided to also evaluate incomplete questionnaires whenever possible and sensible.

Around 57.0% of all participants (n = 98) stated that they played computer games every day. About 39.0% played several times a week and a total of 4.0% played once a week or every two weeks. The majority of participants (76.5%) had been playing Dota 2 for more than 5 years.

3.1 Dota 2's Affinity Space

The participants were asked about their behaviour in the digital Dota 2 affinity space, in other words, how often they engage with Dota 2 outside of the game. Here, 63.3% of the participants stated that they engaged with Dota 2 content daily or several times a week. Only one participant never engaged with Dota 2 outside of the game.

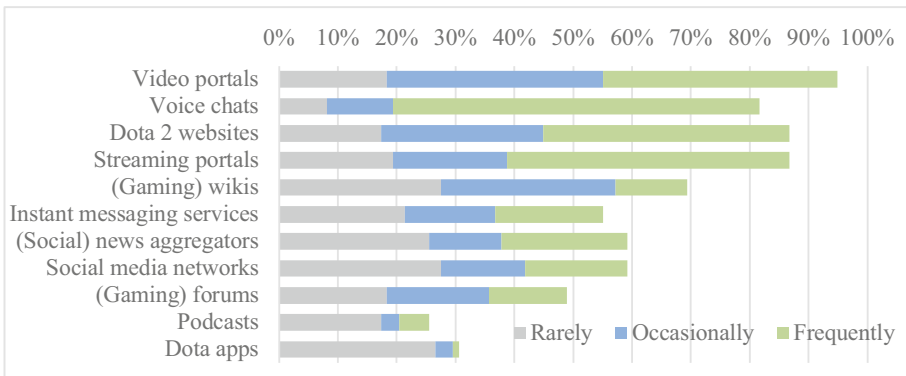


Fig. 1. Services used rarely, occasionally, or frequently for Dota 2 (n = 98)

Figure 1 shows the answers regarding portals in the digital Dota 2 affinity space and illustrates how many participants use these portals at least occasionally. The most used services were video portals like YouTube or Vimeo (76.5% used them at least occasionally), voice chats like Discord or Teamspeak (73.5%), Dota 2 websites (69.4%), and streaming portals like Twitch or SteamTV (67.4%).

To get a better insight into the Dota 2 affinity space, we asked the participants which specific Dota 2 websites and services they know and use. Among the best known and most used services were Dotabuff, Liquipedia, Dota2.com, and Dotasource.

Participants were also asked what information they were looking for on the services mentioned above. The following list shows these types of information and the number of participants (n = 98) who indicated that they were looking for this information.

1. News about the game (75)	5. Exchange with others (51)
2. Game streams (67)	6. Tournament information (49)
3. Information on heroes or items (63)	7. Technical support (9)
4. Guides, tutorials, strategies (52)	8. Others (4)

The interviewees also stated that they were mainly looking for news about the game, such as patch notes. Three interviewees emphasised that the exchange with others was very important to them. Friendships had already been formed in life outside of the game.

Activities in the Dota 2 Affinity Space can be divided into three categories depending on the level of involvement: observing, participating, and creating activities (see Fig. 2). While observing activities summarises the activities in which the user only consumes content, participating activities show interaction with the content or other users. Creating activities included the creation of articles, posts, videos, and streams.

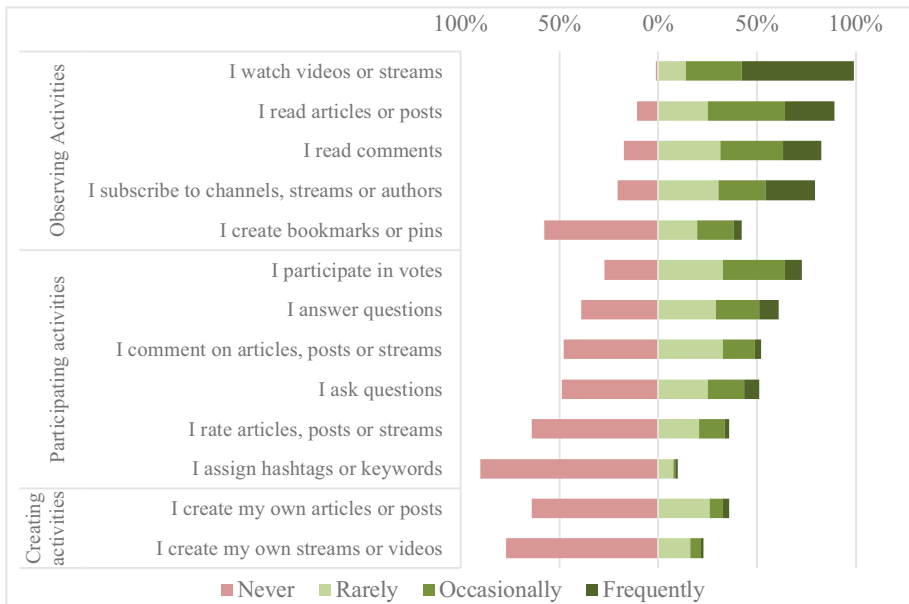


Fig. 2. Activities within the Dota 2 affinity space (n = 92)

According to the results of the survey, the most common observing activity performed within Dota 2 affinity space was watching videos or streams (98.9% at least rarely), followed by reading articles and posts (89.1%). Reading comments (82.6%) and subscribing to channels, streams, or authors (79.4%) were also carried out at least rarely by a large number of participants.

Looking at the participatory activities, 72.8% of the participants took part in votes at least rarely. A majority of participants also carried out answering questions (60.9%),

commenting on content (52.2%), and asking questions (51.1%). Only rating articles, posts, or streams (35.9%) and assigning hashtags or keywords (9.8%) were done less frequently. Looking at the creating activities, more participants wrote their own articles or posts (35.9% at least rarely) rather than publishing their own streams or videos (22.8%). All participants (n = 92) had performed at least one observing activity. 72 participants stated that they carried out at least one participating activity. 43 participants reported performing at least one creating activity.

3.2 Information Literacy in the Affinity Space

The last part of the questionnaire dealt with the question of which competencies the participants considered important and which competencies they thought they practice through the engagement with Dota 2. The questions were based on the indicator areas by Beutelspacher [12] but competence area seven was divided into two parts (see Sect. 2). Participants were asked to rate their level of agreement using a 5-point Likert scale from “Strongly disagree” to “Strongly agree”. The statements for these questions (Figs. 3 and 4) were:

- Q1 ...to formulate and communicate my questions or problems clearly;
- Q2 ...to find out how and where I can get answers and correct information;
- Q3 ...to find out what information is relevant and credible;
- Q4 ...to summarise information and highlight the most important points;
- Q5 ...to organise and store information in a meaningful way;
- Q6 ...to create good posts, texts, and other content;
- Q7 ...to communicate fairly with other people on the web;
- Q8 ...to follow rules and laws on the internet.

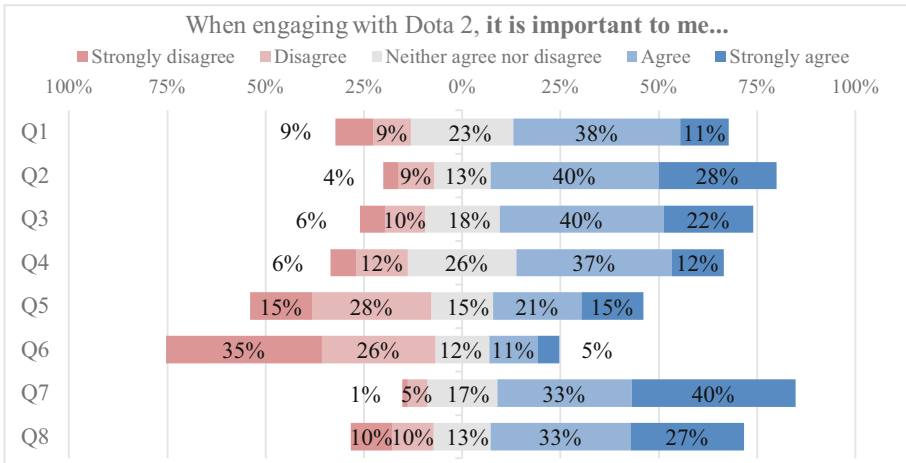


Fig. 3. When engaging with Dota 2, it is important to me... (n = 82)

Figure 3 shows which areas of information literacy were particularly important to the participants when dealing with Dota 2. Missing percentages to 100% are the answer "I cannot tell". We can see that fair communication with other people on the web was most important to the participants. Finding out how and where to get answers and correct information also seemed to be an important point, followed by finding out the credibility and relevance of information. The least important factor for the participants seemed to be the creation of good posts, texts, and other content. If we take a look at those participants who only carry out observing activities, no participant agreed with this statement. For participants who at least rarely carry out creating activities, one-third agreed or strongly agreed with the statement.

Figure 4 represents the participants' estimation of the information literacy skills they gain by engaging with Dota 2. The tendencies of the answers are similar to those of the question on importance. Again, the agreement with the statement "...communicate fairly with other people on the web" was markedly higher compared to the other statements while the lowest level of agreement can be seen in the area of creation of good posts, texts, and other content.

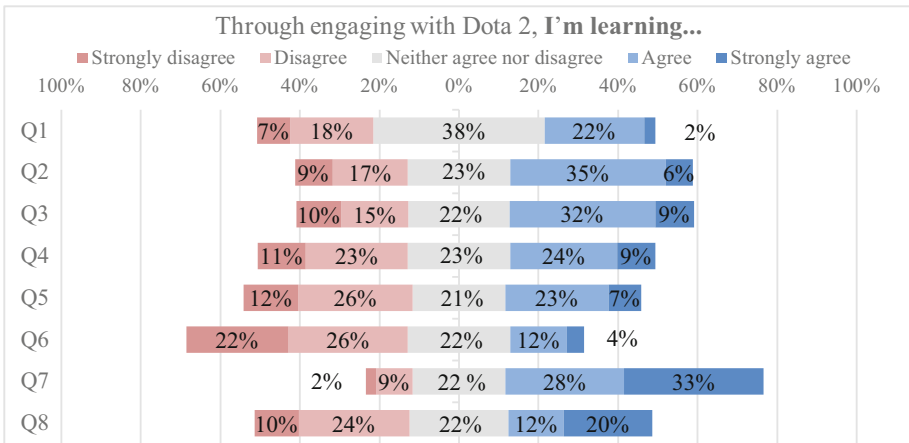


Fig. 4. Through engaging with Dota 2, I'm learning... (n = 82)

The results of the survey were also reflected in the result of the interviews. The interviewees agreed that, with the high amount of information available, it was particularly important to find reliable and relevant sources. Four of the five interviewees also stated that their ability to recognise high-quality information improved significantly over the years they have been involved with Dota 2.

One issue that was evident in both the interviews and the free text questions in the survey was that communication in the Dota 2 affinity space was sometimes very difficult. Many participants and interviewers reported "toxic" players who did not adhere to the rules of fair communication.

Another topic that was discussed with the interview partners was data protection and privacy in the Dota 2 affinity space. The handling of personal data was dealt with

very differently. Two interviewees stated that they give little or no thought to how and where they publish their names or photos on the Dota 2 services. The other three interview partners, on the other hand, only tried to use their personal data when it was unavoidable. Despite their different approaches, they agreed that the safe handling of data was an important topic on the internet.

3.3 Perception of Skill Improvement or Deterioration Through Gaming

We asked survey participants whether they thought certain skills improved or deteriorated due to their Dota 2 gaming activity. This was an open and voluntary question to which 47 people responded. All but four responses (e.g., “I don’t know.”) were analysed and summarised into the categories below.

Skills improved:	Skills deteriorated:
Language, speaking and writing skills (32); Communication (11); Reaction time, hand-eye-coordination, spatial imagination (10); Analytical skills, critical thinking (9); Emotion and stress management (8); Multitasking, project and time management (8); Gaming, game mechanics (6); Fast decision making, strategic thinking, foresight (5); Teamwork (5); Social and soft skills (4); Computer skills, programming (3); Learning from mistakes (3); Self-discipline and reflection (3); Concentration (2)	Patience, delayed gratification (3); Self-discipline, reflection (2); Tolerance and prejudice (2); Interest in politics and society (1); Sense of time (1); Social and soft skills (1)

4 Discussion

The results from the survey and interviews gave us a better understanding of the players’ activities in the Dota 2 affinity space. The high level of use of Affinity Space portals and the number of different activities outside the game showed the importance of additional information for the players. This applies to everything from searching and evaluating to the creation and meaningful use of information. Not only through the survey but also by observing the mentioned portals online it became clear how Dota 2 players worldwide make use of both audio-visual media and textual media to discuss mechanics and gameplay, create guides, or share favourite moments from the last tournament. Communication with other players (information literacy competence area 6) was a very important part for the players. Static information seemed to become less important, while a strong culture of discussion and participation was gaining in importance. This can be deduced from the high number of participatory and creating activities. In such a social space, learning happened in a very different way than in a traditional formal learning environment. Gamers do not rely on teachers or librarians to provide the correct answer but on their own information skills and the expert opinions from peers in the gaming community.

Looking at the multitude of information and information sources, it is obvious that searching and finding the information and assessing those in terms of reliability and relevance (areas 1, 2 and 3) became particularly important. Here, gamers were motivated intrinsically because they wanted to understand and get better at the game. Many participants agreed or strongly agreed it was important to find out how and where they could find good and reliable information and felt they improved this skill due to playing Dota 2. Bebbington and Vellino [2, p. 12] also mentioned this competence in the context of other video games. They stated that assessing the reliability of game-related content “requires critical thinking skills that are enabled by the game itself: as players become better informed about the various elements found in the game, they can practice what they have learned by empirically testing the validity of this new information in gameplay.”

The appropriate use of received information (competence area 4) can be observed in various ways in gaming affinity spaces. On the one hand, the information was used to improve the gameplay or to support choices. This was shown by the result that most participants looked for guides, tutorials, or information on heroes and items. Gaming streams could also contribute to improving gameplay and the choice of strategies, which was confirmed by some interview partners. On the other hand, the information found was also used to create new content and to share and discuss it with others (areas 5 and 6). This required the ability to structure and organize information.

Participants from both the interviews and the online survey emphasised the importance of communicating and exchanging information with other Dota 2 players. Here, especially, the question of fair communication with other people on the web seemed to have struck a chord with our survey participants. To them, this information literacy competency area (7) was not only the most important but also the area where most perceived to learn more than in any other area while playing Dota 2. In the open questions of our questionnaire as well as in the interviews, many mentioned the improvement of their communication skills – not only regarding effective communication in-game but also when it came to discussions with other players or formulating criticism. Since toxic behaviour is widely being recognised as a problem in the Dota 2 community – not only by the players themselves but also by researchers [16–18] – it may be one explanation for the importance attached to this area of information literacy.

The results of the survey showed that participants not only felt information literacy skills being promoted by engaging in the Dota 2 Affinity Space, but they also felt that other competencies such as (foreign) languages or social skills were promoted.

4.1 Limitations and Outlook

At this point, it must be mentioned that this survey is not representative of all Dota players, yet it provides insight into the activities and movements in Dota 2's affinity space. We also want to briefly discuss the large proportion of male participants. Only 5.0% of our participants identified as female. According to a report by Quantic Foundry [19] in MOBAs 10% of gamers are female. However, other Dota 2 surveys also show similar distributions between the genders as seen in our study [18, 20].

Many people are not familiar with the term and concept of information literacy and it is difficult for them to assess to what extent these skills play a role in their

behaviour. This can directly be observed in the questionnaire results as that in some statements on information literacy up to 14.0% of the participants selected the answer “I cannot tell”. Gamers may not be aware that they are using and strengthening their information skills while interacting in the affinity space. A similar finding is made by Gumulak & Webber [1, p. 248]: “It was evident from the interviews that while we could identify information literacy practices in the interviewees’ reported behaviour, they did not think of it as information literacy.” Therefore, we have tried to keep the statements on information literacy as clear and simple as possible. For this purpose of explaining and measuring information literacy related activities, we created seven competence areas of information literacy. In doing this, we risked that certain aspects were being over-simplified or neglected. We recognize that the contemporary concept of information literacy is much more sophisticated and fluid [14] but at the same time very complex, and hard to convey in a survey as well as to understand and measure. Furthermore, our questionnaire did not measure the actual information literacy level of its respondents. However, the subjective assessment of the participants allows us to shed light on gamers’ awareness of information literacy and their perception of the educational value of gaming. In the future, we would like to measure and inquire more about gamers’ level and understanding of information literacy as well.

For this project, we chose to concentrate on just one video game since empirical research of affinity spaces is still in its beginnings and information literacy research in real-life gaming environments as conducted in this study is complex and time-consuming. While our results are not necessarily applicable to other types of games in their entirety, we already found commonalities in how gamers apply different facets of information literacy in other games’ affinity spaces. In this study, we were able to get a first overview of a specific affinity space and laid a foundation for further research into this subject. We found that Dota 2 gamers use a wide variety of affinity space portals and utilise these informal learning spaces to promote information literacy and other skills to some extent. The results provide insight into where and for what purpose gamers seek information, exchange, and communicate, yet they can and should be expanded. Going forward, we would like to conduct further in-depth interviews and observations of the most popular portals and communication channels in Dota 2’s affinity space. We also recommend investigating whether there are differences between genres or between individual games.

Computer games and their roles in our lives are constantly changing and evolving. Long gone are the days when they were only seen as a pastime for children and adolescents. By taking the opportunity to research gamer’s affinity spaces, we can learn from modern information practices and apply them in other areas of education, user design and more. We hereby invite gamers, practitioners, and researchers alike to join the discussion.



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Everyday Health Information Literacy and Attitudes Towards Digital Health Services Among Finnish Older Adults

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Abstract. Everyday health information literacy (EHIL) denotes people's confidence and perceptions of their capability to obtain, evaluate, and use health information in everyday life. This paper presents results from a survey of older Finns on how EHIL relates to perceptions of digital health services. A postal survey was conducted with a random sample of 1,500 Finns aged 55–70 years. In total, 373 completed surveys (25%) were returned. We used an adapted screening tool to measure EHIL and subject position scales to indicate attitudes towards digital health services. The data were analysed using PLS-SEM in SmartPLS 3.0. The analysis suggested that EHIL is positively related to more positive attitudes to digital health services and negatively to more negative attitudes to such services. The results emphasise the importance of EHIL as an enabler of the acceptance of digital health services. The study also introduces new methods for analysing EHIL.

Keywords: Digital health services · eHealth · Everyday health information literacy · Finland · Health literacy · Older adults · Seniors

1 Introduction

An essential premise of maintaining good health is to manage health information. Health literacy is a commonly used concept to describe a person's ability to obtain, process, understand, and use health information [1]. Its main difference to information literacy, besides its focus on health, is that, while health literacy focuses more on interactive communication, information literacy is about competencies to discover and seek information [2]. The Medical Library Association in the US combined health literacy and information literacy to describe the concept of health information literacy, which covers

the abilities to recognize a need for health information, to know how and where to find information about health, and to evaluate and use this information in everyday life to make good health decisions [3]. Health information literacy is often examined in either library or educational contexts (e.g. [4–6]). However, Yates [7] used the concept in a more general sense as using information to learn about health. The focus of information literacy research has more recently changed and health information literacy is nowadays conceptualised in a broader sense in everyday life settings, as well [8].

This paper presents results from a survey study on older adults in Finland and sheds light on the relationship between everyday health information literacy (EHIL) and attitudes towards digital health services. Previous studies have examined the EHIL of older adults in different countries [9–11]. In addition, recent surveys conducted both in Finland [12] and other Nordic countries (e.g. [13, 14]), have studied the use of and attitudes toward national patient-accessible electronic health records, in particular. However, to the best of our knowledge, no earlier studies exist on older adults' attitudes to digital health services in relation to EHIL. Another novel aspect of this study is to analyse EHIL using structural equation modelling.

2 Health (Information) Literacy and Digital Health Information Behaviour

Studies have examined either health literacy or health information literacy and their relations to health information behaviour, especially in the digital environment. Inadequate levels of health literacy have been linked to less frequent use of the internet as a source for health information among older adults [15], whereas adequate levels of health literacy often are related to more frequent seeking of health information online [16] as well as to the use of health information technology including applications, activity trackers, and patient portals [17].

The related concept, eHealth literacy, is used specifically in the context of digital information [18]. Paige et al. [19] studied eHealth literacy in different age groups and found that older adults had lower confidence in their abilities to recognize, acquire, and use eHealth resources and information than younger adults had. Among older adults, barriers to seeking online health information may include limited computer skills, not knowing which information sources are reliable, and lack of confidence in one's own ability to evaluate and apply electronic health information [20].

A review shows that studies link lower health literacy to less frequent use of health web portals [21]. According to another review, health literacy or the capacity to interpret health information is a factor that influences the use of patient portals or personally controlled electronic health records [22]. Moreover, low health literacy has often been found to be a barrier to the use of personal health records (e.g. [23, 24]), whereas higher levels of health literacy are linked to the adoption of these services [25]. Irizarry et al. [26] found, however, that, although health literacy was related to higher confidence in assessing and evaluating online health information among older adults, it was not directly related to the interest in using patient portals. Enwald et al. [9], for their part, studied elements of EHIL and found a link between higher confidence in the abilities to evaluate and understand health information and the use of traditional and mobile information technology.

3 Older Adults and Digital Health Services

A review of research on older adults' perceptions of eHealth services showed that electronic health information could be used for a variety of purposes including health management, social uses, and personal health information management [27]. In a review of studies on the patient portal use of persons aged 60 years or older, the main barriers of the use of both patient portals and electronic personal health records were issues related to privacy and security and the access and ability to use information and communication technologies (ICT) [28]. In a Norwegian survey, respondents 65 years or older used a patient-accessible electronic health service to a lower degree than younger ones did [14]. According to a Finnish survey of people aged 65 to 90 years, those under 75 years considered their ICT skills as good and they were more ready to use digital social and health services and technology, whereas those 75 years or older considered their technology skills as fair or poor. As many as 78%, however, thought that they usually manage to get things solved in digital service, and 88% partly or totally agreed that digital services are useful [12]. In a Swedish survey, those aged 66 years and older considered information in digital health services as useful and they were likely to understand it but perceived technology difficult to use [13].

In studies on attitudes towards digital health services, Young et al. [29] found that the lack of knowledge about electronic health records and unwillingness to change current practices due, for example, to aversions against computers, acted as barriers to use of home-based health information technology among older adults. Older adults who were more positive about the benefits of eHealth services often had at least some experience of digital tools whereas those who had only a little or no experience had aversions towards such services [30]. Among older adults with chronic pain in Scotland, eHealth services were considered to serve as a supplement to personal appointments [31].

Older adults are found to value easy access to information about health, more direct communication with health providers, and the possibility to make appointments online [32]. In a study among Finnish older adults, saving time and not being dependent on location were also considered important. Barriers to use of digital social and health services included a wish to meet the service provider in person and the perception that things are better taken care of in person. The older adults also had trust issues especially connected to privacy [12]. Dutch older adults, on their hand, liked to review their medical record information and check appointments, but experienced difficulties with the interaction and annoyances with, among others, lack of timely reactions to inquiries from the patient [33].

4 Research Questions and Hypotheses

This study addresses the following two research questions and, based on earlier research, we formulate three hypotheses:

- A) Is there a relationship between the EHIL of older Finnish adults and their attitudes towards digital health services?

We pose the following hypothesis:

H1. EHIL is strongly associated with attitudes towards digital health services.

B) What does a possible relationship between EHIL and attitudes to digital health services look like?

Here we formulate the following two hypotheses:

H2. EHIL has a positive association with being more optimistic about digital health services being beneficial to use.

H3. EHIL has a negative association with being more pessimistic about digital health services being beneficial to use.

5 Methodology

We mailed postal surveys to a random sample of 1,500 Finns aged 55–70 years, drawn from the national Population Information System [34], and received 373 completed surveys (25%). The total number of people in Finland aged 55–70 years was 1,158,529 in the end of 2019. This constitutes 21% of the total population of 5,525,292 [35]. The survey contained sections on health information behaviour and use of and attitudes towards digital health services among other topics. The demographic characteristics of the respondents are shown in Table 1.

A five-point likert scale was used to measure all constructs in this study. Subject positions were measured using scales adapted from Huvila et al. [36]. We measured EHIL using an adapted version of the EHIL screening tool developed by Niemelä et al. [37]. The EHIL scale has been the most extensively used health information literacy test so far. It has been applied on different populations, including a variety of age groups and nationalities (e.g. [9–11, 37–40]). EHIL is operationalized as a multidimensional construct that has three dimensions, namely, Motivation, Confidence and Evaluation. Appendix A shows the measurement items.

Partial least square structural equation modelling (PLS-SEM) was used to test the relationship between EHIL and optimistic (positive) and pessimistic (negative) subject positions relating to digital health services. PLS-SEM is a multivariate technique. It is particularly useful for testing exploratory relationships and hierarchical models, as is the case in this study [41]. The analysis was conducted using PLS-SEM with SmartPLS 3.0. Following the guidelines given by Hair et al. [42], the measurement model is analysed before the structural model.

6 Results

6.1 Measurement Model

The measurement model includes assessment of the construct reliability (internal consistency reliability, indicator reliability) and validity (convergent validity, discriminant validity) of the used measures. Table 2 provides the measurement statistics. As is apparent from the table, indicator loadings of all the constructs are above the threshold value

Table 1. Demographic profile of respondents (n = 373)

Items	%
<i>Age</i>	
55–59	27.1
60–64	28.2
65–69	33.5
70 & above	11.1
<i>Education</i>	
Elementary school	21.4
Upper secondary	34.5
Polytechnic or institute level degree	22.2
University degree	20.0
Licentiate or doctoral degree	1.9
<i>Gender</i>	
Male	38.8
Female	60.6

of 0.60, which confirms indicator reliability. Internal consistency reliability is also established as composite reliability values of all the constructs in the model are above the recommended value of 0.70 [42].

Average variance extracted (AVE) was used to assess the convergent validity of the constructs. As shown in Table 2, AVE values of all the constructs are above the acceptable value of 0.50. Discriminant validity was tested using the Fornell and Larcker criterion. Table 3 shows that the square root of AVE of each construct is higher than its correlation with other constructs. It fulfils the Fornell and Larcker criterion [43] required to establish discriminant validity. Overall, the results summarized in Tables 2 and 3 provide sufficient evidence of reliability and validity of the measurement scales used in this study.

EHIL was operationalized as a second order hierarchical construct. The “degree of explained variance of a hierarchical construct is reflected in its components” [44, p.110], which, in this case, is motivation (53%, $p < 0.01$), confidence (61%, $p < 0.01$) and evaluation (51%, $p < 0.01$). Moreover, composite reliability and AVE values of EHIL are 0.79 and 0.56, which are above the recommended values.

6.2 Structural Model

After assessing the measurement model, the relationship between EHIL and optimistic and pessimistic subject positions was analysed using standardized path coefficients and significance levels. The results are presented in Fig. 1. As shown in the figure, EHIL has a positive significant impact on optimistic subject position relating to digital health record services ($\beta = 0.31$, $p < 0.01$). Hence, hypothesis 2 is confirmed. Nevertheless,

Table 2. Measurement statistics of first-order constructs

	Mean	Standard deviation	Indicator loading	Composite reliability	AVE
<i>EHIL Motivation</i>				0.79	0.55
Item 1	4.18	0.64	0.61		
Item 2	3.93	0.84	0.82		
Item 3			0.77		
<i>EHIL Confidence</i>				0.78	0.54
Item 1	3.98	0.89	0.71		
Item 2	3.56	1.17	0.70		
Item 3			0.80		
<i>EHIL Evaluation</i>				0.81	0.58
Item 1	3.33	0.96	0.77		
Item 2	3.67	0.83	0.72		
Item 3	3.85	0.85	0.80		
<i>Optimistic Subject Position</i>				0.91	0.72
Item 1	4.25	0.69	0.80		
Item 2	4.31	0.62	0.88		
Item 3	3.83	0.92	0.86		
Item 4	4.18	0.83	0.86		
<i>Pessimistic Subject Position</i>				0.79	0.66
Item 1	4.03	0.77	0.66		
Item 2	3.97	0.78	0.94		

Table 3. Intercorrelations of the latent variables

	Confidence	Evaluation	Motivation	Pessimistic Subject Position	Optimistic Subject Position
Confidence	0.732				
Evaluation	0.377	0.764			
Motivation	0.369	0.254	0.743		
Pessimistic Subject Position	-0.474	-0.194	-0.363	0.813	
Optimistic Subject Position	0.257	0.11	0.32	-0.316	0.85

EHIL has a very strong negative impact on pessimistic subject position relating to digital health record services ($\beta = -0.47, p < 0.01$), which substantiates our third hypothesis. The significant effect ($p < 0.01$) of EHIL on both optimistic and pessimistic subject positions also confirms the first hypothesis.

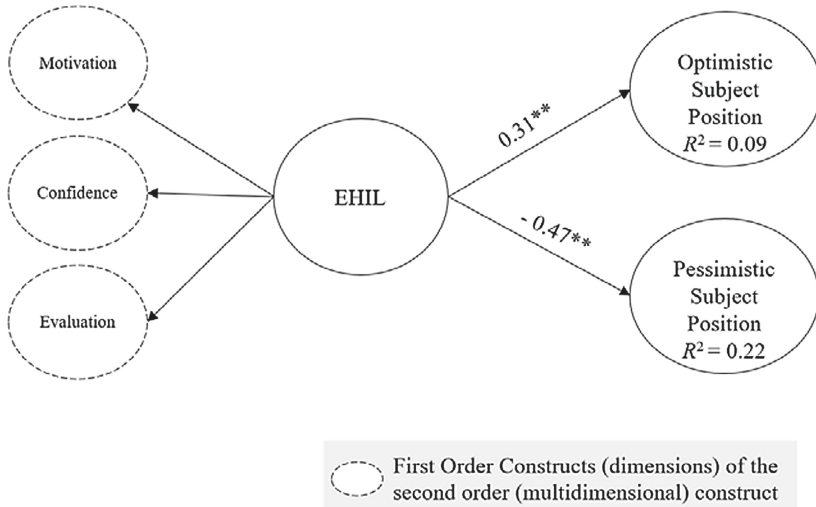


Fig. 1. PLS analysis results. Notes: ** $p < 0.01$ (two-sided test)

7 Discussion and Conclusions

This study used structural equation modelling to analyse the relationship between EHIL and optimistic (positive) and pessimistic (negative) attitudes towards digital health services in a sample of older adults in Finland. In contrast to many earlier studies, the strength of the present study is the use of a population-based random sample. However, both due to the non-response bias and the fact that the sample represents Finnish older adults, there are limits to the degree of how the findings can be generalized to other age groups. In future research, the sample size could be expanded. Although extensive surveys indicate that users of patient-accessible electronic health records are generally content and do not experience major difficulties with access [12–14], older adults especially have shown lower confidence in their abilities to use electronic health resources [19]. Studies on health literacy, understood as the ability to obtain, process, understand, and use health information [1] and eHealth literacy [18] have also indicated that people’s beliefs in their own capacity are strongly linked to the use of eHealth resources, including patient portals and patient-accessible electronic health records or personal health records [17, 22–25]. Our results are in line with these studies, EHIL is also linked to attitudes towards digital health services and the three hypotheses are confirmed.

A successful use of digital health services can depend on understanding the information and being confident about the use. Freise et al. [45] found that barriers to understanding electronic health record information are related to information in the form of

difficulties in understanding terminology and interpretation of test results as well as technology in the form of portal layout and accessibility and presentation of results. Previous studies using the EHIL screening tool show that older adults experienced more difficulties than younger ones in understanding terminology, as well as were less likely to compare information from different sources [10]. Enwald et al. [9] examined EHIL of Finns aged 65 or older and found that around 60% had trouble knowing who to believe in health issues and how to understand terminology. In our study, the variables Confidence (including understanding of health information) and Evaluation (covering ability to assess trustworthiness) were strongly linked to optimism on the benefits of using digital health services. Thus, our results bring new knowledge about the importance of EHIL as an enabler of acceptance of digital health services.

The study also introduces a new method for analysing EHIL survey data. Previous studies of EHIL analysed their results using different statistical methods including correlation analyses [37], factor analysis [37–39], ANOVA [10, 37, 39] and chi-square tests [9, 37, 40]. Our study shows that PLS-SEM, which is a second-generation statistical technique, is also particularly useful for building and operationalizing EHIL as a multidimensional construct. By using this method, we identified three variables that were very close to and, hence, named in similar fashion by Niemelä et al. as the three factors Motivation, Confidence, and Evaluation [37]. Hirvonen et al. [39], in their factor analyses, also ended up with three factors that they labelled Awareness, Access, and Assessment. The contents are, however, nearly identical to those of Niemelä et al. [37]. In contrast to these, Mayer [38], although using factor analysis as well, found only two factors that she called Motivation and Confidence, whereas the Evaluation/Assessment factor of the previous studies did not load as a separate factor on her German sample. Similarly, Hirvonen et al. [39] found some differences in the factorial structure of the Namibian sample compared to three Finnish samples; this might indicate limitations in applying the EHIL scale on different populations or culturally diverse information environments [39].

Nymberg et al. [30] found that older adults who were more positive about benefits of eHealth services often had at least some experience of digital tools, whereas only little or no experience was related to aversions towards such services. In our study, we did not analyse the relationship between experience of digital health services and positive or negative attitudes. This could be a topic of future research.

Our findings imply that EHIL is a useful measure of how older adults perceive their own ability to manage health-related information and how that is linked to attitudes on digital health service use. The positive relation of confidence and evaluation (assessing trustworthiness) and optimistic attitude underlines the need to facilitate older adults' comfortability with health information instead of only motivating them to use it. From this perspective, rationalistic arguments and informing might not be enough and more emphasis should be placed on a positive information experience rather than mere access and the 'technical' (cf. more holistic, lifeworld-wide) usefulness of information. Such measures could be to consider how the contextual relevance of information in the life situations of older adults could be increased and make information more easily actionable and available in contexts and situations where individuals make decisions relevant to their health.

Acknowledgements. This research was conducted as part of the project Taking Health Information Behaviour into Account: implications of a neglected element for successful implementation of consumer health technologies on older adults (HIBA), funded by the Academy of Finland 2015–2020. (Grant no. 287084).

Appendix A

Everyday Health Information Literacy

a. Motivation

1. It is important to be informed about health issues.
2. I know where to seek health information.
3. I like to get health information from a variety of sources.

b. Confidence

1. It is difficult to find health information from the Internet (reverse coded).
2. Health related terminology and statements are often difficult to understand (reverse coded).
3. It is difficult to know who to believe in health issues (reverse coded).

c. Evaluation

1. It is easy to assess the reliability of health information in printed sources (magazines and books).
2. It is easy to assess the reliability of health information on the Internet.
3. It is easy to determine if health information is inaccurate.

Optimistic Subject Position

1. I think that new digital health records services have a lot of potential to improve healthcare in general.
2. I think that using digital health record services is a good idea because it can lead to improvement in my health and healthcare.
3. I think that digital health record services, including e-health services, have a lot of potential to improve life in general.
4. I think that using digital health record services is a good idea because it gives me a possibility to control e.g. that I get proper care, the information is correct and correctly managed.

Pessimistic Subject Position

1. I prefer to communicate directly with healthcare professionals rather than to use an indirect digital service.
2. I have or would have difficulties to understand information provided in digital health record services.

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Information Literacy Education in Different Sectors



A Preliminary Analysis of the Inclusion of Information Literacy in International Higher Education Curricula

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Abstract. This article provides preliminary results of a qualitative research that analyzed the content of bachelor-level higher education curricula through the examination of current study programs belonging to 30 research-related courses from different universities worldwide that were classified in the SCImago Institutions Rankings of 2020. These programs were selected because they were available in one of the languages spoken by the researchers (Spanish, Portuguese, English). As a qualitative research, we did not intend to have a representative sampling. The analytical framework used to examine the programs was divided into six dimensions, however, in this article we centered on presenting the methodology employed for analyzing the information literacy (IL) dimension and summarize our findings. The IL-related indicators under evaluation that were least often included in the study programs analyzed were related to the promotion of using diverse information resources; citations, references, and formatting aspects; and the identification of information needs. Our analysis highlights areas of opportunities for improving the inclusion of IL in the curricula.

Keywords: Information literacy · Research skills · Curriculum · Higher education · Bachelor programs

1 Introduction

Currently, information literacy (IL) is recognized as an important 21st century skill in the information society, hence, it is necessary to include it in higher education curricula. IL is concerned with developing information and research skills; thus, properly integrating it in the curriculum is important, since library courses may not be enough to develop such skills. This study originated from the need for providing elements for developing a common curricular framework to enhance the teaching of information and research skills at the Universidad Autónoma de Chihuahua (Mexico), by conducting a comparative and international analysis of study programs. The best practices for IL-curriculum integration include training on library services, usage of catalogs and databases, development of

information competencies, development of critical thinking, and encouraging learning to learn [1]; assignments directed at demonstrating students' learning about content and IL skills [2]; and fostering library-school connections through IL-curriculum integration [3]. Furthermore, a multimedia and technical-scientific writing program has been proposed to help students develop IL while writing [3]. Moreover, implementing such programs shows that most students enrolled in them consider that research skills are important for their education [4]. Outside the academic context, employers are interested in hiring people with technology and information skills, so the curriculum must address such demands [5]. IL is usually taught and integrated in the curriculum along with research skills, scientific writing and transliteracy [1–4, 6]. It is also pertinent to see the library as a support agent for using scientific information and discriminating less reliable sources, to avoid fake news, post-truth and alternative facts, quite common nowadays because of information overload, mainly digital [7].

2 Methodology

This qualitative research evaluated bachelor-level study programs from universities considered successful in research, by using a checklist to assess the following dimensions: a) infrastructure and resources; b) competencies; c) contents; d) methodology; e) educational strategies; and f) IL. In this article, we only present the analysis of the latter dimension. The checklist has a yes/no box for each indicator to write down its presence or absence in the study programs, and another box to register the qualitative data for the cases where the indicators are present, which allowed us to analyze their inclusion.

For selecting the cases to study, that is, the universities whose programs we were going to analyze, we used the SCImago Institutions Rankings (SIR) of 2020 [8], which integrated 3,897 universities worldwide. The following criterion of selection was to take only the universities of countries whose official languages were Spanish, Portuguese or English (45 countries), being languages known by the research group. The result was 1,308 selected universities. Subsequently, we counted a maximum of five universities per country since not all the selected countries had this number of institutions. Some of them had more whereas others had two or only one; this count resulted in 56 universities. Using Scopus, we looked for publications of the 56 universities to determine the area of knowledge where they had the higher number of publications. This area would become the chosen one to look for the study program to evaluate, which had to be bachelor study programs related to research. These criteria of selection (SIR/Scopus) arose from the assumptions: a) the universities with strength in research appear in SIR; and b) the area of knowledge in which a university has the higher number of indexed publications in Scopus corresponds to its area of specialization in research; and c) the universities offer good research teaching in its area of specialization in research. The 56 cases decreased to 30, corresponding to the number of universities whose study programs were available on their websites; besides the cases in which we could reach the coordinators to request the study programs, and the ones who replied positively. The 30 selected cases corresponded to 16 countries (five universities of the United States of America, four in Spain and England, three universities for each of the cases in Argentina and Colombia, and one for each of the following countries: Australia, Bolivia, Chile, Costa Rica, Ecuador, Malta, Mauritius,

Mexico, Peru, Philippines and Uruguay). We did not try to achieve representativeness of the sample, because this was an exploratory and qualitative study, hence, we did not address sampling.

The IL indicators we used in the checklist were based on the IL standards of the Association of College and Research Libraries (ACRL) [9], as well as from other cited sources. The evaluated IL indicators were the following:

- Academic integrity, ethical & legal guidelines for information usage & retrieval [9].
- Evaluation and assessment of information sources [9].
- Development of textual skills: writing, synthesis, and management [10].
- Identifies, acknowledges and determines information needs and their scope [9].
- Information seeking, access and retrieval [9].
- Promotes using diverse information sources [9].
- Integrates new information with the knowledge base [9].
- Citations, references and document formatting [11].
- Promotes practices and tools for information management [12].
- Explicitly mentions an IL standard.
- Promotes the use of information resources (libraries, databases, or repositories) [13].
- Bibliographic characteristics: a) number of documents in the course's bibliography [14]; b) diversity: number of documents by type (articles, chapters, books, theses or websites) and number of documents by format (print or digital) [11, 14, 15]; c) level of depth: number of texts, specialized and dissemination documents [15]; d) timeliness: number of documents from the past five years and the median age of the bibliography [11, 14, 15]; and e) courses without a bibliography [15].

3 Results

This section presents the results corresponding to the IL analysis using the previously described checklist. The data were extracted directly from the 30 study programs that were analyzed, then we grouped such data by each indicator under evaluation and it is presented in the following subsections.

3.1 Academic Integrity, Ethical and Legal Guidelines

Eight out of the 30 analyzed study programs include the ethical management of retrieved information and its legal use, but mainly focusing on the ethical retrieval and management of the research data. Few bachelor programs address ethical matters, since this may not be considered a priority when facing the variety of contents to be developed at such educational levels. However, these topics are important, especially the protection of research participants. Eight programs include the following aspects related to integrity and ethics indicators: a) considering possible ethical conflicts; b) defining plagiarism; c) analyzing ethical aspects of the research with human beings; d) writing the informed consent to collect data; e) reflecting on ethics and scientific research; f) ethical commitment in the work field; g) ethical implications in the research paradigms; h) ethics in the processes of collection, analysis, publication, and storage of data.

3.2 Evaluation and Assessment of Information Sources

Fourteen study programs include some remarks about information sources' evaluation and assessment, but they do not specify the criteria to do it. We consider this important aspect must be included. If students are not instructed about the significance of evaluating the information they consume, students can be victims of post-truth and fake news in their academic work and in their daily life. The following affirmations related to this indicator are present in the study programs:

- Communicate scientific information; develop a creative and critical point of view.
- Formalization of the problem, empirical approximation, analyze results and conclude; critically develops knowledge through their own work and from others'.
- Argumentation and writing expression workshop.
- Demonstrating a research-oriented, creative, critical point of view.
- Evaluate sources' credibility and authenticity.
- Understand the specialized literature.
- Integrates other relevant literature.
- Reflect on relevant topics about ethical, scientific and social matters.
- Analysis of notes, scientific and dissemination articles.
- Know about the state of the art regarding the topics of the course.
- Epistemologically reflect on the practice of scientific research.
- Analyze and discuss the research results available in the specialized literature.
- Criticize the data analysis made by others.
- Analyze issues, construct arguments, problem-solving, exercise critical judgement.

3.3 Development of Writing Skills

This indicator appears in 19 of the analyzed study programs. More than half explicitly require that students present projects or reports under specific guidelines, which allow them to develop writing dexterity. This indicator was expressed in the following ways:

- Use communication and information technologies in clinical activities.
- Make a writing & oral presentation, group discussion, and answers to criticisms.
- Necessary tools to express themselves clearly in the written and oral form.
- Make summaries.
- Develop the scientific foundation of the research question.
- Elements of scientific and technical writing.
- How to formulate and develop research questions.
- Understanding background literature.
- Write an essay about the contemporary relevance of their topic.
- Contribute to the development of scientific thinking and culture.
- Use scientific language and writing.
- Scientific information presented in professional articles and popular outlets.
- Writing a research grant proposal.
- Epistemologically reflect on the practice of scientific research.
- Write a paper considering theoretical interests and current methodologies.

- Disseminate the acquired scientific knowledge in the oral and written format.
- Methodological-theoretical approach.
- Be able to manage information.
- Organize and synthesize information, arguments, and evidence.

3.4 Identifies, Acknowledges and Determines Information Needs and Their Scope

Only two study programs fulfill this indicator, which may be a sign of little interest in this point, either because it may seem irrelevant, or they already include some recommended bibliography. Omitting the identification and expression of the information needs, implies leaving out one of the main and first IL skills, which may cause students not to know which sources they can consult. Thus, expressing a search strategy would be difficult if they cannot properly identify their information needs. The two study programs that fulfill the indicator mention: a) assimilate, appropriate and reproduce the economy knowledge canon; and b) use a variety of online and traditional sources.

3.5 Information Seeking, Access and Retrieval

Half of the study programs include some remark about the development of competencies regarding information seeking, access and retrieval. These may be the most important aspects of IL, since the individual can use them to enrich their academic work and in their daily life. The study programs show the following:

- Obtaining, organizing, interpreting, and communicating information.
- Information seeking.
- Literature review.
- Bibliographic seeking.
- Review the literature and scientific evidence about the chosen research problem.
- Review historical information sources.
- Seeking and discussing the articles related to the questions and topics.
- Principles of the systematic seeking of information.
- Conceptual theoretical framework.
- Recognize the different sources of evidence in the literature.
- Develop provable hypotheses that are based on previous research.
- Collect bibliographic data, index cards and thesaurus.
- Use a variety of online and traditional sources.
- Steps to collect, organize, analyze and present textual data.
- Collect data and information from varied sources.

3.6 Promotes Using Diverse Information Sources

Two universities show this in their study programs. This indicator would have the purpose of nourishing the information archives of their students beyond the search engine they use. Both study programs register: a) management of numeric and documentary sources; and b) collect data and information from diverse information sources.

3.7 Integrate New Information with the Knowledge Base

This aspect is present in 19 study programs and its purpose is using information to enrich their bases, that is, help them to create better analysis or produce new knowledge. This is important in research subjects, where the aim is to go deeper in the understanding of phenomena or to produce innovative knowledge from the correct analysis and interpretation of results. The study programs reflect the following:

- Create a concise, well-written, clear, and consistent document.
- Results and presentation.
- Develop the scientific foundation of the research question.
- Discourse analysis.
- How to formulate and develop research questions.
- Include articles, reports, documents in the construction of the project.
- Contribute to the scientific thinking and culture.
- Reflect on relevant topics about ethical, scientific, and social matters.
- Writing based on articles of scientific dissemination.
- Interpretation of the results provided by the evidence.
- Scientific information presented in professional articles and popular outlets.
- Writing a research grant proposal.
- Interpretation of the results of such investigations.
- Disseminates the acquired scientific knowledge in written and oral format.
- Presentation of the results analysis.
- Better practices to communicate the research results.
- Develops an independent research project.
- Analysis and presentation of survey data reports.
- Analyze issues, construct arguments, problem-solving, exercise critical judgement.

3.8 Citations, References and Document Formatting

Only two study programs explicitly include these formal matters in the documents. These are important aspects, for they encourage giving the right credit to authors of other works and, thus, fulfill ethical issues, besides using the scientific communication canons. Nevertheless, aside from what was mentioned in the indicator ‘Development of writing skills’, there are no other remarks regarding the guidelines to present documents. Both study programs mention: a) use the reference format of the American Psychological Association; and b) use citations for including authors’ ideas to support students’ arguments.

3.9 Promotes Practices and Tools for Information Management

Only six study programs consider this indicator about the practices and tools to facilitate the use of information by students, which also includes the development of digital or information skills. For instance, reference managers. The study programs include:

- Organize the information extracted from the sources.

- Use of technology to convey the acquired psychological knowledge.
- Be able to manage information.
- Understand the principles of organization to collect and store data.
- Steps to collect, organize, analyze and present textual data.
- Organize and synthesize information, arguments and evidence.

3.10 Promotes the Use of Information Resources

Only three programs explicitly promote using libraries, databases or repositories, whether for students’ knowledge or as recommendation of reliable sources. It would be relevant to grant more relevance to this indicator, to promote the use of information resources and hence to develop an IL culture. The study programs mention: a) knows how to use clinical and biomedical information sources; b) data sources; c) all the required and recommended readings will be available in Blackboard.

3.11 Explicitly Mentions an IL Standard

None of the study programs fulfilled this criterion, which can mean that, at a curricular design level, teachers or people in charge of the educational planning may not be familiarized with the existence or benefits of such standards, or they may even choose not to consider them. Additionally, none of the study programs mentions the term IL; one mentions the terms ‘critical literacy’ and ‘language, communication and literacy’, while another one mentions the term ‘quantitative literacy’.

3.12 Bibliographic Characteristics

This section gathers the indicators related to the bibliographic characteristics of the study programs that included a list of references. Although professors should teach students to search the literature, not every lecturer will do so. However, study programs should include a bibliography with the basic and recommended sources to support their contents, while lecturers should also encourage students to retrieve and read more references. Out of the 30 analyzed study programs, only 10 include a bibliographic section. Concerning the number of documents in the bibliography, the results varied. One of the study programs includes only one document and another one has 51. In this case, the average was of 9 documents. Table 1 presents the number of documents included in the bibliography of each study program.

Table 1. Number of documents (n = 10)

Study plan	Number of documents
1	9
2	14

(continued)

Table 1. (continued)

Study plan	Number of documents
3	11
4	5
5	51
6	2
7	1
8	24
9	9
10	9

Table 2. Diversity of documents by type and format (n = 10)

Study plan	No. of documents by type					No. of documents by format	
	Books	Articles	Book chapters	Conference papers	Videos	Printed	Digital
1	6	3				1	8
2	9	5				9	5
3	6	3		2		8	3
4	5					5	
5	16	30	5			21	30
6	2					2	
7	1					1	
8	11	10	1		2	10	14
9	6	3				6	3
10	9					9	
Total	71	54	6	2	2	72	63

Table 2 presents the diversity of bibliographic documents; first, by the type of document (book, article, chapter of a book, conference papers or video) and then by format of the document (printed or digital). Regarding the type of documents, most were books (71 altogether) and articles (54), while there were very few chapters of books, conference papers and videos. Bibliographies did not list websites nor theses. It is expected that books be more common in bachelors' subjects, which were the cases studied. Besides, books are chosen based on the level of inquiry and availability in the library. Concerning the format, this is mostly printed, but the difference with digital documents was not that

significant. However, most of the digital documents corresponded to articles and not books.

Regarding the level of depth, bachelors' subjects usually recommend text materials (like textbooks), instead of specialized or dissemination works. This was the tendency found (see Table 3).

Table 3. Level of depth in the bibliography (n = 10)

Study plan	No. of documents by level of depth		
	Textbook	Specialized material	Dissemination material
1	6		3
2	9		5
3	6	3	2
4		5	
5	21	30	
6	2		
7	1		
8	12	1	11
9	6		3
10	9		
Total	72	39	24

Regarding timeliness, there were few documents published during the past five years. Three study programs do not present any and two had only one (see Table 4); The average of recent documents was of 2.6 documents. Similarly, the median age of the oldest bibliography was 1968 and the most recent one was 2013 (two cases); not even the most recent one meets the rigorous to-be standard of the last five years. As we stated before, only 10 study programs include a bibliographic section. The other 20 do not, but eight of them mention the bibliography is left to teachers' consideration.

Table 4. Timeliness in the bibliography (n = 10)

Study plan	No. of documents from the past five years	Median age of the bibliography
1	1	1998
2	1	2010
3	3	2001

(continued)

Table 4. (continued)

Study plan	No. of documents from the past five years	Median age of the bibliography
4	0	2013
5	14	1968
6	0	2000
7	0	2013
8	2	2003
9	3	2008
10	2	2000
Total	26	2001

4 Discussion

A little more than half of the analyzed study programs consider some of the indicators we defined to analyze IL-curriculum integration, and very few positively fulfill all the indicators. Therefore, we believe it is necessary to study thoroughly such integration. This article suggests indicators so that other colleagues may analyze their own study programs. Improving the inclusion of IL to the curriculum is important since students may be victims of misinformation or information overload, due to the excess of information sources of questionable quality [16].

Only 10 of the 30 selected study programs include a bibliography, which should be available in the library, even when is outdated. Although this aspect is difficult to evaluate, for it would require the revision of its catalogs. The study programs without a bibliography or those left to the teacher's consideration are more or less disadvantaged. Without explicit references to check, students are left on their own for selecting materials to use, if they are interested to look for them. Students may develop inappropriate patterns for searching and managing information, such as seeking information exclusively in social media or just Google's first results [16]. Overall, there are several challenges associated with study programs' bibliographies, such as the efforts required to keep them updated and available in the university libraries. We ignore the existence of a study that has systemized the analysis of the challenges involved here. However, in our observations of different universities' study programs, we have found their bibliography usually presents one or several of the following problems: a) a high rate of unavailable bibliography in the library or in subscribed databases; b) dated bibliography; c) lack of bibliographic variety; and d) dated or obsolete bibliography. The bibliography of the study programs falls to librarians and affects libraries as well since the library promotes the use of scientific information of quality [7], which can help to prevent post-truth and fake news. Simultaneously, it promotes the development of an information culture, whose core is IL and its basic competencies. Moreover, librarians along with the academics must play the role of allies to guarantee a curricular design that integrates IL with subjects related to information and research (even subjects of other areas), and a good, available bibliography in the archives and library's subscriptions.

From the selected study programs, those that best fulfill our evaluation of IL indicators include six from Spanish speaking countries: a) three Colombian study programs (two from public universities and one from a private university). Two are study programs of economics and one of communication; b) two of public universities from Spain, one of medicine and another one of business administration; and c) one of agronomy from a Bolivian public university. In the English context, the following cases stand out: d) a study program of anthropology from a private American university; e) a study program from a public university in Malta; and f) two study programs from British public universities, one in human sciences and another one in archeology. Therefore, the most successful universities in our evaluation of indicators related to IL were mainly public universities and Spanish speaking ones. They were mostly from Latin America and with study programs concerning social sciences. This finding could explain that universities known as prestigious do not necessarily implement IL better in the curriculum or possess a greater research culture. On the contrary, these universities appear in the rankings for other indicators, such as: financial resources, infrastructure, student, teachers and researchers' population. Nonetheless, further analysis of this information is necessary to verify such hypothesis.

An appropriate IL-curriculum integration would help to develop information skills to avoid fallacies and other cited information problems. The curricular combination of IL with a multimedia writing and technical-scientific communication has several benefits. However, university libraries should also contribute to these projects, instead of working separately [3]. IL-curriculum integration can help students to be aware of the importance of seeking and evaluating relevant information, that is useful for their contexts and duties which emphasizes the relevance of this task.

It has been suggested that librarians should work in projects of IL-curriculum integration and understand the different teaching and learning styles [5]. This represents an excellent area of opportunity to learning and job-related development of information professionals [17]. Therefore, it is important to train librarians in topics related to teaching, in order to enable their participation in projects of curricular design and teaching subjects related to IL. On this matter, emphasizing the importance of the faculty-library collaboration has been pointed out, enabling librarians to be part of the academic staff of the faculties to facilitate IL development [2, 4]. It is also essential that the information professional can successfully apply marketing, to demonstrate and promote the libraries' role and IL relevance nowadays through different means [1].

Sometimes, the responsibility of teaching IL falls to the librarian, who not always has the necessary teaching competencies. Also, teaching IL becomes a problem when it is trivialized, due to the librarians' lack of influence and even their administrative position. Similarly, some academics may not be perceived as teaching partners and, thus, show themselves unwilling to collaborate. These challenges may result in IL teaching that may not be appropriate. On one hand, the librarian may have limitations in IL teaching (competencies, institutional position, resources, bureaucratic processes). On the other hand, academics may not understand IL relevance and advantages [17–21]. These limitations could transcend when making projects of IL-curriculum integration.

IL-curriculum integration would allow students to develop their ideas at length, discuss different perspectives, be more critical and aware of the development of research

processes [6], and developing the skills that professionals need during the information age. It has been suggested that the curricular structure for IL be modular, rather imparted by information professionals. Moreover, the titles of the modules must explicitly convey their usefulness and, thus, be appealing for students [17].

4.1 Conclusion

This preliminary analysis highlights areas of opportunity to better integrate IL in study plans, which could solve students' problems when seeking information, post-truth or fake news management, and lack of awareness identifying reliable and accurate information to conduct academic work or for their daily life. These deficiencies could also weaken libraries and avoid recognizing the value and investments made to acquire information resources, which can be at risk of not being used and, therefore, removed, putting the academic community at a disadvantage. IL is important in higher education, for it is strongly related to research teaching. Having a good practice consists of including librarians in the development of IL initiatives, as well as their involvement in educational activities through this work area. They would take care of the timeliness and accuracy in the selection and acquisition of information resources, and the development of appropriate competencies for their management, evaluation and use. As a result, there would be a development of a rich information culture in higher education.

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Creative Pedagogy and Information Literacy in Higher Education

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Abstract. This paper explores the language around creative pedagogical practice – that the definitions and theories that inform creative pedagogical practice are not universally shared and understood by all in the information literacy field. This paper will discuss preliminary results of a grounded theory study, conducted with library information literacy instructors, that reveal a need to develop a better understanding and definition of creative pedagogy in information literacy. The aim of the research/paper is to synthesize findings into a theory to better account for what explains the application of creative pedagogy in the teaching of information literacy. The paper will summarize preliminary research findings that address the varied considerations for employing creative pedagogy in the information literacy classroom. The preliminary findings represent data from a larger, ongoing study.

Keywords: Information literacy · Creative pedagogy · Higher education · Grounded theory

1 Introduction

Theories of teaching and learning in other disciplines can provide opportunities for the library to adopt more flexible and “creative” approaches to implementing models of information literacy in the classroom. To the extent that the library engages in teaching, there is an opportunity to be more innovative and for students to be more engaged in their learning. With an increasing proliferation of technology across higher education campuses, and the creation of new flexible and collaborative spaces, the library can play a central role in embracing changes to the way teaching and learning takes place, and potentially change the conversation for the way the library teaches information literacy. This paper explores the need for information literacy practitioners to better understand these changes and practices in higher education as an opportunity to enact more holistically creative pedagogical practices.

The preliminary results will show that creative pedagogy is often linked to varied definitions of creativity, constructivist principles, and both critical and reflective pedagogical practices, to explain traits that embody terms that are often synonymous with creative pedagogy. In ascertaining through the literature and the research a more concrete definition of and need for creative pedagogy, an argument is made for educators to better understand creative pedagogy as a mandated educational need. The paper will

summarize the results of the research with the aim of uncovering the varied dimensions and concepts around creative pedagogy to inform information literacy best practices and its teaching moving forward.

Creative pedagogy has not been well-researched or discussed within Library and Information Science (LIS). However, the fact that academic librarians operate somewhat outside of the more traditional classroom space – that is, they are often guest lecturers providing one-shot sessions; teaching credit-bearing courses that are only loosely connected to the larger curriculum; or working with individuals and groups in flexible learning spaces – learning commons and makerspaces; suggests that they could be in a good position to implement creative pedagogy. Usually, they do not grade students, which also opens up more room for exploration and creativity. Without much research, it is unclear whether creative pedagogy is happening in these spaces. This paper seeks to share results of a study that is designed to investigate whether and how library instructors are using creative pedagogy, understood as the philosophy, theory, and methodology of creative teaching implemented through active/constructivist approaches, either explicitly or implicitly in their teaching. Because there is no clear definition of creative pedagogy, only a loose idea of what it is or could be, this paper explores the preliminary results of a grounded theory approach to discover whether and how library instructors are engaging in creative pedagogy and how creative pedagogy is defined within the context of academic library instruction.

Creative pedagogy is not easily quantified or understood as a term that applies to the teaching of information literacy. The study informing this paper employs constructivist grounded theory research as a method with the aim of “abstract understanding of studied life and view the analyses as located in time, place, and the situation of inquiry” [1]. To explore the relationship between creative pedagogy and information literacy, this study garners feedback through interviews with library instructors about the ways in which creative pedagogy informs their practice. Interviews seek to uncover hidden actions and intentions or expose policies and practices, and their implications [1].

- Since creative pedagogy is a loose set of guidelines, frameworks and theories, there is very little language in the library classroom that formally acknowledges creative practice as informed by the influence of creative pedagogy. Creativity has not yet been understood as a term that applies to the teaching of information literacy.
- In order to develop an understanding of the potential role of creative pedagogy, this study garners feedback from library instructors to explore the ways in which creative pedagogy informs their practice and manifests in their instruction. Acknowledging the lack of an existing theory, set of standards, or a precise vocabulary to underpin the research, the study will implement grounded theory research using a phenomenological approach with the aim of uncovering the varied dimensions of the concepts around creative pedagogy to characterize information literacy and its teaching moving forward. The study will employ in-depth interviews with and situational observations of instruction librarians in order to examine whether and how instruction librarians integrate creativity in their teaching.
- Ultimately, the research findings will be synthesized into a theory to better account for what explains the application of creative pedagogy in the teaching of information literacy. In this paper, the theory begins to take shape.

2 Operationalizing Creative Pedagogy

In the latter part of the 20th century, creative pedagogy was introduced within the field of education. Creative pedagogy is framed generally as a need to introduce more creative thinking and action into the classroom [2] and is linked to other pedagogies and theories of learning, such as critical pedagogy and constructivist learning theory. It is instrumental to the growth of students, and as such it expands the pliability of the mind. It was John Dewey in the early 20th century who called for a need for educational practice to reflect the changing times. He made a link between the need for children to experiment and to be more self-expressive impacting their overall success and happiness [3]. Proponents of creative pedagogy make a case for creativity by linking it to specific cognitive characteristics – traits in students that could be seen as facilitating creative thinking. Traits that enhanced cognitive learning processes, such as curiosity or a tolerance for ambiguity, enhance problem-solving strategies so that learning is “transformed”.

Creative pedagogy is often tied to strategies in the classroom that seek to define creative practices generally, then outline its application on teaching and learning. Aleinikov, publisher of the first work on creative pedagogy in the *Bulletin of Higher Education*, defined the concept of a ‘creative pedagogy’ as an approach to creative teaching to promote creative learning [4]. Aleinikov contends that the learner is no longer an ‘object’ of pedagogy but becomes a creator of new knowledge in the field being taught [5]. Additionally, Aleinikov states that creative pedagogy teaches how to learn creatively and become creators “of themselves and creators of their future” [6].

Despite Aleinikov’s influence in formalizing modern creative pedagogy, other researchers explored and wrote about the concept as demonstrated in Cremin and Chappell’s system review of the relevant literature from 1990–2018 [7]. The systematic review underscores seven characteristics of creative pedagogy, including generating and exploring ideas; encouraging autonomy and agency; playfulness; problem-solving; risk-taking; co-constructing and collaborating; and teacher creativity [7]. In the paper, definitions are not offered as the terms are framed differently in each of the 35 papers/studies analyzed. The authors point to the “nuanced discussion of the various ways in which the characteristics are documented” in each study, outlining the challenges in defining creative pedagogy [7]. The nature of creative pedagogy is evidenced but not defined.

3 Review of the Literature

3.1 Higher Education

A Chronicle of Higher Education special publication, *The Creativity Challenge*, [8] outlines why creativity in higher education matters. Colleges, Supiano says, must pay attention to students’ educational backgrounds, their future goals, and the needs of society at large. Teaching creativity relates to all of those concerns, but the most obvious link is to students’ post-college plans [8]. Supiano highlights creativity and human literacy as student needs in a future that looks to “robot-proof” the work force [8]. Colleges need to teach students how best to deal with uncertainty, and to do that it is necessary to get students to think differently. As a practical call, employers value

creativity because creative people are likelier to succeed in the face of uncertainty and change, “and in many industries those conditions are now the norm” [8].

A compilation of articles in a book, *Creative Learning in Higher Education*, provides a scholarly resource to understanding the evolution and implementation of creativity in higher education. Creative pedagogy is often tied to strategies in the classroom that seek to define creative practices generally, then outline its application on teaching and learning. Sawyer synthesizes research on creativity and explains the ways in which educators can put into practice a model that Sawyer calls “guided improvisation” [8]. Creativity depends on having “creative knowledge” – a deep understanding of a particular domain [8]. Developing creative knowledge requires a particular sort of teaching, but teachers have to change the way they teach everything. They have to “transform” pedagogy [8].

Teresa Amabile is a leader in creativity research who identifies critical thinking as an aspect of creativity, found within the component of creative-relevant processes [9]. Hennessey and Amabile name three preconditions for creative performance: domain relevant skills (factual knowledge, technical skills, special talents), creativity relevant skills (cognitive style, working style, personality dispositions) and intrinsic task motivation (absence of extrinsic constraints, temporary situational/state factors). Not only do they cite preconditions for creative performance but outline leading schools that have put creativity in the curriculum, such as Nordic countries, aiming to improve innovation and entrepreneurial skills in students [10].

Creativity and innovation are becoming increasingly important for the development of the 21st century knowledge society. They contribute to economic prosperity as well as to social and individual wellbeing and are essential factors for a more competitive and dynamic society. Creativity posited as an individual’s skill that is a necessary precondition for the development of nationwide innovation, invention and entrepreneurship, the call for its improvement in future generations, through the education system, seems to be a logical consequence [11].

While the dimensions of creative teaching and learning can be complex and represent an increasing need for students to learn creativity, information literacy is another much needed 21st century skill. The purpose of this research study is to explore connections between the need for students to be more creative, ways in which creativity can enhance information literacy teaching and learning, and ways in which both share common threads.

3.2 Constructivist Pedagogy

Today’s learners emphasize a constructivist paradigm whereby they prefer to construct their own knowledge—assembling information and tools from different sources, enjoying collaborative learning, looking for ways to apply new knowledge to real-world problems, and preferring active participation in their learning rather than being passive recipients of lectures as so often is the main university pedagogy [5].

Vygotsky is acknowledged for laying the foundation of sociocultural theoretical influence and its application on information literacy research. The understanding is that for Vygotsky learning is embedded within social events and occurs as a learner interacts with other people, objects, and events in the environment [12]. Based on sociocultural theories, with social interaction, “students talk to learn, and the affective and subjective

aspects of learning are brought into play as students must articulate their viewpoints and listen to the views of other group members” [12] The goal, which seems to be rarely realized, is to develop a capacity for critical, conceptual and reflective thinking. This requires information literacy practitioners to extend the ideas of social constructivist theory into a more holistic understanding of creative pedagogical principles.

3.3 Guided Inquiry/Inquiry-based Learning

Inquiry-based education is generally seen as supportive of the natural inclination of most students – as fostering an innate desire to both question and create. Terri Hebert discusses the importance of inquiry in scientific research. This is particularly relevant to the way library research is traditionally conducted, including the establishment of an investigable question, the decision of how to carry out the investigation, the method of what and how to collect data, and the valid interpretations of data [13]. It is through this inquiry that teachers provide the problem for investigation as well as necessary materials. Students in turn select the data to record and interpret but also the procedural process that will ultimately address the preselected investigable questions.

Inquiry and Research [14] establishes a direct connection between constructivism and information literacy that outlines the need to engage students in new ways, as students demonstrate a lack of curiosity and the lack of deeper learning when approaching research assignments. It is discussed that for students there is little tolerance for messiness. Straight lines are much easier to traverse than circuitous ones [14].

It is up to librarians to help mediate this process by balancing a mix of convergent and divergent thinking [14]. Educators must work to acclimate students to the process of reflection. This, the author terms, is a “Questioning Pedagogy” – a question centered pedagogy proposes question-posing, problem-making functions to be handed over to students so that students engage the course material as independent thinkers. The pedagogical process challenges students to think, question, and honor the process of research as anything but a simple task. The approach is inquiry-centered and facilitates questions according to cognitive levels, which run the gamut from low to high levels of comprehension based on Bloom’s Taxonomy [14]. Levels of comprehension are gauged between ability to evaluate to application to knowledge. Verbalizing assignments precipitates a questioning process all its own, and also helps to reduce fear in grappling with an issue.

Inquiry-based learning is predicated on independent thought, also known as critical thinking, a complex skill that requires instructional guidance, practice, and ongoing feedback. This begins with the teacher/librarian modeling the steps of inquiry to students, then gradually transferring the leadership role to the student [13]. The student, through questioning, can formulate more complex questions [14]. The indication is that inquiry through a “questioning pedagogy” gets at creative pedagogical principles, as it is exploring the critical thinking and problem-solving processes encompassed in creative pedagogical aspects. For those information literacy practitioners who weave social constructivist practices or an inquiry-based model, do they understand the necessity in higher education in applying creative pedagogical principles?

3.4 Critical and Reflective Pedagogy

Troy Swanson outlines an opportunity for both instructors and librarians working together to draw on critical literacy theory, or critical pedagogy, where the instructor introduces topics and directs learning with student input. Knowledge is not neutral in this setting. It reflects social, economic, and political views that are situated in history and are still changing [15]. As with much library and information science literature in recent years, Swanson roots his definition of critical theory in a range of educational theories. Critical literacy can be traced to theorist Paulo Freire, whose work in critical pedagogy, particularly in developing theory on the pedagogy of the oppressed. Swanson outlines critical literacy through three points: “Critical literacy assumes that teaching of literacy is never neutral but always embraces a particular ideology or perspective; Critical literacy supports a strong democratic system grounded in equity and shared decision-making; Critical literacy assumes that the literacy instruction can empower and lead transformative action” [15]. Critical literacy fosters multiple ways of looking at an issue and facilitates a personal and engaged relationship between the student and the information.

Swanson applies Paulo Freire and Ira Shor’s problem-posing approach to instruction. In this approach, librarians and instructors act primarily as guides. As guides, they ask students questions and challenge them to produce their own knowledge -- their own theories on the information material presented. The facilitation of questions is then rooted in the transfer of “the strategies that support creativity – solving problems, exploring multiple options, and learning inquiry – also support depth of understanding” [16].

In the work, *Information Literacy and Reflective Pedagogical Praxis* [17], Heidi Jacobs explains that critical pedagogy invites creative, reflective dialog. Jacobs explains that “To teach students about personally meaningful information and non-analytic information processes means first and foremost to create a space where inner life can be nurtured, where creativity can emerge, where students can love the questions” [17]. It is in the questions as a reflective and creative foundation that students, and librarians, can see the world differently, exploring alternatives and possibilities, as it allows for exploration, play and divergent thinking. The basis of questioning is predicated on a healthy skepticism. In hearing an answer, the healthy skeptic will ask: “Is that correct? Is there another way to approach the problem?” Jacobs explains “the importance of not jumping too quickly to the answers” [17]. He further explains that “information literacy is a way of being that comes from living the question” [17]. It seems that for information literacy practitioners in the library, there could be some difficulty in differentiating between critical and reflective pedagogical principles. The differentiation does not conform to a holistic definition of creative pedagogy, but instead each exists as its own entity – critical or reflective. There is a symbiotic relationship between the two.

4 Framing the Research Study

The current study focuses on library instructors’ conceptualizations and applications of creative pedagogy as revealed through interviews. In pursuing a constructivist grounded research study that recognizes a lack of cohesive theory or definition for creative pedagogical practice in the information literacy classroom, this study “discovers” reality that

arises from the interactive process and is framed by a series of questions: How is creative pedagogy in information literacy understood and utilized? What does the application of creative pedagogy in information literacy mean for academic libraries? What explains the application of creative pedagogy in the teaching of information literacy?

While the purpose of the research is to discover how creative pedagogy is understood in LIS, a broad conceptualization of the phenomenon is necessary to shape the interview questions. Drawing on the existing writing in the field, I construct a composite conceptualization for creative pedagogy as: An active/constructivist/social constructivist approach to learning in which the instructor emphasizes exploration of and connections to real-world problems, open-ended approaches to problems, and risk-taking, often by using less traditional instructional strategies (flipped classrooms, problem-based learning, inquiry and discovery learning) where the intended outcome is for students to ultimately become comfortable with risk and ambiguity so that they can make connections and be creative in their approaches to learning and understanding. Charmaz states that we must start with a provisional definition stating what the term, in this case 'creative pedagogy,' will cover [2].

4.1 Subject Population

The population of this study is academic librarians at both the undergraduate and graduate level. The study focuses on the academic librarians teaching information literacy and who use, or may be using, creative pedagogy. The sample size for findings for this paper is 15 participants.

4.2 Participants

As part of initial sampling, participants are librarians who teach general information literacy classes but have not necessarily self-identified as implementing creative pedagogy in their teaching. This is done with an initial sample size of 15 librarians, those who teach general information literacy classes. Interview participants were recruited by personal invitation and by soliciting participants via information literacy listserv.

The initial set of interviews, phase one, focuses on general information literacy practitioners – those who do not necessarily self-identify as creative practitioners. The aim of the research is to identify creative pedagogical practices that may already be part of “standard” library instruction – those instructors who employ creative pedagogical practice, but are not aware that it is creative pedagogy, is the focus of the study.

After interviewing the initial 15 librarians, the researcher continues to elaborate and refine theoretical categories, and continues soliciting participants from specific and established teaching and learning communities and consider them representative of and “authorities” in specific perspectives and practices associated with more creative learning communities. Based on their “expert” responses, those who employ creative practice will establish a baseline for components of creative pedagogy in action. This paper reflects research in progress and summarizes phase 1 findings.

5 Examining the Results: The Interviews

The categories below represent the critical consciousness phase of the interviews, and are created as a result of the questions asked by the researcher. The analysis is the result of coding the data, memo writing, and comparative analysis. The themes, dictated by the initial questions, are analyzed and explicated to adjust interview questions moving forward, especially when interviewing the creative information literacy experts.

5.1 Challenges in Teaching Information Literacy

Those interviewed cite little formal background in teaching. Many of those librarians made up for the deficit by training themselves, mostly on the job and in the classroom. This means that they have had to read up on teaching practices. In many cases librarians learned to develop their teaching skills in the classroom where they had a chance to put their self-taught learning into practice. Among the 15 librarians interviewed as part of the initial phase of the study, almost all indicated that they see their role in the information literacy classroom as one of a “guide.” Here Guide is defined as supportive, or complementary, to another faculty’s class. To clarify this role, it means that the information literacy librarian is not seen as central to the learning of the students, but supportive to a particular task, for example, research development in support of another discipline-specific class. Additionally, this means that librarians feel they are teaching certain techniques and tools, rather than addressing underlying systems for sustainable thinking, albeit critical means for thinking about their research. This, then, is understood that librarians lack the flexibility to develop their own curriculum for each class, as they are not viewed as a primary partner in the classroom.

The trouble, as expressed through the interviews, is that there is little leeway to really develop teaching skills without autonomy in the classroom, or to enhance the class in a meaningful way. This is discussed during the interviews primarily as the ability to try new things in the classroom, as librarians are seen as task oriented.

5.2 Engaging or Awe-inspiring

One of the interview questions asks librarians to think about a great class that they consider to be awe-inspiring. The question is designed to get interview participants to reflect on how they might define a great or engaging class. Many of the terms used to describe that class include words like “engaging,” “passionate,” “exciting,” “knowledgeable,” (referring to mastery of knowledge by the person teaching the class). There is very little differentiation between the type of class, such as lecture or active learning. Many of the classes were thought to be inspirational despite the format for delivery. There was almost universal agreement that passion, also referred to as excitement, and engagement, were what made the class or lecture so memorable and awe-inspiring.

When recalling the class, the librarians interviewed felt that they wanted to implement that same type of engagement and passion in their own class; however, they felt that implementing similar delivery was challenging without control of their own class, and in many cases, without the pedagogical training to do so. As stated above, it is challenging when information literacy classes are connected to another faculty member’s course, meaning that certain tools and outcomes for research are drivers for the class.

5.3 Critical and Reflective Practice

The data of interest that gets to the research is a series of three questions that prompt interviewees to think about part of their information literacy instruction that might be considered creative. The first is a question about implementing critical and reflective practice in the classroom. Importantly, despite thinking that librarians have little control over the pedagogical delivery in the class, all librarians interviewed acknowledged that they are doing work in the realm of critical and reflective teaching. Much of the work being done in the information literacy classroom, while tools and skills-based (teaching to database searching), involves a degree of “practical” based pedagogy. The critical component, then, involves a “real-world” component in which librarians will conduct exercises examining an approach to something like buying a car, or clothes. The exercise takes students out of the traditions of scholarly research and applies similar decision-making strategies to their everyday life. Even with this practical, but critically minded exercise, there is a reflective component. These reflective components often get combined with the critical. Some examples include asking students to find resources that would help in reviewing their purchase, then review the source. Some of these exercises involve group work during class, while other work involves a formal reflective component in the form of a minute, aka reflective, paper in which students “reflect” on their work during the exercise –how they approached the search exercise, how they thought about resources, what they would have done differently. Librarians in all cases are thinking about ways to engage their students in unique ways, whatever the context.

Most interestingly, implementing a critical and reflective component is nearly universally seen among the librarians interviewed as necessary to enhancing the information literacy classroom. It is also seen as a crucial component to defining information literacy. Critical and reflective practice is viewed as necessary to changing perceptions of the library and librarians. These perceptions are seen as enhancing the credibility of the librarians, also enhancing the perception of librarians as educators – as central to students’ education. There was a logical connection between critical and reflective practice and creativity when librarians were asked specifically about ways in which they employ creativity in their teaching.

5.4 Employing Creativity

In what ways do you employ creativity in your teaching? Can you give me an example? How could creativity, as you might define it, become a key component of student engagement? How could creativity in the classroom, if at all, transform the library experience, and could/does it engage students in the research and learning process?

Creativity, as the interviewees define it, is considered a key component to student engagement. Creativity is tied to activities and new “things”, aka processes, in the class. The common theme among interviewees is that students tend to engage more if they do something they have never done before. The goal for many in the classroom is to do something fun and exciting and to get students to realize that information literacy is “not all dry and boring.” Fun is the operative word, as it transforms students’ relationship to the library and changes the conception of the library itself. Importantly, creativity can unlock student potential, reasoning that students are curious, interested and motivated to

do something, and want to be excited about the lesson. One interviewee asks: “How can I get them motivated and interested, and in-turn transition that energy into their creativity for their research project?” Creativity, this interviewee suggests, transforms the library experience, and transforms the reputation of the library.

Another interviewee noted that that libraries need to build more collaborative spaces to encourage collaborative learning – a key component for defining creativity. The library, as one interviewee explained, is a “stoic, quiet, serious, academic place.” The perspective is that the relationship between the student and the library is changing, and creativity is fueling the change. Librarians are breaking down mental-blocks students have in thinking that research has to be hard.

5.5 Creativity and the Future of Information Literacy

The framework is an important foundation, but what else can be done to break down barriers and make information literacy instruction more engaging? There was consensus among interviewees in stating that making information literacy more engaging, and creating information literacy strategies is crucial to making information literacy relevant. Librarians also need this to stay relevant. The common thread among respondents is that there will be a new revolution that is beyond the classroom. If the Framework plays a more central role in facilitating creativity in information literacy instruction, it needs to be more fluid by addressing current needs in teaching and learning.

Finally, one of the other emergent points of note is that transformations in the classroom must be driven by a changing generation of student learners. A new generation of students will have new ways of thinking. In order to meet them where they are, we have to use creativity to think of these new ways to do things.

6 Conclusion

Early results indicate that the Library and Information Science field uses interchangeable terms to define creative pedagogy. Because of a lack of central importance in the classroom, library information literacy instructors do not initially see themselves as educational practitioners; however, librarians see their importance in the information literacy classroom. Sometimes not consciously, the librarians interviewed are trying to do more in the classroom to change the perception for how students view their role, how students view the library, and as a way to both engage students and transform the way they learn. The information literacy librarians interviewed seem to doubt their knowledge and implementation of creative pedagogy. This lack of knowledge does not necessarily mean that creative pedagogy is not being applied in the classroom. Creative pedagogical practices are being implemented in the classroom, but they are not fully understood why or how. It is clear during the course of the study that however creative pedagogy is referred to, it is understood broadly to be necessary for changing the conversation in the information literacy classroom and for engaging more fully in both the information literacy classroom and higher education in supporting transformations of students.

It is too early to say how those who identify as creative “experts” in the classroom will identify creative pedagogy. It is clear that creative pedagogy is happening in academic

libraries, by way of critical and reflective practice, through constructivist principles, and with an acknowledgement that larger forces are at work in developing an expectation among students for the way they learn, how they engage with material, and what they expect in practical terms for their future. Librarians are aware of this imminent change but are searching for the help they need to better understand and respond to these changes.

7 Further Research Directions

The number of participants for phase one (1), and parameters around theoretical sampling, is dependent on saturation. As part of Constructive Grounded Research Theory, the constant comparative method will be employed during the collection of data, and will continue until the researcher has reached saturation – no new categories have emerged. Saturation has not yet been determined as there are still more interviews to conduct, and research material to review. Not included in the first phase of the study is the analysis of additional research material (artifacts) from interview participants. Interviewees were asked to provide a copy of a lesson plan used in the planning of their information literacy class, preferably for a class they consider to be creative. For those who do not use lesson plans, participants were asked to provide 4–5 sentences reflecting on their approach to the class – how they make creative considerations, how they engage students, and any thinking about ways in which they might “enhance” instruction for the class. The lesson plans/reflective approach analysis is not examined in the context of this (short) paper.

Saturation is also dependent on the second phase of the study that, as of the writing of this paper, had not yet been completed. The second phase targeted those librarians who employ creative pedagogical practice. Based on their “expert” responses, those who employ creative practice will establish a baseline for components of creative pedagogy in action. This will comprise phase 2, interviewing an additional set of librarians. The responses will be compared to the first phase of the study as part of the ongoing comparative analysis.

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Information Literacy of University Students and Its Improvement by a Campus-Wide Course: A Comparison of Czech Private and Public University

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Abstract. Information literacy is supposed to be an integral part of higher education. This paper presents research on students' information literacy skills and their improvement after completing a course at a private university Ambis, compared to a similar survey conducted at public Masaryk University. Unlike the latter, Ambis students' self-evaluation showed only a slight improvement in the competencies examined, most likely due to their prior practical experience. The objective evaluation revealed even more substantial differences between the two universities. While Ambis students displayed a higher starting level of information literacy in the pretest, for their MU counterparts, posttests revealed statistically significant improvements after finishing the course. Despite the potential of massive online courses, the contradictory outcomes of the present research are affected by the very massification of higher education and the related insufficient tutor staffing of the information literacy course.

Keywords: Information literacy · Information literacy education · Blended learning · E-learning · Private university · Research

1 Introduction

Information literacy (IL) indicates the ability to work with information effectively. Competencies specified in IL standards are necessary for adequate participation in the information society. The Global Media and Information Literacy Assessment Framework [1] (MIL) and Framework for Information Literacy for Higher Education [2] belong among IL standards the most often used and supported by organizations, such as ALA, ACRL or UNESCO. The first one focuses on life-long learning and active participation in the information society; the second emphasizes the competencies necessary for higher education and the professions that require it.

Universities have included IL courses in their curricula for the adoption of requested skills. However, many first-year university students lack the skills required to successfully manage their studies [3], primarily academic writing. IL courses should include

core competencies in all three areas defined in MIL – to find, evaluate and use relevant information [1]. The form of courses can vary greatly. For instance, universities provide face-to-face, blended, and purely online courses, massive courses, and small courses embedded for a specific field, and individual consultations. Each form could be effective if proven procedures are followed (see Sect. 2 Literature review).

Tertiary education in the Czech Republic is open to high school graduates to increase their qualifications in various specializations. Czech law divides university education into three basic levels: bachelor's, master's and doctoral (PhD.). Education at state universities is provided free of charge, in contrast to private ones that collect tuition fees. Students of the latter expect a higher quality of instruction and a greater focus on practice [4–6]. Education at both types of schools respects the same law and rules, but private universities are generally more connected with negative bias about the quality of education (e.g., “purchased university degree”) [6].

This paper aimed to determine how effective was the blended IL course focused on first-year private university students. At the same time, we wanted to compare the IL level of students at public and private universities.

2 Literature Review

IL courses have been an essential part of university curricula for over thirty years [7]. The content should reflect current recognized standards, including critical thinking and the production and sharing of new information [1, 2]. Some authors pointed out the spread of these standards throughout the syllabi of university IL courses [8]. Others criticized thematic deviations and a decline in standards observance [9]. The content of IL courses is evolving, with new topics emerging, for example, critical thinking [10]. Some researchers discussed content differences and the absence of country- and culture-specific contexts [9]. Other authors demonstrated the positive impact of IL training on the management of academic information resources – pointing to more efficient search and improved use of the library and other reliable sources [3, 11].

As a result of ICT advances, academia has to adapt to students' changing needs. Although the current digital-born generation is assumed to be computer literate [9], several studies pointed to insufficient IL skills and competencies [12, 13]. Teaching IL via e-courses seems to be an alternative solution [14]. Because e-learning allows an individual pace of study and unlimited access to materials, it can be a viable method to acquire theoretical knowledge and practical skills [15]. The tutor's role is crucial [16], but the credit-awarding scheme also supports students' motivation [17]. Blended learning courses have been growing in importance [18, 19] because massive online courses allow only limited individual communication [20]. Some authors even suggested a retreat from mass education [21]. A review [22] of the effect of IL teaching methods at universities showed no overall preference of delivery method of IL teaching: face-to-face, online, or blended learning. In addition, there is no overall statistically significant difference between formats in student skill outcomes [22].

A nationwide survey in the form of IL self-evaluation at state-run universities in the Czech Republic showed that IL level factors were the study program, personal motivation, course completion, and the participants' gender [23]. Many studies showed the

positive impact of IL courses. Especially navigating through information resources and determining their relevance saw a significant improvement [11].

The original study [17], followed by this contribution, found problems in digital and IL and also all MIL components. The worst self-evaluation was in the Evaluation component; the worst objective evaluation was in the Creation component. Students often overestimated their ability to acquire information and IT competencies. The study proved suitability to educate in traditional topics (e.g., library services) and the positive impact of massive general online IL courses, which should be followed by smaller practical, individualized lessons in the library.

3 Methodology

The present paper aimed to describe the IL of students of private Ambis University and compare it with the original study based on the MU [17]. Both studies focused on the students' level of IL and detecting improvements after completing a semester IL course. Questioning the presumption of generally low IL levels at Czech private universities, the outcomes will help develop IL courses. Because of limitations at the two universities, we do not want to generalize our results.

There were several similarities and differences in compared environments. IL courses at both schools were designed primarily for first-year students. They focused on the competencies defined in the MIL [1] and the ACRL standards [2]. The courses were comparable in their content and form, exploiting the potential of e-learning, both lasting for 12 weeks (one semester).

We perceive the fundamental difference in the status of the schools – a large state-maintained Masaryk University (MU) and private university Ambis. The IL course run at MU took place purely online, and it was optional for all students. At Ambis University, the course was taught to all undergraduates as a compulsory subject by all departments. The Ambis course had the form of blended learning. Having attended a four-hour lecture and a two-hour seminar, students continued online using six e-learning modules and six compulsory tests, finishing the course with a face-to-face written test. To assess the effectiveness of both courses, we conducted self- and objective evaluation before and after course surveys.

We formulated the following four hypotheses:

- There is a relationship between self-evaluation and objective evaluation before IL course completion at Ambis University.
- Ambis students raised their IL level significantly after completing the IL course.
- The entry IL level was higher at MU than at Ambis University.
- Ambis students raised their IL level more than MU students after their course.

We replicated the original MU's research design [17] at the Ambis University in the 2019 winter semester. Both studies used a self-evaluation questionnaire and pretest and posttest for objective evaluation. Both evaluation types covered twelve topics covering all items of the MIL framework [1]: defining the topic, the Internet as a source of information, databases, information resources and information retrieval (Access in

MIL); organization of information, evaluating resources and information, effective reading (Evaluation); text creation, formal text processing, visualization, presentation and publishing, sharing and collaboration (Creation). We examined each topic using one five-point Likert scale question for self-evaluation and two multiple-choice test questions with one correct answer and three distractors in each data collection phase. In the Ambis study, we modified several questions to reflect slightly different course content, while the competence set remained the same. The Ambis study left out the possibility of “I do not know.” in the pretest. Another methodology difference was using the test as pretest and posttest. It was the same as the original pretest; in the original study, questions were applied to the different text in each test version.

We administered online questionnaires to all eligible students enrolled in the IL course at the time of data collection. The questionnaires (covered both self- and objective evaluation questions) were completed by 1163, respectively, 580 Ambis students (compared to 1287/602 MU students in the 2016 and 2017 autumn semesters).

4 Results

42% of male and 58% of female students composed the set of respondents (including all test-takers). Unlike the MU research, only undergraduates participated in the survey, but they represented all three Ambis University departments – security and law (52.4%), economics and management (39.9%) and regional development (7.7%).

As in the original research, students self-assessed their competencies quite similarly in all three components (see Fig. 1). We found both the best (searching on the Internet) and the worst (searching in databases) self-evaluated topics in the access component of MIL. The second worst self-evaluated issue was creating text. All the other problems had almost the same self-evaluation (between “rather satisfied” and “something between”, closer to the lower point of satisfaction).

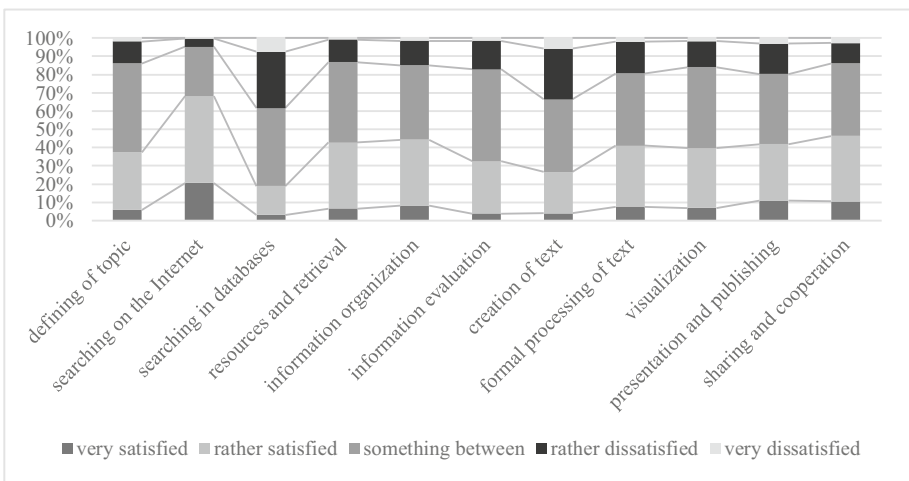


Fig. 1. Self-evaluation before the course

We found the correlation (Spearman's rho) between self-assessment and objective assessment before the course only in two thematic areas and in both weak and negative – visualization ($\rho = -.085$, sig. at the 0.01 level) and presentation ($\rho = -.067$, sig. at the 0.05 level). The result refuted our first hypothesis. Testing the correlation between self- and objective evaluation after completing the course rested on the assumption of increased awareness of the topic area and students' knowledge. However, no correlation appeared. Despite this, there was a slight improvement in self-evaluation after the course completion (still mostly between “rather satisfied” and “something in-between” but closer to a higher level of satisfaction for almost all items). Again, students scored the lowest on database searches and text creation, but these topics gained the highest improvement in self-assessment, followed by information evaluation (all three topics improved more than half a point).

Because of the limited relationship between self-assessment and objective assessment, we focused more on identified problems in competencies by test questions. In contrast to MU, we detected small differences between pretest and posttest results at Ambis University (see Table 1). The t-test, nevertheless, indicated that they were large enough to be statistically significant ($t = 6.556$, $df = 481$, $p = 0.000$). There was some improvement, though. In the pretest, 60.3% of students got 12 or fewer points (half of the answers correct), compared to 38.3% in the posttest.

However, a closer look at the examined competence revealed a less optimistic picture (see Table 2). The average scores for pretest items showed IL gaps of Ambis students. We found the lowest values for topics: narrowing the topic, self-presentation, graphs and argumentation. But fourteen items scored less than half a point. Backing-up, visualization and suitability of resources lay at the opposite end of the scale. Posttest showed some (but not all) similar topics. The lowest values were for self-presentation, search engines, argumentation, databases and graphs. After finishing the IL course, the presumed improvement proved problematic as the results are even worse in seven areas.

Table 2 included a comparison with MU. Students at Ambis got significantly better results in fifteen questions of the pretest compared to five questions where students of MU were better. But if we looked at the improvement after the course (points in posttest minus in pretest), MU students shifted their knowledge level more in all questions (only for one question is this result not statistically significant). We found the highest differences (>0.5 points) for self-presentation, search engines and databases. Thus, we refuted both the third and the fourth hypotheses.

We tested differences in data from Ambis according to gender (t-test) and study department (ANOVA test). Men had better pretest results ($p = .002$), but women had higher improvement ($p = .004$), and there was no statistical difference in the posttest. When we focused on topics, women were better only in sharing in the pretest and improved more in referencing. Men got better results in six issues in the pretest (access to full text, tagging of information, evaluation of resources, referencing, terms and services, and social networks). Still, they did not improve statistically in any topic. We found no difference in the pretest and only one difference in improvement according to the department (a form of text where department of security and law got the best results and the department of economy and management got the worst results).

Table 1. Pretest and posttest descriptive statistics

	Pretest score	Posttest score
Valid resp.	1163	580
Missing resp.	98	681
Mean	11.80	13.1621
Median	12	13
Mode	12	14
Std. deviation	2.822	3.14716
Skewness	-.100	-.645
Std. error of skewness	.072	.101
Kurtosis	.470	1.218
Std. error of kurtosis	.143	.203
Minimum	1	0
Maximum	22	21

5 Discussion

A survey carried out at Ambis University yielded different outcomes from those produced at MU. The current state of IL at privately-run higher education institutions in the Czech Republic is unknown, either in its research or school practice (for instance, implementation of IL courses, integration into strategic plans). Except for Ambis University, represented by the co-author of this article, private schools are not members of the professional commission Information education and IL, Association of University Libraries of the Czech Republic. Not being mapped by research, the situation of private universities is reflected only in unsubstantiated assumptions. Their comparison with actual data on students' IL is also the goal of the present study.

Previous MU research identified a correlation between self- and objective evaluation [17]. However, Ambis University's survey did not confirm the same, either before or after the IL course. The pretest revealed considerable closeness of self-evaluation in individual areas, except for searching information on the Internet and databases, that is, the skill that students can assess without in-depth knowledge. While students searched on the Internet daily, professional databases are often a novelty, especially to first-year students who have little idea of how they work and why they are worth utilizing. Other competence categories, in their complexity, seem to be more difficult for students to evaluate. Reacting primarily to the name of the given topic area, the respondents assume that they have demonstrated the respective skill before. But since the university expects more of them, they have to take a compulsory course in IL. Hence, they place their responses in the middle of the self-evaluation scale, not differentiating between various themes too much. Students' self-evaluation in the respective schools varies according to how it is affected by prior knowledge and skills, objective evaluation showing differences favouring Ambis

Table 2. Students' average points in different topics (* sig. <0.05, ** sig. <0.01).

Competence	Ambis			Difference (MU-Ambis by Mann-Whitney test)	
	Pretest	Post-test	Difference of means (t-test)	Pretest	Improvement
Keywords	0.42	0.34	-0.08**	0.04*	0.39**
Narrowing the topic	0.08	0.34	0.26**	0.11**	0.20**
Search engines	0.59	0.21	-0.38**	-0.09**	0.55**
Search query	0.40	0.48	0.05	-0.07**	0.05
Databases	0.35	0.27	-0.12**	-0.07**	0.54**
Full text access	0.73	0.88	0.16**	-0.45**	0.32**
Suitability of resource	0.83	0.91	0.05*	-0.10**	0.13**
Library services	0.61	0.76	0.13**	-0.48**	0.44**
Backing-up	0.95	0.97	0.00	-0.41**	0.34**
Tagging of information	0.35	0.38	-0.01	-0.02	0.35**
Evaluation of resources	0.38	0.45	0.09**	0.09**	0.30**
Argumentation	0.28	0.24	-0.05	0.01	0.34**
Effective reading	0.49	0.55	0.05	-0.04	0.34**
Orientation in document	0.60	0.73	0.11**	-0.02	0.17**
Type of text	0.31	0.42	0.12**	-0.09**	0.09*
Quotations	0.56	0.74	0.15**	-0.09**	0.10**
Text creation	0.45	0.46	-0.01	-0.18**	0.29**
Referencing	0.45	0.59	0.13**	0.10**	0.22**
Graphs	0.25	0.27	0.01	0.10**	0.35**
Visualization	0.87	0.94	0.04*	-0.70**	0.35**
Sharing	0.55	0.75	0.18**	-0.36**	0.46**
Self-presentation	0.21	0.18	-0.05*	-0.08**	0.60**
Terms and services	0.36	0.56	0.15**	-0.09**	0.40**
Social networks	0.73	0.74	0.00	-0.09**	0.19**

students. These considerations set the direction for any follow-up qualitative research on their IL needs.

Compared to MU students, Ambis undergraduates achieved better outcomes in many pretest items. This difference may be because approximately half of Ambis University students take up their studies after several years of work experience, acquiring some practical IL competencies. Both courses and tests focused on practical skills rather than mere theoretical knowledge. Some research suggests that students drawing on their prior experience have a competitive advantage even before classroom instruction begins [5].

We taught both courses as massive online courses. That projected into them the advantages and disadvantages associated with the use of this educational environment, like the rare application of collaborative and interactive activities. Despite that, the results showed that massive online courses are a promising approach for developing IL skills, according to other research [9].

Having completed the course, Ambis students raised their level of IL only slightly compared to MU. It might be a consequence of the format of the educational process. A substantial part of the course took place in the massive online course platform designed for hundreds of primarily first-year students who had not yet developed the study habits necessary for efficient e-learning [9]. Compared to that, the MU course included fewer students and students of all degrees. Another limiting factor was the lack of tutors, a single teacher in charge of all the communication. It weakened the provision of relevant feedback during the course, which negatively affected the understanding of the subject matter [16]. Even IL courses implemented via blended learning mode are reaching their limits, mainly due to the massification of higher education. That collides with the opposite direction of its personalization, the path that ICT-mediated education should take, not just relying on thousands-of-students' responsible approach [20]. Blended learning proved to be more effective than traditional e-learning [18]; however, mass tertiary education requires tools to improve feedback and communication.

The course format affected the perception of its content. At MU, the IL course was optional, with fewer students compared to Ambis University. The compulsory/optional difference was one of the research limits. Students choose an optional course when they are generally interested in the issue (here IL). Moreover, Ambis tutors provided the learners with weekly individual feedback on their assignments. Due to their large number, tutors did not assign Ambis course participants tasks requiring the teacher's correction. All six obligatory tests performed throughout the semester were assessed automatically by the information system, without students knowing where there were gaps in their knowledge that they should close. Students who possess a certain pre-understanding of the subject had to attend the compulsory Ambis IL course. The lecturer faced a tricky task to convince them how beneficial the training was to them personally. The above drawbacks affected the students' motivation to develop their IL skills further, the respective role of motivation confirmed by research [23].

Compared to MU, the knowledge improvement of Ambis University students was insignificant. The results could also be influenced by the fact that MU students, unlike Ambis ones, had an "I don't know" option in the pretest. When the latter students did not know the answer, they guessed, that is, chose the option that seemed most likely to be correct. That could affect the pretest outcomes and thus the overall rate of improvement.

Another potentially influential factor was the attitude of the participants. The study efforts of some private university students are not driven by a long-term vision of the future practical application of acquired skills and knowledge but rather by a short-term pragmatic goal of passing exams and finishing their studies [5]. Since the posttest was not part of the exam, they used only the least possible effort to pass it.

6 Conclusion

The present paper examined the IL level at a public and a private university in the Czech Republic. It compared the respective participants' self-evaluation, input knowledge, and IL skills improvement. In terms of content and form, the courses were similar. Some format differences, however, might significantly affect students' competencies.

The research focused on whether the results of private Ambis University students would indicate the same significant post-course improvement as that of MU students. Despite having had a higher entry-level of IL, Ambis students' competence progress after the IL course was tiny compared to MU course graduates. The underlying reason is the excessive massification of higher education and the subsequent reduced student-teacher interactions and insufficient feedback from the tutor to each student. Because of the massive increase in student enrolment and weak feedback, even a well-designed IL training course seems to be just one of many compulsory curriculum subjects to complete, the substantial reduction of skills and knowledge deficits being of secondary importance.

The results of the research led Ambis University to improve the content and form of the course. More tutors were involved, and they set up more frequent communication with students. We are going to conduct further comparison in the coming year.

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What Accounts for Estonian Student Science Literacy PISA Prowess?

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Abstract. Consistent performance by Estonian students ranking among the world's best and, most recently, in first position among European countries in all three PISA assessment domains has sparked widespread interest as to the reasons for this. We review the literature especially with respect to science literacy and compare those findings to the reasons that twelve expert Estonian science educators offer. These educators' views largely match the explanations in the literature, but the experts suggested an important factor is the extensive instructional support systems and the strong value that teachers, students, and Estonian society generally have traditionally put on education. While Estonia's PISA ranking is impressive, the country's continuing integration into Europe with the values and attitudes common to other OECD countries may dilute the attributes that have propelled Estonia's education system and its students to this lofty status on the PISA.

Keywords: Science teachers · Science literacy · Estonian education · PISA

1 Introduction

The impressive results that Estonian students have attained on the PISA, the triennial international evaluation of 15-year-old student skills and knowledge, has focused international attention on Estonian education. In the most recent PISA, conducted in 2018, Estonia's students ranked first in all three domains of literacy, reading, mathematics and science, among all participating European countries, and among the top ten of all participating countries worldwide (Table 1). PISA, is the acronym for the Programme for International Student Assessment, which the Organisation for Economic Co-operation and Development conducts for OECD members and non-member countries. The assessment focuses on knowledge and skills applicable to tasks relevant to student lives, rather than on rote memorization of subject knowledge [1].

Estonia has participated in the PISA since 2006. Its earlier rankings were strong but on nearly each iteration it has climbed higher in the European rankings. The latest results are a source of pride for Estonia's students, educators, and this small nation as a whole. These results have spurred interest from educators and the public as to what accounts for this performance and whether there are aspects of the Estonian education system that can be successfully transferred elsewhere and produce similar outcomes. What makes

Estonia’s results particularly intriguing is that the country spends 30% less on education than the average for other OECD countries [2].

Table 1. Estonian student PISA rankings compared to all participant countries and European participants (Source: [3])

PISA domain	2006		2009		2012		2015		2018	
	All	Europe	All	Europe	All	Europe	All	Europe	All	Europe
Science	5	2	9	2	6	2	3	1	4	1
Mathematics	14	6	17	7	11	4	9	2	8	1
Reading	13	8	13	5	11	4	6	3	5	1

Estonia’s consistently outstanding performance on PISA for the last decade and a half has been explored in popular media, in professional publications, and academic journals [4–8]. For example, a BBC program about the most recent PISA results posed the question, “Why do Estonian pupils shine in global tests?” [9].

There is much about Estonia which makes this performance especially perplexing given the country’s tumultuous history and the inevitable impact that it had on the education system along with every other aspect of society. Throughout the 20th century the Estonian nation was buffeted by wars, revolutions, Sovietization, and forced population movements. The country first gained its independence from Russia in 1918. The Soviet Army occupied Estonia in 1940, after which it was annexed as a USSR republic. Estonia regained its independence in 1991, months before the collapse of the Soviet Union. Today, Estonia is a small democratic country with a population of approximately 1.3 million and is well integrated into the international community being a party to 181 international organizations including the European Union and the North Atlantic Treaty Organization [10].

Estonia’s educators have sought to build ties internationally. Cooperation with their northern neighbor Finland has been particularly important for science education as it has been for Estonia’s educators in general [8, 11]. Beginning in the mid-1980s, during the Soviet-era Perestroika (restructuring), while Estonia was still a part of the Soviet Union, its educators established cordial and extensive contacts with Finnish educators and their pedagogical institutions. These have continued to deepen for the mutual benefit of education in both countries. The type of ties that Estonia’s science educators first built with Finland now extend throughout the world.

Researchers have identified various factors that explain Estonia’s performance on PISA. Mainly, they have centered on two key elements of education: teachers and curriculum. Marc Tucker, the former president and CEO of the U.S.-based National Center on Education and the Economy suggested that the quality of Estonian education is due to “... a tradition of very high education standards, a very demanding curriculum matched to the standards, high quality examinations built directly on that curriculum, highly educated teachers with master’s degrees from research universities ...” [4]. In a study that compared teacher education among five PISA high-performing countries, the

investigators found that these countries design their teacher training and professional development based on their perceptions of their particular needs and characteristics in order to offer the best education to their students. These high-performing countries put a strong emphasis on teacher training. They all have comprehensive and high-quality university education and mandatory in-service education requirements for teachers which reflect their specific needs, demographics, philosophies, and traditions [12].

Gunda Tire, the PISA national project manager for Estonia, identified the following aspects, important for Estonian student performance: “Schools have access to free digital textbooks and assessment banks” [2 p. 113] and “... teachers have access to in-service courses and training programs free of charge” [2 p. 118].

Tire also points to another critical element that may contribute to Estonia’s PISA standing: the emphasis on ensuring that all students attain the same standards. Estonia has implemented a system that emphasizes equity where all students are treated equally [7]. The education system aims to provide the best education for each child regardless of their background [2 p. 108]. This obviously poses challenges because many children still attend small rural schools. Estonian schools are free to separate their students however they see fit, but all students are expected to learn the same material in each grade [13].

While the reasons accounting for the overall performance of Estonian students have attracted considerable attention, their attainment on the science domain has received less scrutiny. This investigation therefore aims to probe why Estonia science education is producing such high results on the PISA. The specific question that it seeks to answer is, how do Estonian science education experts explain the performance of Estonia’s students on the PISA science assessment?

The goal of the PISA science assessment is to evaluate the level of the 15-year-old students’ science literacy skills rather than their knowledge of factual information [14, p. 23]. The Information Literacy User’s Guide defines science literacy as, “being well versed in all matters pertaining to basic science and scientific laws, to the extent that one is able to make sound decisions concerning their wellbeing and the wellbeing of their families, communities, and society as a whole” [15 p. 122]. These skills form the irreplaceable base necessary for individuals to lead fulfilling lives and for their society to meet the challenges of the ever-changing world.

2 Methods

This investigation queried twelve prominent Estonian science educators to learn their views on the factors that account for Estonian student performance on the PISA science domain. All the selected experts have strong publication records on didactics or have authored methodological material. They are well-known and respected within the community of Estonian science teachers. The experts were selected based on knowledge of the authors who are themselves science educators and through informal consultations they had with their colleagues at the country’s educational institutions. In order to obtain information from the range of science education, experts were selected based on the science field which has been the main area of their attention; three experts each from

biology, chemistry, geography, and physics.¹ Most of these experts have taught in public schools, and many have lectured at Estonia's universities on science pedagogy. Two experts are mid-career, the others are senior educators, who either have retired or expect to do so within a few years.

While these experts have spent their entire careers involved in education in Estonia, their experience and reputations extend beyond the country's borders. All have participated in conferences and other collaborative activities internationally.

The authors collected information from the experts by means of a brief open-ended interview. Due to Covid-related restrictions, the interviews were conducted by telephone in 2020 and early 2021. The respondents were not informed of the specific topic or questions in advance. When they were initially contacted, they were asked to consent to an interview about science education in Estonia for a study in which their participation and responses would be treated as confidential and anonymous.

All experts were asked the same questions in the same order: (1) In your opinion, what are the reasons for the strong performance of Estonian students on the PISA science assessment? (2) How does the way that you teach your subject account for student performance on the PISA? (3) What are the important traditions that shape science education in Estonia?

One investigator conducted all interviews in the Estonian language which is the vernacular of the experts and the investigators. The interviews lasted between 40 and 90 min with 60 min the average. In addition to the three science education questions, the investigator used the interview to ask about other subjects that are not included in this study.

The responses were captured by handwritten notes during the interview. The investigator repeated the responses back to the expert in order to ensure that they were accurate. If necessary, questions were repeated or rephrased in order to clarify responses. In some cases, the investigator conducted follow-up telephonic interviews to seek further clarification or elaboration. The responses were then entered into a spreadsheet. No audio recordings of the interviews were made.

The two investigators then independently coded the responses and grouped them into thematic categories based on their experience as educators. They then compared their results, discussed their coding decisions and their thematic categories. They produced English-language translations of response phrases in a manner that conveys the meaning and nuance of the responses without being verbatim.

Their analysis identified three theme categories: Characteristics of teachers and the instructional process; Characteristics of systems supporting instruction; and Curriculum attributes. The responses that the experts provided were then compared to the information in the literature concerning the factors that account for high-performance on the PISA science assessment by Estonia's students and others. Literature sources were searched using the multidisciplinary platform Web of Science and the database of the Research Library of Tallinn University, as well search engine Google.

¹ Geography as a subject in Estonian education includes geology, physical geography, and human geography.

3 Results and Discussion

In their responses, the experts emphasized the strong subject knowledge of Estonia's science teachers. They also pointed to the value of the instructional support that is now available to educators nation-wide, such as in-service training, digital resources, adequate supplies of laboratory equipment at schools, and the network of environmental educational centers. Most experts cited the essential role of teachers' official and informal gatherings and the associated networks of peers that result. Several praised the opportunities science educators have for productive collaboration to refine the national curriculum. Table 2 presents the expert responses grouped into thematic categories.

Table 2. What accounts for Estonian student performance on the PISA science assessment? Responses of twelve Estonian expert science educators categorized by theme

Theme category	Expert responses	Number of experts offering this response
Teachers and instructional process	<ul style="list-style-type: none"> Lessons are serious and systematic. (Some experts noted the importance of lessons being interesting without being “playful”.) 	7
	<ul style="list-style-type: none"> Teachers have strong subject knowledge and are committed to students mastering their subject 	5
	<ul style="list-style-type: none"> Teachers are enthusiastic about innovations introduced since Estonia regained its independence in 1991 and they are eager to embrace them 	4
	<ul style="list-style-type: none"> Teachers guide students to take tests seriously, including PISA 	3
	<ul style="list-style-type: none"> Lessons are diverse using instructional aids such as illustrations, visualizations, and computer simulations 	2
	<ul style="list-style-type: none"> Teachers are Internet and computer proficient 	1
	<ul style="list-style-type: none"> Teachers recognize the importance of independent work by students and structure their lessons around it 	1

(continued)

Table 2. (continued)

Theme category	Expert responses	Number of experts offering this response
	<ul style="list-style-type: none"> • Teachers organize experiments and practical work 	1
	<ul style="list-style-type: none"> • Lessons are based on traditional pedagogical approaches with control and feedback 	1
	<ul style="list-style-type: none"> • Lessons guide students to pursue higher learning objectives [Bloom’s taxonomy] 	1
Instructional support	<ul style="list-style-type: none"> • In-service teacher training is routine. (Some experts described this as the venue for teachers to analyze their work and where a sense of community among subject teachers is promoted.) 	8
	<ul style="list-style-type: none"> • High-quality teacher education 	7
	<ul style="list-style-type: none"> • Teachers meet at both official subject sections and their informal organizations where they share experiences and best practices, and mentor junior colleagues 	5
	<ul style="list-style-type: none"> • Teachers receive support from their subject official sections and informal organizations 	3
	<ul style="list-style-type: none"> • Teachers cooperate with university-based pedagogical centers 	3
	<ul style="list-style-type: none"> • Extracurricular partners support inquiry-based instruction (universities, municipalities, civil society organizations) 	2
	<ul style="list-style-type: none"> • Environmental education is well funded 	2

(continued)

Table 2. (continued)

Theme category	Expert responses	Number of experts offering this response
	<ul style="list-style-type: none"> • Long-standing national commitment to nature and environmental education 	1
	<ul style="list-style-type: none"> • Country-wide network of natural environment education centers offers opportunities for class study visits 	1
	<ul style="list-style-type: none"> • Frequent student research conferences 	1
	<ul style="list-style-type: none"> • Tradition of “Olympiads,” student science competitions 	1
	<ul style="list-style-type: none"> • Schools are well equipped to conduct practical lessons 	1
	<ul style="list-style-type: none"> • Schools have had access to up-to-date information technology equipment and the Internet since 1990s (<i>Tiigrühüpe</i>) 	1
Curriculum	<ul style="list-style-type: none"> • National curriculum is continuously updated 	4
	<ul style="list-style-type: none"> • Grades 4–9 have sufficient emphasis on science 	1
	<ul style="list-style-type: none"> • National curriculum is good 	1
	<ul style="list-style-type: none"> • Science content relates to real world and student lives 	1
	<ul style="list-style-type: none"> • Inquiry-based instruction has been included since mid-1990s 	1

Due to the specifics of the profession, describing the instructional process, the physicists and chemists remarked on the necessity of organizing experiments; the geographers and biologists valued the availability of environmental education centers and the country's long tradition of nature and environmental education. In addition to the responses reflected in Table 2, the availability of publications with theoretical and practical content in the local languages was noted. And while several experts pointed to the society-wide appreciation of the importance and value of education as invaluable, its impact is on educational attainment in general.

3.1 Teachers and the Instructional Process

The experts emphasized the science teachers' deep knowledge of their subjects. They attributed this to the high quality of their university education. Many Estonian science teachers have graduated from research universities. During the Soviet era students preparing to be teachers wrote their thesis on a science matter. Today, prospective science teachers can choose to write their bachelor's thesis on a science topic, subject didactics, or another topic. While they can write their master's thesis on science didactics, they have the option of selecting another education-related topic. The experts called this a worrying change. Through their university education these science teachers-in-training acquire the knowledge and skills which prepare them to offer instruction that blends scientific fact with science literacy. Tucker [4] underscored the relevance of highly educated teachers as did Tire who stated that, "Teachers used to have master's degree equivalent diplomas already in the Soviet times and it seemed only natural that this requirement should remain" [2 p. 105]. Estonian educators at all grade levels are required to have master's degrees. In their study comparing high-performing countries, Tonga et al. found master's degrees as a requirement for teachers is not common for countries in general and suggested that teacher quality might be related to their undergraduate education [12].

The experts expressed concern about the recent reduction in the required number of science courses that prospective science teachers must take during their university studies. This has weakened the long-standing strong emphasis on acquiring science subject knowledge for these educators.

Several of the experts mentioned the enthusiasm and openness to innovation of Estonia's science teachers, and their recognition of the importance of student learning through experiments and practical lessons. Most experts described both teachers and students as taking their science instruction seriously. Lessons are structured to guide students to attain higher learning objectives, skills, and abilities according to Bloom's taxonomy, the widely used hierarchical framework that classifies educational learning objectives [16, 17].

While some experts commented on the willingness to be open to innovations in the classroom, several experts also described Estonian teachers as preferring to have their classes structured on what they described as traditional pedagogical forms with control and feedback. Tire similarly noted this: "[The] Estonian teacher is inclined to follow more traditional, already well-established practices in their everyday work. Altogether 86% of lesson time is spent on teaching and learning. This exemplifies more effective time management than 78% of average in OECD countries." [2 p. 111] However, during this

lesson time, Estonia's science educators are open to using extensive resources accessible through their instructional support system such as visual aids, experiments, computer simulations.

3.2 Instructional Support

The experts emphasized the value of routine in-service training for teachers with respect to acquiring knowledge and refining professional skills but also the importance of these as providing opportunities to build a sense of community. For example, in 2018, Tire found that 98% of Estonia's teachers and 100% of the country's principals attended some sort of professional development activity [2 p. 111].

Teacher in-service training to acquire digital skills has been popular since the mid-1990s when Estonia made a nationwide commitment to bring computers and the Internet to every school in the country. That effort was called the *Tiigrihüpe*, Estonian for "Tiger Leap." Launched in 1996, its goal was to develop and expand the information infrastructure throughout the country, with a particular emphasis on education. While it was seen as an exceedingly ambitious and even unrealistic project when it was first announced, by 2001, all Estonian schools were equipped with computers and connected to the Internet [18].

Another important support for instruction is "Opiq," an "educational environment" which serves as a repository for commercial publishing houses from which they can distribute their educational products. Ministry of Education support for Opiq makes the instructional material free to all educational institutions in the country. Opiq has resources for all primary and secondary levels, in both Estonian and Russian, the country's two languages for educational instruction. Opiq content is fact-checked, copy-edited, and subjected to quality control. Opiq offers more than 300 study packages: textbooks, workbooks, and tests in national curriculum subjects where needed. Opiq material is formatted for all types of Internet-connected devices [19]. This platform was launched in 2016 [20]. While it has been used extensively since then, it became a critically important resource during the COVID-19 pandemic which disrupted education in Estonia as it did elsewhere.

Other instructional support material that the experts mentioned is the Estonian government "e-schoolbag" (*e-koolikott*) [21]. This platform has digital resources not only for basic and secondary education, but also for preschool, vocational education, and non-formal education, covering topics of curricula of different education levels. These instructional materials are also subjected to editing and quality control. All are available in Estonian, and some are also in Russian.

New knowledge and educational materials for Estonian science teachers which were available in the 20th Century via in-service training and publications are today widely, extensively, and efficiently available by the Internet.

Besides the computerization of Estonian schools, the experts pointed to the adequacy of the technical base for practical exercises at schools. Important financial support for this has been coming from the European Union. The experts also praised the network of environmental educational centers. At present, Estonia has 157 officially recognized environmental educational centers which are located throughout the country making them readily accessible to students nationwide. These include nature centers, museums,

and even some private farms that offer to have student visits. These facilities, many which are non-governmental provide valuable support to the national curriculum [22].

The government's Environmental Investment Centre, which is a main sponsor of environmental projects in Estonia, offers support for student's visits to the environmental educational centers [23]. The biology and geography experts pointed to the tradition, dating to the 1940s, of informal environmental education opportunities available at local government-funded nature and hobby centers [24–27].

Several experts mentioned the importance of opportunities for science educators to participate in international conferences. They also noted the availability of subject journals. Estonia has published pedagogical journals in the Estonian language continuously since 1917. The current journal's title is the "Estonian Journal of Education" [28]. Educators also have their own newspaper, *Õpetajate Leht* (Teachers Paper), which has published continuously since 1930 [29].

The experts also pointed to the importance of Estonia's tradition of teacher subject networks. A science teacher network was active in the 1920s and 1930s, led by Johannes Käis, an internationally recognized education innovator [30, 31 p. 34, 32 pp.173–175, 198]. After World War II local governments in Soviet-occupied Estonia established sections for teachers of biology, chemistry, and geography (and other subjects, such as mathematics and history).

Beginning with the Perestroika reforms and continuing to the present, Estonian science teachers have been active in their independent subject-based associations which are separate from the education ministry's local subject sections. These independent associations create networks that connect science teachers nationwide. These teacher groups are registered as non-profit associations and have established a productive presence on the Internet [33–37]. Teachers look to these networks as sources for sharing new knowledge (scientific and instructional), experiences, and lesson material. The role of these independent teacher groups and their contribution to the quality of instruction merits further study.

3.3 Curriculum

Concerning the curriculum, which is standard for the entire country, the experts praised its quality and up-to-date character. They attributed this to it being continuously revised. The national curriculum undergoes a major update approximately every ten years. Some experts mentioned the importance of inquiry-based instruction, which Dostál defines as, "... an activity of a teacher and a pupil that is focused on the development of the knowledge, skills and attitudes based on the active and relatively individual cognition of the reality by the pupil who learns on his/her own how to explore and explores" [38] p. 79]. This has been integral to the Estonia's national curriculum since 1996 [39].

The goal of science education according to Estonian national curriculum is to promote scientific literacy. In addition to the elements that are included in the OECD definition of scientific literacy [14], the Estonian national curriculum directs special attention to identifying environmental problems and the means to solve them, valuing biodiversity, and the elements of sustainable living [40].

4 Conclusions

The responses of these twelve expert educators broadly overlapped with what the reviewed research and analysis have identified as the factors that account for the effectiveness of Estonia's science education system as evidenced by its students' performance on the PISA. With a confluence of factors accounting for this, it can be expected that as Estonia and Estonians continue their integration into the world in a myriad of ways – a process which has been underway most intensively for less than two generations since the country regained its independence – the factors that affect the education systems of the other top-performing countries for good or ill will increasingly also exert their influence on the Estonian education system.

One example of this is what the expert science educators raised about the changes in the university curriculum for future teachers with reduced science courses. This is in part due to non-science interests staking their claims that their academic fields should be recognized as important and given more prominence in studies as students prepare not only for their careers but also to be responsible citizens and well-rounded members of society. One step that could reverse this would be to restore the requirement that the bachelor or master's thesis be in a science field for those preparing to be science teachers.

Other high-performing education systems, such as that of Finland have experienced a trend of declining mean performance across all three PISA domains during their participation in PISA (dating back to 2000) [41 p. 132]. Should this occur for Estonia, the immediate reaction may be one of disappointment among Estonians. But such a decline may have to do not only with aspects of the education system but to the fact that a society's education system is inextricably linked to not only the other elements of its own society and culture but to the links that the society has to the culture, values, trends, and influences that are at large in the world to which the country is connected.

Acknowledgements. We wish to thank the twelve expert science educators who graciously shared their knowledge and ideas in the interviews.

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Navigating Institutional Histories: A Typology for Graduate Researchers to Differentiate Genres and Determine Historical Veracity

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Abstract. While institutional histories are important information resources for researching the history of higher education, the nature of such documents requires thorough examination to establish their authority within the context of graduate research. Often institutionally sponsored, these histories may be biased towards narratives of the administration that commissioned them. Graduate students studying the history of higher education often find a plethora of histories dedicated to a single college or university—but may struggle to determine their historical veracity. They must account for a history’s provenience, vis-à-vis the author or the institution’s intent. An analysis from a large-scale bibliographic project informed the development of a definitional typology that provides a framework to enable graduate researchers to navigate the use of institutional histories in their studies. Using this typology offers graduate students a template by which they can effectively assess an institutional history’s historiographic and historical content.

Keywords: Historiography · Institutional histories · Student learning · Typology

1 Introduction

The *Framework for Information Literacy for Higher Education* emphasizes the authority assigned to information as “a type of influence recognized or exerted within a community” [1]. For graduate students using American college and university institutional histories to investigate the history of higher education, this requires identifying the historiographic value of a given institutional history. This paper presents an effective typology to assist novice researchers in evaluating the relative historiographic veracity of institutional histories.

While institutional histories are important information resources for researching the history of higher education, the nature of such documents requires thorough examination to establish their authority within the context of graduate research. Often institutionally sponsored, these histories may be biased towards narratives of the administration that commissioned them [2]. Graduate students studying the history of higher education often find a plethora of histories dedicated to a single college or university—but struggle to determine their historical veracity. Graduate students must account for a history’s

provenience, vis-à-vis the author's or the institution's intent. The typology presented here provides a framework to enable graduate researchers to navigate the use of institutional histories in their studies.

2 Background

Calls to address information literacy within disciplinary settings are longstanding [3], yet movement to address this educational need has been slow to materialize in higher education. When information literacy is taught in disciplinary settings, it is often addressed as general information practices, such as search techniques or source evaluation, that can be applied in history, chemistry and so forth. Recent work in this area includes explorations into how each of the threshold concepts outlined in the Framework for Information Literacy for Higher Education may be applied in various disciplinary courses [1]: 1. authority is constructed and contextual, 2. information creation as a process, 3. information has value, 4. research as inquiry, 5. scholarship as conversation, and 6. search as strategic exploration [4]. Alternatively, information practices may be shaped by the disciplinary or professional setting in which they are experienced [5]. From this perspective, information literacy educators would need to know the disciplinary information practices used within a discipline, or at least those relevant to the disciplinary course with which they are working.

Information practices associated with disciplines and professions are being identified through research. For example, scholars have investigated information practices in various fields, such as nursing [6], or website design [7]. Another approach to identifying such information practices is to draw from scholarship that explores disciplinary publishing and dissemination practices. Hérubel has examined publishing practices related to journal publishing in history [8], publishing venues of art historians [9], and the delineation of types and purposes of institutional histories [10]. As exemplified in the current project, once identified, publishing practices may be used to design instruction that enables higher education students to understand information practices within their field of study and to best utilize disciplinary information sources when studying within a field [11].

3 Approach and Methods

An examination of publishing practices may shed light on constructions of authority within specific disciplinary communities [11]. An analysis of published institutional histories from a large-scale bibliographic project [10] informed the creation of the typology presented in the paper. The data derived from the bibliographic project provides illustrative examples of different kinds of institutional histories, such as university presses, administrations, private publishers. The identified types of institutional histories are arranged into a hierarchy of historical veracity, and a glossary is presented describing the characteristics of each. Exemplifying how the glossary may be used in a learning context, an exercise is described in which students apply a typology in the examination of select institutional histories in a history of higher education course.

4 Information Literacy and the Study of the History of Higher Education

Graduate students enrolled in a history of higher education course will have to engage with histories about individual colleges and universities. Institutional history may be defined as an historical account or narrative devoted explicitly to a treatment of the entirety of a singular institution, not a constituent part or facet, of an institution. These histories represent a wide spectrum of narratives that purport to cover an institution's life-course, from foundation to the present of year of publication. Often institutional histories offer the graduate student valuable information as well as discussion critical to the institution's evolution and development, including challenges, administration, student life and activities, fiscal conditions, and/or educational programming, curricula, local imperatives. Too often, graduate students find that institutional histories vary in quality, focus, may be incomplete, or offer highly selective coverage, especially, varying in historical methodology and historiography. How may graduate students effectively navigate the plethora of institutional histories in their research into higher education?

General contours and characteristics may be identified related to institutional histories [2, 10]. Upon first impression, many graduate students may view institutional histories as ceremonial artifacts, goodwill gestures dedicated to a celebratory narrative conveying the most positive approach to an institution's history. Institutional histories may emphasize the institution's humble origins, early foundational struggles, key features of successful achievements, while emphasizing key figures in its evolution. Often the narrative weaves a story that focuses firmly on the highlights and salient features that throw into relief a respective institution's most interesting aspects, including sports, student life, architectural uniqueness, campus changes, and especially administrative achievements and triumphs. Rarely do they focus on ignominy or episodes that project a mediocre light.

Institutional histories, especially as historical artifacts, present many challenges for graduate students researching an institution. To support their historical research, it is critical for them to ascertain the veracity of these documents as secondary and primary sources for historical research, especially if institutional histories are used for foundational purposes in analysis. For reputability, graduate students need to be able to ascertain institutional histories as verifiable historiographic tools.

5 Hierarchy of Institutional Histories

Institutional histories conform to bibliographic and intellectual characteristics that are identifiable and open to verification vis-à-vis their historical veracity and purpose for which they were written. Among key characteristics are authorial intention, and type of approach to an institution's history and publisher. To grasp authorial intention, it is critical to ascertain who the author is. Is the author affiliated with the institution, a faculty historian, retired administrator, alumnus(ae), or an interested party? If the author is an academic historian, or one with formal training in historical research, the final history will generally reflect concerns for historical veracity, following historical scholarly best

practices and research protocol. An administrator has vested interest in guiding the narrative toward presentation of the institution in the best light. An alumni approach will generally focus on a celebratory narrative, eschewing concerns for historical best practices. Authors who are unaffiliated with a given institution exhibit different reasons for writing an institutional history; they may be academic historians independently pursuing an institution's history, or someone commissioned to write a history for the institution itself.

Approaches to writing an institutional history are typically characteristic of the purpose for which an institution's history is pursued and published. Some histories are written as celebratory works often during centennial, sesquicentennial, etc., commemorations. Some histories are commissioned by the institution's administration to champion the institution's achievements; often these are top down narratives with little regard for historical analysis. Rarely is a disinterested and neutral academic historian writing an institutional history—however, historians affiliated with an institution do write for their administration.

Complementing authorship, 'type of publisher' is instrumental in ascertaining what kind of institutional history the graduate student will encounter. University press, scholarly trade press, private printing, thesis, or dissertation also reflects purpose and veracity of the historical value a given institutional history represents. Graduate students may benefit by recognizing the hierarchy of publications treating institutional histories displayed, such as shown in Fig. 1.

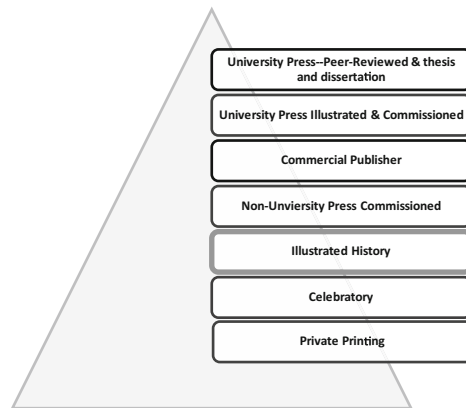


Fig. 1. Hierarchy of historical value [10, adapted]

By using this hierarchy, a graduate student may identify a given history's purpose, intent, and execution that conforms to a graduating hierarchy of historical veracity, and adherence to historical best practice. The highest value is placed at the university press, peer reviewed level, where scholarly apparatus and vetting guarantees a professional standard of historical scholarship. Also, at this level, graduate students will find master's and doctoral dissertations focused on individual institutional histories. Although not considered strictly published, these studies adhere to historical methodologies, techniques, and evaluation reflected in best practices exercised by the professorial committees

charged with graduate training of historians. These histories must conform to the stated protocols propounded by the academic history profession.

Critically differentiating among genres familiarizes graduate students with the complex nature of historical veracity exhibited by institutional histories. Not all genres can attest to strictly demarcated definitions; an institutional history may contain definitional elements from several genres, presenting a multidimensional context. Some institutional histories are not identifiable as pertaining to and acceding to a single genre. For example, a scholarly trade publisher may publish the work of an academic historian author that is grounded in analytical use of primary sources and historiographic explication and methodologies, but accompanied by illustrations and visuals.

6 Definitional Glossary of Types of Institutional Histories

To effectively support their efforts to identify, verify, and successfully navigate institutional histories, a definitional glossary is proposed that will provide a degree of verification with which graduate students pursuing primary resources can categorize and historiographically situate individual institutional histories.

1. **University Press--Peer-Reviewed**—this is the most rigorous in selection and process of vetting for best historical research practice. Often the author is an academic historian, and the work adheres to the vetted use of primary sources available. Additionally, a faculty board typically passes critical assessment and judgment for publication.
2. **University Press Illustrated & Commissioned**—these histories can be commissioned by vested entities, for instance, administrations, or alumni associations. They do pass through a preliminary vetting process for historical accuracy and veracity, yet lack the critical imprimatur invested by a university press although at times are published under auspices of the university press.
3. **Commercial Publisher**—these highly variegated histories can be both historically critical and celebratory. Generally, they adhere to historical research. Some scholarly trade book publishers observe some peer review procedures vis-à-vis these histories.
4. **Non-University Press Commissioned History**—these histories are requested and supported by administrations or boards of trustees, and are narratives propounding an institution's past. Rarely adhering to critically informed historical practice, they may be illustrated, and do not usually present a protracted analytical approach. They offer a strong narrative of triumphs and, are rarely analytically critical.
5. **Illustrated History**—these histories convey visual narratives that can be categorized by celebratory and laudatory perspectives. Rarely do they offer critical analyses but are visually constructed to convey nostalgia and driven by aesthetic considerations, or filiofetism. They are often sumptuous visual accounts with some accompanying textual material. Publishers include university presses [no peer review], scholarly trade presses, and often alumni organizations, administrations, for instance, and rarely privately published.
6. **Celebratory**—these histories often present a narrative that conveys an uncritical view of the institution's past with little regard for strict historical approaches.

They can be commissioned and can originate with alumni associations as well as administrations and are highly illustrated with less primary sources used.

7. **Private Printing**—this category is amorphous, containing a spectrum of publications that are written and produced privately. Their content can be celebratory or critical, but are idiosyncratic and do not adhere to historical peer reviewed best practice. Often, an author has written an institutional history and published it via self-publication. They may contain some primary sources depending upon the tenor of the narrative.

Using the glossary will allow students to answer questions that inform selection of a history or histories to further their research. Such questions may include:

- (1) Who is the author, their background, and relationship to the institution?
- (2) Is there more than one type of history for the target institution?
- (3) What genre of historical approach is used?
- (4) What type of publisher published the account?
- (5) Are there primary sources that are used judiciously and analytically?
- (6) Does the history add to a wider contextualized history of higher learning?

These, and other possible questions frame and contextualize student learning as they navigate institutional histories within the context of how historically useful and valid the documents are to critical historical analysis.

7 Applying the Typology in a History of Higher Education Course

Graduate students in a seminar focused on the historiography of institutional histories use the glossary as they perform examinations of institutional histories individually selected among a pre-determined list of histories. The list, intentionally historical, is a corpus of institutional histories for the years 1780–1990, created from a bibliographic utility [2, 10]. It comprises over 2,803 unique histories of both U.S and Canadian institutions. From this list each graduate student is free to select five histories and read them to discern their respective characteristics (Table 1).

Guided by the following questions, the exercise of reading and identifying characteristics outlined in the definitional glossary for each history permits the student to identify major and minor points that animate each history:

- (1) Who is the author?
- (2) What is the author's intent?
- (3) Are primary sources utilized, such as documents?
- (4) Is the narrative grounded in evaluative best practice historical research procedures?
- (5) Are there illustrations and how are they used?
- (6) Is there an attempt to ground the history in a larger historical context?
- (7) Who is the publisher? Which glossary entry fits the history, and why?
- (8) Is the history grounded in the historiography of previous research on higher education?
- (9) Is the history commissioned, and by whom?

Table 1. Examples of institutional histories

Roger Ebert, ed. <i>An Illini Century: One Hundred Years of Campus Life</i> (Urbana: University of Illinois Press, 1967)
Gilbert Klaperman, <i>The Story of Yeshiva University</i> (Toronto: The Macmillan Company, 1969)
Verne A. Stadtman, <i>The University of California: 1868–1968</i> . (Berkeley: The Regents of the University of California, 1970)
Richard J. Storr, <i>Harper's University: The Beginning</i> (Chicago: University of Chicago Press, 1966)
Herbert F. Taylor, <i>Seventy Years of the Worcester Polytechnic Institute</i> (Worcester, Mass.: Davis Press, Inc., 1937)
Franklin Bowditch Dexter, <i>Sketch of the History of Yale University</i> (New York: H. Holt Dexter, 1887)
C.W. Butterfield, <i>History of the University of Wisconsin from Its First Organization to 1879</i> (Madison: publisher unlisted, 1879)
Harold H. Lentz, <i>A History of Wittenberg College, 1845–1945</i> (Columbus: F.J. Heer Printing Co., 1947)
H.H. Kitzmiller. <i>100 Years of Western Reserve</i> (Hudson, New York: publisher unlisted, 1926)
Richard David Breslin. <i>Villanova: Yesterday and Today</i> (Villanova: Villanova University Press, 1972)

This comparative exercise bridges both historical methodologies as well as frames institutional histories within the historiographic body of knowledge pertaining to the veracity of individual institutional histories. To this end, the definitional typology contributes significantly to students learning to navigate a specific type of information commonly used to study institutional history. A research paper and seminar presentation may then be used to focus further discussion on how institutional histories are conceived, purposed, and follow best practices including the judicious use of primary sources, in ways that are critical to a sound historical examination.

8 Conclusion

The use of institutional histories as primary sources to ground research in higher educational institutional history presupposes a requisite knowledge of what characteristic institutional histories possess, and to their usefulness to sustained historical research. The exercise described in this paper exemplifies how the investigation of disciplinary information practices may inform the development of intellectual and historiographic tools to carry out historical work requiring the ability to ascertain and situate institutional histories along a spectrum. Applicable to other disciplines, this paper highlights a process and benefits of drawing from the study of disciplinary publishing and other disciplinary dissemination practices to inform information literacy efforts in graduate educational settings.

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STEM Information Literacy: A Bibliometric Mapping (1974-2020)

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Abstract. This exploratory paper investigates with bibliometric methods the area of research and practice constituted by information literacy in science, technology, engineering, and mathematics (STEM). Amongst the findings are the most central publication channels, authors, and topics. Academic librarianship and library and information science appear as intellectual bases for this field, although a degree of specialisation (particularly towards the health sciences and engineering) also emerges. The findings are discussed in light of Richard Whitley's sociology of science and Annemaree Lloyd's sociocultural approach to information literacy.

Keywords: STEM information literacy · STEM · Information literacy · Bibliometric mapping · Science mapping · Bibliometrics · Sociology of science · *Bibliometrix*

1 Introduction

More than fifteen years ago, the American Library Association (ALA) published *the Information Literacy Standards for Science and Engineering/Technology* [1]. Since then, diversity in terminology has characterised the epistemic landscapes of the information literacy (IL) research focused on science and technology fields. For instance, Harris [2] has used the expression 'STEM information literacy', that includes the acronym STEM, in other words, science, technology, engineering and mathematics [3]. Quite differently, other authors have coupled the concept of IL with specific science and technology disciplines as in the case of 'engineering information literacy' in the recent systematic literature review by Phillips, Van Epps, Johnson and Zwicky [4] or 'chemical information literacy' in the article by Bawden and Robinson [5]. Moreover, another layer of complexity is added by the emergence of transdisciplinary sciences, for example, sustainability science [6], that also impacts how IL in the context of science and technology is conceptualised, as shown by the research on IL for sustainable development [7].

Recent studies have employed bibliometric methods to analyse the scholarly output of IL research [8, 9]. In the existing literature, however, an overarching mapping of the

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/978-3-030-99885-1_33.

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S. Kurbanoğlu et al. (Eds.): ECIL 2021, CCIS 1533, pp. 385–395, 2022.

https://doi.org/10.1007/978-3-030-99885-1_33

field with the specific disciplinary perspective of the STEM fields is still missing. This exploratory paper is the first attempt to map the IL research from such a perspective. Moreover, recent research by Kaufman, Tenopir, and Christian [10] has pinpointed the importance of IL competencies in the STEM professions and the subsequent need to harmonise IL interventions with the skills that STEM graduates are expected to master in their workplaces. A deeper understanding of the research on IL in the context of STEM would then aid practitioners to align their instructions with these expectations. As IL is a field of research and practice, the aim of the paper will subsequently be a two-fold one: to gain sights on the research on the field, but also to assist IL practitioners, typically librarians, in identifying significant publications channels and research trends. The paper focuses on three aspects of the literature—publication output, authors, and topics, that correspond to the following research questions RQ1–RQ3:

- RQ1. Which are the main publication channels and documents in the field?
- RQ2. Who are its authors?
- RQ3. Which are the major topics?

Bibliometric mapping (or science mapping) is an umbrella term that covers several approaches to data visualisation. The aim is the overview of a literature set through the clustering and the analysis of its documents. In this paper, the clusters are obtained by looking at three different levels: (1) publications, (2) authors, and (3) topics. These research questions will be answered by applying the methods I describe in the following section.

2 Data Sources and Methods

There is no agreement on how to define STEM disciplines [11]. The term ‘STEM’ emerges from a policy context, that offers the opportunity to operationalise the concept [3]. It is noteworthy to recall that the term ‘STEM’ has been used in the educational literature outside the American context from where it originated [12]. The *Classification of Instructional Programs (CIP) Codes* of the U.S. Department of Education was used to establish which disciplinary fields ought to be considered as STEM field and included in STEM policies [13]. The period 1974–2020 was chosen for the present paper since it starts with the year of Zurkowski’s report [14], a well-known milestone for the IL field, and ends with 2020, the last completed year at the time of writing. The documents relevant to the IL field were selected with the search query of the systematic literature review by Phillips and her colleagues [4]. Through this search in the bibliographic database *Web of Science Core Collection* (Clarivate Analytics), 8,683 English-language documents were identified as being of relevance for the IL field. From the *CIP codes*, the metadata information of 40,430,380 documents published in English and relevant for STEM was retrieved from the same database. Due to the large scale of this search, querying the database took place in intermediary steps (the final dataset was downloaded on April 14, 2021). Due to the limited inclusion of books in the index of *Web of Science*, this study only targets journal articles (including reviews) and conference papers to avoid a biased picture that would have included very few books and book chapters as publication

channels. The intersection between the first dataset of IL documents and the second one of STEM documents was obtained by a combined query with the Boolean operator AND.

The bibliographic information of the documents was imported in R statistical environment, and in particular, by using the R package *bibliometrix* [15]. The extensive data cleaning resulted in 6,621 final documents, corresponding to 14,9055 references in their reference lists, 12,224 author-keywords (i.e., not generated algorithmically in the environment of the database) and 14,946 authors. The query is available in Appendix A from the online supplementary material that also includes the complete dataset of the study and the files needed for reconstructing the maps in Figs. 1 and 2. The methods I chose to answer the research questions were the bibliographic coupling network [16], the historical direct citation network [17], and the thematic mapping [18]. Bibliographic coupling is a relation between documents based on the references included in their reference lists: document A is linked to document B because both cite document C [16]. Garfield [18] developed a method for what he named ‘algorithmic historiography’, in other words, the reconstruction of the historical development in a field based on the *direct* citations—a document A cites a document B without any other the intermediary steps. In other words, it focuses on the other additional citing documents that would connect A and B. The last research question, RQ3, was answered through a semantic approach: the thematic map according to [18] and based on the author-keywords and the words included in the titles and abstracts. All words associated with the documents are clustered in a network based on co-occurrence. The more often the keywords occur in the same documents, the closest they are in terms of meaning. Finally, the graphics of Fig. 1–3 were enhanced by using the software *VOSviewer* [19].

3 Results

In this section are presented the findings according to the research questions RQ1–3.

3.1 Publication Channels and Core Documents (RQ1)

Table 1 presents the top sources according to the number of documents. Figure 1 below shows clusters of publication channels based on their similarity according to bibliographic coupling.

All the major publications in the network are well-known journals in library and information science (LIS) such as the *Journal of Documentation*, the *Journal of Academic Librarianship*, *College & Research Libraries*, *Evidence-Based Library and Information Practices*, *Information Research* and *Electronic Library*. Furthermore, the map in Fig. 1 shows publication channels dedicated to the topics of online educational technology and digital libraries, academic librarianship, medical libraries, health information, engineering education, and chemical education.

At the level of documents, it is possible to identify in Fig. 2, below, the network of documents based on bibliographic coupling. The number of bibliographic-coupling ties between documents is graphically rendered in this thermal (or ‘heat’) map by the intensity of the colour. The name of the first author and the year of publication identifies the documents in the network. Among the ‘hot’ documents, several works by Maria

Table 1. Top sources according to the number of documents in the dataset (N = 6,621).

Sources	N. of Documents
Journal of academic librarianship	167
College & research libraries	91
Reference services review	87
Journal of documentation	83
Evidence-based library and information practice	81
Portal-libraries and the academy	81
Electronic library	75
Journal of librarianship and information science	68
Journal of the medical library association	68
Information research	66
Health information and libraries journal	62
Library & information science research	53
Computers & education	50
Library hi tech	50
Library trends	47
Journal of chemical education	44
Journal of the american society for information science and technology	41
Communications in information literacy	40
Worldwide commonalities and challenges in information literacy research and practice	37

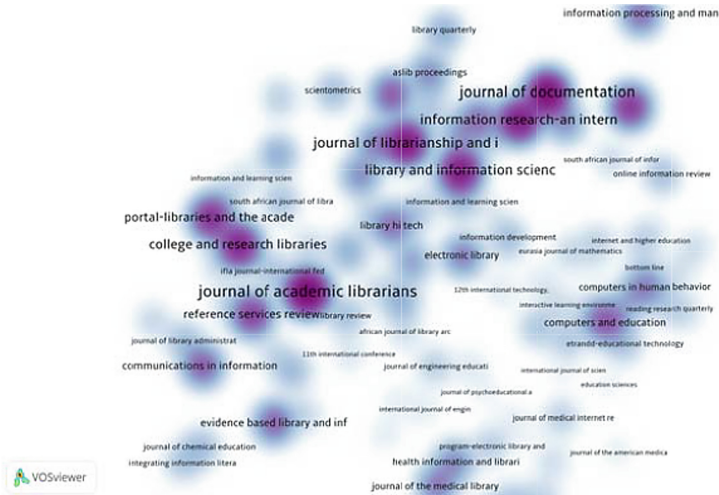


Fig. 1. Map of the core publication channels based on bibliographic-coupling

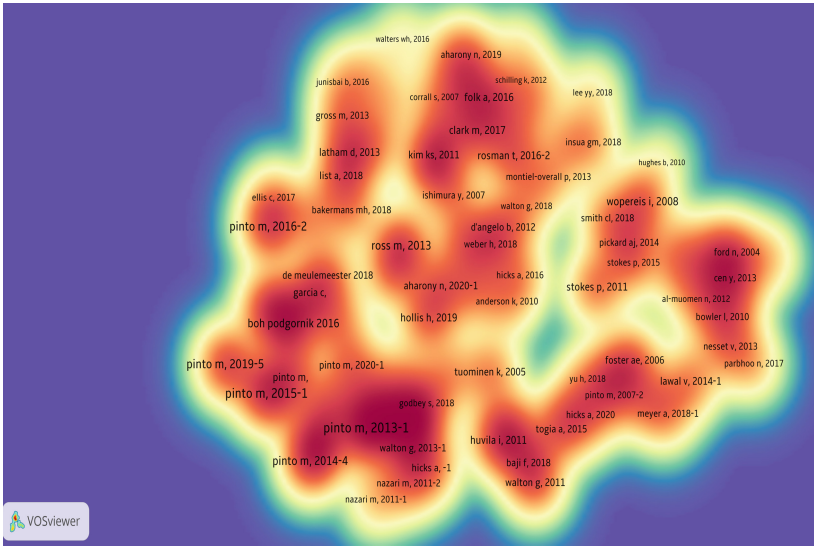


Fig. 2. Bibliographic-Coupling map of the documents

Pinto are recognisable, and the publications by other LIS scholars such as Olof Sundin, Alison Hicks, Geoff Walton, and recent work by Helena Hollis.

Garfield's algorithmic historiography shows that the starting point for the field's growth was the 1999 paper on *Information Literacy in Science and Engineering Undergraduate Education* by Leckie and Fullerton [20]. Core documents of the field concern the self-assessment of IL skills [21–23], the development of an IL test [24], and IL instructions [25], the theoretical distinction between IL and digital literacy [26], problem-solving [27], and the role of motivation in IL [28].

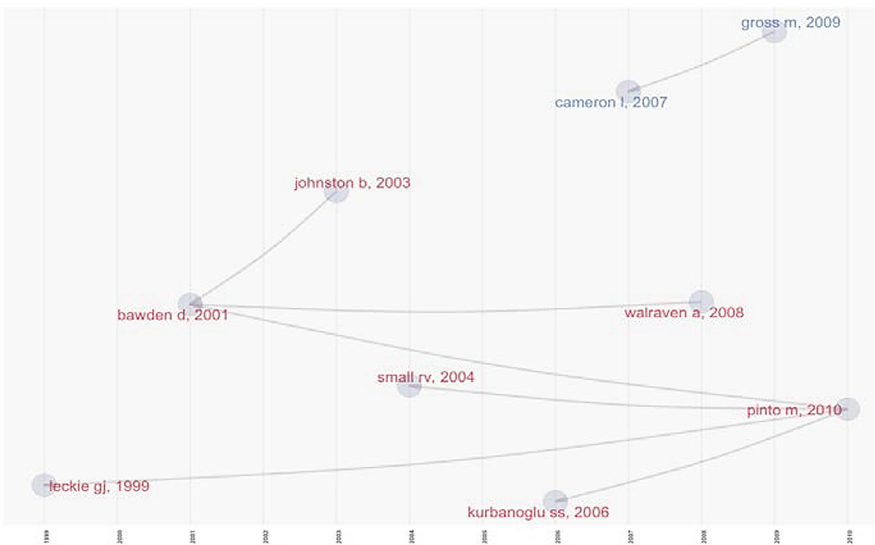


Fig. 3. Historical direct citation network

3.2 Authors (RQ2)

Table 2 ranks the authors according to the citations received from the other documents of the dataset ($N = 6,621$). Names already encountered when exploring the level of documents are met again at the aggregate level of authorship.

Table 2. Top 20 authors, according to local citations, i.e., citations received by documents in the dataset.

Sources	N. of local citations
PINTO M	124
BAWDEN D	72
AKKOYUNLU B	58
KURBANOGLU SS	55
UMAY A	55
TSAI CC	47
TSAI MJ	44
WEBBER S	44
CASEY AM	43
IVANITSKAYA L	43
JOHNSTON B	43
O'BOYLE I	43
FIELDHOUSE M	42
HUNTINGTON P	42
NICHOLAS D	42
ROWLANDS I	42
GROSS M	41
LATHAM D	41
SALES D	40

Figure 4 shows the rank of the authors that have published the most documents in a given year, and their citation received in the whole of *Web of Science Core Collection* in that year. The graph displays (a) the 20 authors with the most documents; (b) the timeline of the number of papers they published per year; and (c) the citations received each year from documents indexed in the whole of *Web of Science Core Collection*. Maria Pinto is the most cited and productive author. When looking at the number of publications and the citations received 'globally' from other papers indexed in *Web of Science*, rather than from other papers included in the dataset of STEM IL, other names appear. The latter authors would seem to attract citations from outside the research community of STEM IL, for example., in the case of Micheal Fosmire, who has authored contributions to engineering IL in the publication channels of engineering education research.

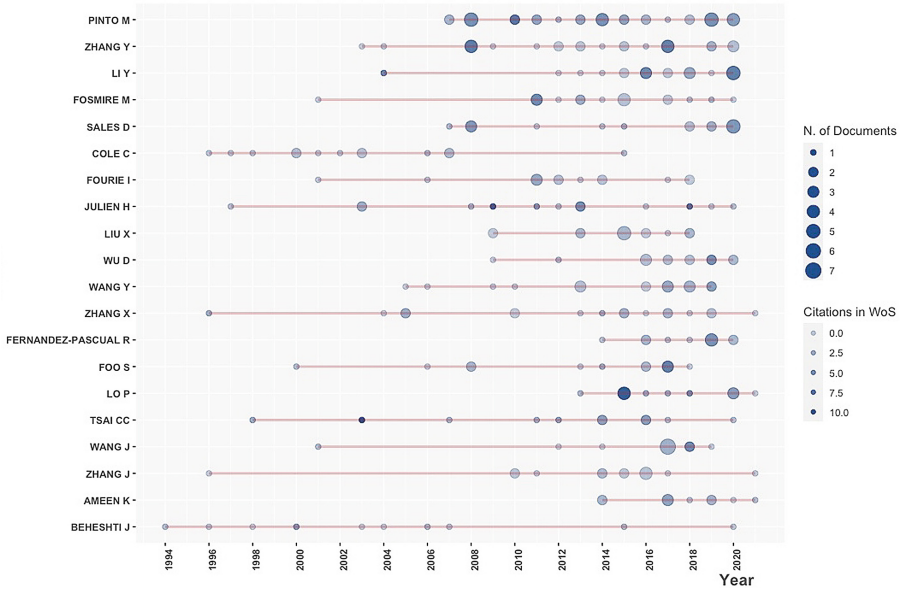


Fig. 4. The most productive authors and the citations they have received in *Web of Science* (WoS) in a given year

3.3 Topics (RQ3)

The thematic map in Fig. 5, below, utilises a co-word analysis based on *Callon's centrality* and *Callon's density* and indicates as 'themes', the terms with the most centrality in clusters of words extracted from titles, abstracts, and author-keywords [29]. No themes are found on the left side, which means that there are no 'niche themes', in other words, clusters with strong internal links (within the cluster itself), but weak external links (between clusters). The lower-left section of the map (corresponding to both weak internal and external links) where emerging or declining themes are expected is also empty.

On the contrary, both right sections display thematic clusters. In the lower-right section, one finds the so-called 'intellectual bases' of the field, the topics on which a literature set lies, historically. Such topics correspond to clusters that are not dense in terms of ties but are highly central. The topics 'school', 'higher education' and 'academic libraries' are among the intellectual bases. In the upper-right section are found the 'motor themes', i.e., those that drive forward the research front. The topics 'health care' and 'lessons learned'—the later recurring in the terminology of the evidence-based practice together with the topic of (systematic) review—are found in the quadrant of the motor themes.

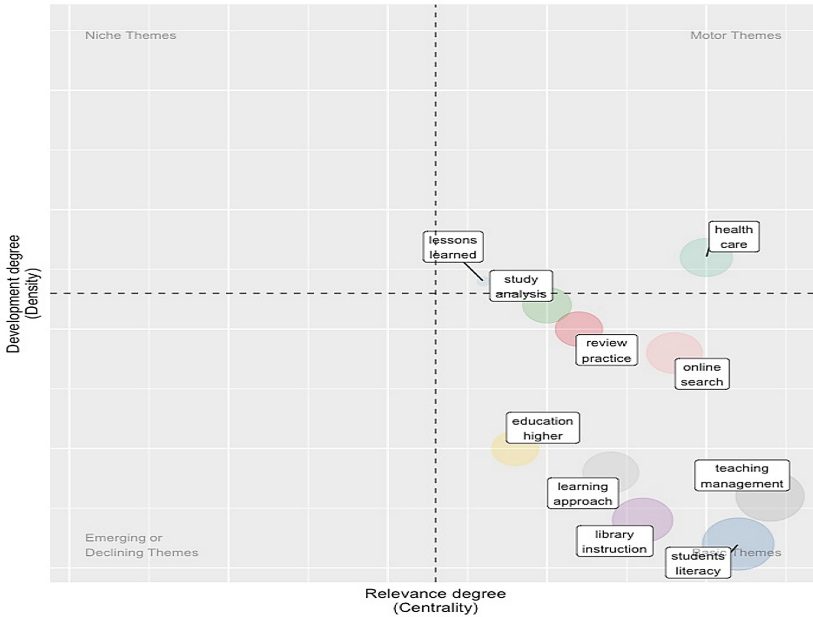


Fig. 5. The thematic map based on author-keywords and words in titles and abstracts

4 Discussion and Conclusions

This study showed that most of the 8,683 documents identified as relevant for IL overlap the dataset of documents identified as relevant for the STEM field. I conducted further analyses of the resulting 6,621 documents (after data cleaning) utilising several bibliometric methods: bibliographic coupling, network analysis based on co-authorship, and a semantic approach, the thematic map. Among the most significant findings are the following: (a) the core publication channels were LIS journals; (b) there was a degree of specialisation towards specific STEM contexts such as the health sciences and engineering; (c) academic librarianship, education (higher education in particular, even if the theme ‘school’ is also represented in the thematic map), digital libraries, and information retrieval are the bases of the field.

To better understand bibliometric data in the broader context of scholarly communication, Leydesdorff [30] has argued for the need to read bibliometric data in light of science-sociological theories, in addition to theories and methods typical for the bibliometrics field. Following Leydesdorff’s line of thought, my findings in the present paper could be read in light of one such theory, Whitley’s [31] organisational approach to the study of scholarly fields. This approach hinges upon the concepts of ‘mutual dependency’ and ‘task uncertainty’. Mutual dependency regards the degree to which researchers depend on each other for mutual recognition of authority. This is seen, for instance, in the degree of agreement on who the key authors or what the most prestigious journals are. Examples of fields with low mutual dependency are the humanities and the social sciences, where it is more common to find different schools of thought

when compared with the natural sciences. Fields with high task uncertainty are those where the authors disagree on which topics and methods should be pursued. Even if Whitley classifies scholarly fields at a higher level than the one of STEM IL, or even of IL, the concepts of mutual dependency and task uncertainty are still valid for putting the findings of this paper into a science-sociological perspective. In fact, mutual dependency and task uncertainty apply to the sciences because the two notions characterise any work organisations based on knowledge labour. Hence, the landscape of STEM IL appears to show high mutual dependency in terms of key authors and journals; both groups are grounded in LIS and core IL research. There is an indication of an additional task uncertainty, besides the one embedded in the IL field, derived from the epistemic landscapes of the STEM disciplines. Hence, task uncertainty for the STEM IL field derives (1) from the different perspectives on IL associated with LIS, including health IL, that has been found among the motor themes; (2) from the library professions (e.g., the presence of the *Journal of the Medical Library* in the map of Fig. 1); and last but not least, (3) from the professional and educational context of the STEM fields, for example, the themes related to evidence-based medicine in Fig. 5.

Another theoretical perspective from the IL field could be useful to frame the paper's findings in the context of the social practices beyond the domain of academic specialities theorised by Whitley [31]. In fact, Lloyd's approach to IL as sociocultural practice [32] helps understand STEM IL in the various educational contexts and better interpret the interplay between core IL research that emerged in the analysis of publication channels and authors and the context of STEM. The sociocultural perspective recently applied to the workplace settings of STEM IL [see, e.g., 33] is a useful theoretical tool to interpret two different tensions that characterise the STEM IL. The first is a centripetal force that organises the field around IL and LIS research. The second one is a centrifuge from this LIS and IL core research towards the STEM fields. Future research could further investigate the task uncertainty that these two tensions generate.

Acknowledgements. I would like to thank my PhD supervisors Assoc. Prof. Björn Hammarfelt and Assoc. Prof. Helena Francke, as well as the Head of Division Christina Johansson and Dr Tahereh Dehdarirad at Chalmers University of Technology, and the three anonymous reviewers for their comments and feedback, that have greatly improved the paper.

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Information Literacy Instruction



An Exploratory Study of the Relationship Between Individual Cognitive Factors and Information Literacy Ability in College Students

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Abstract. To effectively teach information literacy (IL), it is important to understand how an individual's epistemic motivation influences their decision making, learning, and information processing. Epistemic motivation is the desire to think deeply to gain knowledge and understand the world and can be understood from a developmental theoretical framework which suggests that personal epistemic beliefs develop as a student matures from youth to adulthood. Various cognitive dispositions, such as *Need for Cognition*, have been used to assess aspects of epistemic motivation. This research explored the relationships among dimensions of epistemic motivation and their predictive influence on IL ability in a sample of college students. The results showed that *Actively Open-minded Thinking*, *Need for Cognition*, and *Need for Cognitive Closure* all significantly predicted IL scores after controlling for age and gender. This mixed result warrants deeper investigation and may partially be explained by the method and instrument used for measuring IL ability. The results from this study can help librarians enhance their IL instruction by aligning instructional content with characteristics of students' cognitive development. Further, the findings can inform IL instruction that helps students recognize their own epistemological positions and build new understandings as they advance to subsequent stages of cognitive development.

Keywords: Information literacy · Personal epistemic theory · Reflective judgment model · Epistemic motivation

1 Introduction

Information literacy (IL) is a person's set of knowledge and skills related to recognizing and understanding a need for information, knowing where and how to locate information, evaluating information, incorporating it into an existing mental framework, and using information effectively and ethically [1]. Information literacy asks a lot of traditionally aged (18–25) college students. To be fully information literate, students must have a high degree of knowledge about the information ecosystem (where information comes from, how it is produced, in what forms it is presented), an understanding of information systems, their structures and affordances, an awareness of their own purpose or goal

for seeking the information, and knowledge about how to assess the quality, relevance, value, and utility. These are not trivial or routine information processing activities [2]. Rather, the information seeking and use processes that make up information literacy present as ill-structured problems—problems that are non-routine and cannot be solved by following a simple set of rules but rather require consideration of evidence to make a judgment or decision [3].

Individuals are differentially expert at this, that is, students vary in their ability to understand and consider evidence related to their information seeking and use. Developmental models of cognition, such as the reflective judgment model, provide a helpful theoretical framework in which to understand individual student growth and development in their ability to understand and resolve information problems [4, 5]. This is a critical aspect of information literacy instruction that is understudied in the IL literature [6]. Much of the research on IL focuses on the institutional and instructional components of teaching IL, but there is less research on the characteristics of the individual student and how those characteristics contribute to the development of information literacy. Without considering the individual cognitive growth of a student, IL instructors unintentionally may be creating an impossible learning situation for students. Developmental models of epistemic cognition, the underlying assumptions a student holds about knowledge and sources of knowledge, demonstrate that students' judgments about knowledge acquisition and authority change dramatically from adolescence to young adulthood, the age span of traditional college years [3]. The progression of that development begins with a belief that knowledge is absolute and knowable, moving to an awareness that knowledge holds some uncertainty and that personal judgment informs knowledge claims, to a recognition that knowledge claims are relative, constructed, and more or less approximations of reality [7–9]. If we juxtapose that progression of thinking against the information literacy instruction that a typical student might encounter at a university, we may find that the learning outcomes for an IL session are incompatible with a student's developmental stage. For example, consider the threshold concepts of IL as described in the Association for College and Research Libraries Framework for Information Literacy [1]. The Framework advances an understanding of IL based on six frames that describe complex information literacy concepts that must be situated in a particular context to be best understood [10]. Frames such as Authority is Constructed and Contextual and Scholarship as Conversation describe the relative nature of authority and the uncertainty of knowledge claims [1]. Acknowledging this disconnect, Black and Allen write, "...freshman are just beginning to develop the desired metacognitive skills, yet many librarians are expected to assess information literacy as defined in ways that require mature levels of cognitive development [11, p. 223].

The solution, of course, is not to avoid presenting the knowledge complexities inherent in information literacy. But in order to find the most effective ways to provide IL instruction, it is critical to study the relationship between student cognitive development and information literacy mastery to understand how these concepts are associated. The results of such research can be used to design and deliver information literacy instruction with developmentally appropriate instructional strategies that align and enhance students' developmental progression.

2 Theoretical Framework

2.1 Reflective Judgment

This research is based on personal epistemology theory, or an individual's theories and beliefs about their own knowing [12]. Much of the research in this line of inquiry follows a developmental stage approach. The developmental perspective builds on the idea that personal epistemic beliefs develop through advancement of different qualitative stages as an individual moves through their life [7, 13]. Although there are various developmental models presented in past research, they share a similar overall structure characterized by three stages of development: (1) the absolute belief that knowledge is right or wrong; (2) the belief that knowledge is an opinion; and (3) the belief that knowledge is subjective and should be situationally judged for evidence of trustworthiness [13]. One such developmental model is the reflective judgment model [4, 5]. The reflective judgment model is a cognitive processing model that models the development of reflective thinking from late adolescence through early adulthood. Reflective judgments are "initiated when an individual recognizes that there is controversy or doubt about a problem that cannot be answered by formal logic alone, and involve careful consideration of one's beliefs in light of supporting evidence." [3, p. 6]. The model describes a progression of epistemic cognition, that is, knowledge about the fundamental nature of knowledge, and especially the justification and truth of beliefs [8]. The reflective judgment model captures the progression of students' underlying assumptions about knowledge, knowledge sources, and knowledge certainty as they move from youth to adulthood. Developmental models such as this one rest on the idea that individuals construct meaning from their experiences and that the patterns of interpretation that emerge from experiences become more complex over time [3]. One's experiences contribute to a more complex and rich understanding of the environment, which supports growth and development. The reflective judgment model describes seven stages in the development of reflective thinking. The seven stages are grouped into three levels: pre-reflective thinking (1–3); quasi-reflective thinking (4–5); and reflective thinking (6–7). Table 1 describes the seven stages.

In stages one through three, students believe knowledge is absolute and comes from authority figures. They are confident that what they know is correct. Students in stages four and five are more able to accept uncertainty in knowledge, but presume such uncertainty is due to missing information. In these stages students accept that knowledge is subjective, contextual, and constructed and are aware that the knowing process involves using evidence, but rely on evidence to support a previously held belief. Stages 6 and 7 depict reflecting thinking where students recognize the inherent uncertainty in knowledge claims and are able to use evidence to support a reasonable judgment on an ill-structured problem. Knowledge claims, rather than being assessed as right or wrong, can be evaluated based on the context and the consistency of the claim with available information. Students using reflective thinking are aware that new knowledge is constructed and are able to remain open to new interpretations and new conclusions.

Decades of research with thousands of students have validated the model. Research has shown that students move through the reflective judgment stages slowly over time. Students may modulate between two stages, but the general trajectory over time is

Table 1. Reflective judgment model [3].

Level	Stage	Description
Pre-reflective	1	Knowledge exists absolutely and is obtained by direct observation
	2	Knowledge is certain, obtained directly through senses or via authority figures
	3	Knowledge is absolutely certain, or temporarily uncertain
Quasi-reflective	4	Knowledge is uncertain, and specific to situations
	5	Knowledge is contextual and subjective
Reflective thinking	6	Knowledge is constructed into individual conclusions about ill-structured problems, based on a variety of sources
	7	Knowledge is the outcome of a process of reasonable inquiry where solutions to ill-structured problems are constructed

a progression in advancing their reflective thinking. Longitudinal data across a span of high school students through advanced graduate students show a stable, repeated developmental pattern, consistent by age and educational level [3].

2.2 Epistemic Motivation

Epistemic cognition and the reflective judgment model address students' cognition around the nature of knowledge and the nature or process of knowing [12]. This cognitive element focuses on the new knowledge and beliefs that are formed from evidence applied to existing knowledge [14]. But while the cognitive lens accounts for the knowledge and knowing processes, it does not address the motivational mechanisms that drive students toward knowledge development. Epistemic motivation is the willingness to engage in deep thinking to understand the world [15]. It describes a cognitive-motivational process where individuals search for information to engage with to achieve a fuller, more expansive understanding of an experience [16]. Epistemic motivation considers when, to what extent, and for how long, a person will engage in knowledge acquisition processes [17]. Individuals differ in the degree to which they have epistemic motivation. Those with low epistemic motive do not enjoy the effortful processing of information and thus tend to "seize" and "freeze" on information to achieve closure on the information process [14]. At the opposite end of the spectrum, high epistemic motivation drives people to seek out information for deliberation and information processing. People who have higher epistemic motivation are internally stimulated to search for and process larger amounts of information. Conversely, people lower in epistemic motivation do not enjoy effortful thought processes and therefore tend to search for and process less information. Additionally, people with higher epistemic motivation find more value in quality arguments than quantity [15].

Epistemic motivation has been characterized as a stable personality trait, and therefore is not expected to change as an individual moves into adulthood [15]. In previous

studies, epistemic motivation has been conceptualized as the need for cognitive closure, need for cognition, and openness [15, 18].

Need for Cognitive Closure

Need for Cognitive Closure (NFCC) is an individual's need for a definitive answer, though not necessarily the best answer, just as long as resolves the feeling of uncertainty. Arriving at this answer gives the individual closure, which exists on a continuum from a strong need to avoid closure at one end, to the other end where there is a strong need to obtain closure [14, 15, 19, 20]. An individual with a high need for nonspecific closure feels a sense of urgency to terminate the feeling of discomfort associated with not knowing and therefore tends to "seize" on information very early in the search process; then they tend to "freeze" on those results and judgments and become closed-minded to considering new, relevant information on the topic because they wish to avoid reliving those feelings of ambiguity and uncertainty [19–21]. On the other side of this continuum is the need to avoid closure, which results in individuals preferring to keep their options open and do not tend to adopt definite stances on topics.

Need for Cognition

Need for Cognition (NFC) is the amount of effortful thought that an individual pursues and enjoys engaging in [20, 22]. While Need for Cognitive Closure and Need for Cognition are both motivations, they are distinct from one another. The motivation behind NFC is the enjoyable cognitive processing itself, whereas the focus of NFCC is to find a quick end to the discomfort of cognitive processing [15]. This means that individuals who have high NFC tend to intentionally process more information in a more deliberate way and typically appreciate complex issues [15, 20]. Need for cognition is inversely related to NFCC; individuals high in NFCC desire to quickly terminate the feeling of ambiguity that comes with unknown answers, therefore there is less enjoyment in cognitive processing [20, 21].

Openness to Experience

Openness to Experience is one of the Big-Five personality traits and considered stable throughout life, helping to make a person who they are [15]. Openness is responsible for helping individuals form values and attitudes, and how they experience and interact with others on an interpersonal level [23]. People who are high on openness are typically more curious about the world, imaginative, able to adopt novel ways of thinking, and socially progressive [15, 23, 24]. Like NFC and NFCC, openness has been proposed as a form of epistemic motivation [15, 18].

Actively Open-Minded Thinking

Styles of thinking are also individual characteristics that connect with epistemic cognition and motivation. Actively Open-Minded Thinking (AOT) is a thinking style, or thinking disposition, which enables an individual to actively seek out and consider different conclusions or points of view, even if it is not one's initially preferred conclusion [25, 26]. AOT is considered important for two reasons: it is helpful in goal setting and achievement, and it provides an important standard for evaluating the credibility of sources [25, 27]. In AOT, as in information literacy, critical evaluation of sources of

information is imperative for ensuring information is accurate and trustworthy. Those with higher AOT tend to provide more supporting information when they take a stance on a subject and are more reliable in gauging their own knowledge about a topic than those with lower AOT [26].

Epistemic Motivation and Information Literacy

In order to better understand how to develop and teach information literacy, it is important to understand the role individual differences in epistemic motivation and thinking style play as influencers of information processing and learning [14, 18]. Epistemic motivation as a driver of the knowledge acquisition and formation process would appear to be a necessary precondition to developing reflective thinking. Epistemic motivation is the mechanism that propels a student to attend to the world around them and to make meaning from the evidence they take in, developing deeper, richer frameworks through which to understand the world. Students with a greater epistemic motivation will be willing to engage in information seeking longer, will acquire more information to stimulate their learning, and will be more open to new evidence compared with students with low epistemic motive [15, 18]. Given the exploratory nature of this research, we hypothesize only that there will be an association between epistemic motivation and information literacy ability such that more developed epistemic motivation will be associated with greater information literacy ability.

3 Literature Review

Prior theoretical work has done a good job making connections between students' epistemic cognition, motivation and beliefs and information literacy [2, 11, 28–31]. A key point found in each of these papers is that librarians teach information literacy concepts that require epistemological understandings beyond where the student may currently be in their development. As Black and Allen write, "In short, the majority of students entering college are not yet developmentally ready to integrate and apply knowledge in context to the extent desired by professors and librarians [11. p. 222]. This is an essential point instruction librarians must understand. Looking at IL instruction through the theoretical lens of epistemic development should help instruction librarians understand why their work is challenging, and can also offer insight into how instruction can be better designed to meet students where they are.

While such theoretical connections between epistemic cognition and information literacy have been well-established, there is only a very small body of empirical research that explores these connections. Whitmire carried out two qualitative research to study undergraduates' epistemic beliefs and how those beliefs intersected and informed their information search processes [32, 33]. Results from both studies showed a relationship between epistemic development and information seeking behavior such that students with more advanced epistemic beliefs consulted a greater variety of information sources and were better able to evaluate the authority of those sources compared with students at earlier stages of their development. Mokhtari examined whether students' epistemic beliefs would influence their information seeking behavior and found support that students with higher epistemic beliefs reported more advanced information searching behaviors [6].

Following on the research that establishes a connection between epistemic belief and searching behavior, Rosman et al. studied how epistemic beliefs might influence the effectiveness of information literacy instruction [9]. In two different field experiment studies, they found that students in the middle stages of epistemic development who tend to accept multiple viewpoints as equally valid (and are not yet at the stage to be able to fully evaluate the truth levels of information) did not acquire as many information seeking skills after receiving instruction compared with students with more sophisticated beliefs, nor did they acquire as much topic-specific knowledge after receiving instruction. This finding supports the idea that there is value in creating IL instruction appropriate to epistemic development. Building on these theoretical premises and empirical studies, the research reported here examines the relationship between epistemic motivation and information literacy ability.

4 Methods

To explore the research question, an online survey was developed using Qualtrics software and distributed to undergraduate students from a public university in the U.S. enrolled in a basic public speaking course. Students received course points for participating in research studies.

Existing scales were used to measure each of the cognitive constructs. Need for cognitive closure was measured by the brief, 15-item Need for Closure Scale [34]. Participants rate their agreement with each statement, for example “I dislike questions which could be answered in many different ways,” on a 1-to-6-point Likert scale, with 1 being Completely Disagree to 6 being Completely Agree. The scale measures an individual’s motivation related to judgment in information processing.

Need for cognition was measured using the Need for Cognition Scale [35]. The scale contains 18 items and quantitatively measures the tendency for someone to participate in and enjoy thinking. Participants respond to each item by selecting the extent that they agree with each statement using a 5-point Likert scale, with 1 being “extremely uncharacteristic of me” and 5 being “extremely characteristic of me.” A sample statement is, “The idea of relying on thought to make my way to the top appeals to me.”

Openness was measured using the Openness to Experience from the IPIP 5-factor personality model [24]. The scale contains 10 items, for example: “Have a vivid imagination.” Using a five-point scale, participants indicate the accuracy of each statement with 1 being “Very Inaccurate” to 5 being “Very Accurate.”

The Actively Open-Minded Thinking (AOT) Scale (Actively Open-Minded Thinking Beliefs) is comprised of 10 items and measures how an individual thinks in relation to evaluating information that is free of bias from their own previously held beliefs [36]. Participants rate their agreement with each statement on a 1 (Completely Agree) to 6 (Completely Disagree) scale. A sample question is: “People should revise their conclusions in response to relevant new information.”

The TRAILS (Tool for Real-time Assessment of Information Literacy Skills) was used to measure IL ability. TRAILS was initially developed by Kent State University Libraries as a part of its high school outreach program to help gather a basic understanding of students’ IL knowledge [37]. For this project, TRAILS was selected because it

offers different versions based on grade level from 3rd grade, to 6th, 9th, and 12th. The 12th grade information literacy skills test fit the target population of first- and second-year college students. For this project we shortened the freely available General Assessment 1 test from 30 questions to 15 questions, selecting 3 items from the 5 sub-areas of the test. The test measures an individual's IL knowledge in the areas of topic development, identifying potential sources, developing, using, and revising search strategies, evaluating information and its sources, and using information responsibly and ethically. An example question is: "Which of the following is considered an example of plagiarism? (A) Rewriting someone else's words and giving credit; (B) Turning in someone else's paper as your own; (C) Using 'common knowledge' and not giving credit."

5 Results

There were 103 responses in total to the survey instrument, out of which 96 responses were valid. From the valid sample, 30.21% were males, 65.63% were females, 2.08% were "non-binary", 1.04% were "prefer not to say", and 1.04% were "other." The average age was 20.63, with a standard deviation of 5.67. The average college semester credits completed were 30.56, with a standard deviation of 29.23.

For descriptive information of continuous variables and correlation results, see Table 2. We conducted hierarchical regression to identify how need for cognitive closure, need for cognition, openness to experience, and actively open-minded thinking can explain the variance of the IL score. Results suggested that need for closure, need for cognition, and actively open-minded thinking are significantly related to the IL score after adjusting for gender, age, and college credits. Specifically, need for closure ($B = 1.12$, $SE = .38$, $p < .01$) was positively associated with the IL score; need for cognition ($B = 1.12$, $SE = 0.44$, $p < .05$) was positively associated with the IL score; and actively open-minded thinking ($B = 2.02$, $SE = .42$, $p < .001$) was positively associated with the IL score. Furthermore, actively open-minded thinking significantly contributed to 24% variation of the IL score; need for closure significantly contributed to 4% variation of the IL score; need for cognition significantly contributed to 4% variation of the IL score. The overall model explained 32% variation of the IL score. These results support our hypothesis of an association between epistemic motivation and information ability.

We then performed multiple linear regression for each subcategory of TRAILS. Results suggested that need for closure was positively related to "evaluate sources and information" and "use information responsibly, ethically and legally." Need for cognition was positively related to "identify potential sources" and "evaluate sources and information." Actively open-minded thinking was positively related to all subcategories but "develop topic." Openness to experience was not significantly related to any subcategory. In total, though our primary predictors were not significantly associated with "develop topic" they were partially associated with the other four subcategories of TRAILS, see Table 3.

Table 2. Correlation and descriptive information of continuous variables (N = 96).

Variable	Age	College credits	Actively open-minded thinking	Need for closure	Openness to experience	Need for cognition	Information literacy score
Age							
College Credits	0.29**						
Actively Open-minded Thinking	-0.06	0.00					
Need for Closure	-0.10	0.19	0.03				
Openness to Experience	-0.05	0.17	0.39***	0.07			
Need for Cognition	0.26**	0.34***	0.17	-0.15	0.24*		
Information Literacy Score	-0.01	0.19	0.46***	0.31**	0.19	0.26*	
Mean	20.63	39.56	3.70	3.72	38.79	3.15	9.57
SD	5.67	29.23	0.61	0.67	6.29	0.6	2.69

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3. Multiple linear regression results for each subcategory of TRAILS (N = 96)

Variables	Develop topic			Identify potential sources			Develop, use, and revise search strategies			Evaluate sources and information			Use information responsibly, ethically and legally		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
AOMT	0.15	0.16	0.10	0.49	0.15	0.35**	0.50	0.15	0.36**	0.54	0.16	0.35**	0.34	0.13	0.29**
NFC	0.25	0.14	0.19	0.07	0.13	0.06	0.11	0.13	0.09	0.45	0.14	0.32**	0.25	0.11	0.23*
OTE	0.02	0.02	0.16	-.00	0.02	-.00	-.00	0.02	-0.02	-0.03	0.02	-0.22	-0.01	0.01	-0.07
NFCog	0.25	0.17	0.18	0.36	0.25	0.26*	0.01	0.16	0.01	0.39	0.17	0.25*	0.10	0.13	0.09
Adj R ²	0.06			0.18			0.13			0.19			0.13		
F	1.58			3.07**			2.41*			3.19**			2.44*		

* $p < .05$. ** $p < .01$. *** $p < .001$.

Notes: Controlling for age, gender, and college credits.

6 Discussion

Prior theory argues that students’ epistemic cognition, beliefs, and motivations are connected to their ability to master information literacy skills and knowledge. Only a small body of empirical research has set out to test these relationships and the research reported

here makes a contribution to that growing body of knowledge. The study explored how students' epistemic motivation related to their information literacy ability. Several measures of epistemic motivation were used in order to capture the subtle nuances within that construct. The results partially confirm our hypothesis. Consistent with what we expected, need for cognition and actively open-minded thinking were significantly related to the IL score after adjusting for gender, age, and college credits. Student who reported greater comfort with processing complex ideas and seeking out countervailing viewpoints did better on the information literacy test. Contrary to what we expected, students who scored higher on the need for closure instrument also performed better in the IL test, that is, students who reported greater need to seize and freeze when seeking information to reach certainty also scored higher on the IL test compared with students with less need for closure. Further, we also expected openness to experience to predict IL scores and no significant relationship was found.

These mixed results are interesting and suggest the need for further research. Most puzzling is the association of need for closure with increased IL scores. One explanation for this result could be related to the instrument used to measure IL ability. The TRAILS test is a set of multiple-choice questions with one right answer. It is possible that the nature of this type of measurement is preferred by students' whose cognitive motivation is to seize and freeze on the right answer on the test. Rather than capturing students' thought processes, beliefs, or understandings around IL concepts, it measures more discrete, surface-level IL skills. It is possible that the instrument lacks the validity to capture the cognitive processes associated with need for closure and that an alternative method for measuring IL ability would yield different results. Field experiments or collaborations with class instructors where students' IL knowledge and skill could be captured through observation, interview, and/or assessment of scholarly deliverables would provide a much richer and more holistic indicator of IL ability. Alternatively, the Threshold Achievement Test for Information Literacy is a newer standardized test developed to align with the ACRL Framework and may offer researchers a better measure of IL, incorporating both dispositions and knowledge to better capture the complexities of information literacy [38].

7 Limitations

A number of limitations to the design and methods used in this study must be noted. The smaller sample size and the cross-sectional nature of the data collection require a conservative interpretation of the generalizability and directionality of the results. As previously mentioned, the TRAILS instrument may be more useful for librarians as a means to assess students' recall of skills taught in an instruction section than a robust measure of the complexities of information literacy. These limitations can be factored into future research design and build on the early results reported here. More research that explores how students' epistemic cognition may predict, enhance, or even impede their information literacy mastery is needed. With greater understanding of how students' reflective judgment interacts with their IL ability, instruction librarians will be able to develop more targeted instructional strategies that meet students where they are, and also guide them into the next stage of their development.

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“On the Fly”: Collaboration Between Teachers and Teacher Librarians in Inquiry Learning

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Abstract. Education in a post-truth era poses unique challenges for educators supporting youth in developing the critical thinking and information literacy skills needed to navigate an information landscape fraught with fake news, alternative facts, and information overload. Australia faces further issues with a crowded curriculum, funding cuts in education, and underachievement on national and international tests. As trained professionals in information literacy, teacher librarians are in a strong position to guide teachers and students towards achievement of these important information literacy and lifelong learning skills. The purpose of this research was to explore collaboration between Australian teachers and teacher librarians while planning, delivering, and assessing inquiry units supporting information literacy skills. Using a phenomenological case study methodology with six schools, eight teachers and teacher librarians describe their experiences, sometimes “on the fly” as teacher librarian Annie notes, identifying important elements to successful and unsuccessful collaborations including schoolwide culture, time, and relationships.

Keywords: Information literacy · Inquiry learning · Collaboration · School libraries · Teacher librarians

1 Introduction

Education in a post-truth era poses unique challenges for educators supporting youth in learning how to engage with an information landscape fraught with fake news, alternative facts, and information overload. Australia faces further challenges with the underachievement of Australian students in national and international tests [1]; a growing focus on content in syllabi [2]; and increased accountability and “administrivia” for teachers [3]. In their recent curriculum review, the New South Wales Educational Standard Authority carves a path towards reducing the focus on content and moving forward to prioritizing information literacy in all its phases for Australian students [2]. As trained professionals in information literacy, teacher librarians (TLs) are in a strong position to guide teachers and students towards achievement of these skills and lifelong learning. However, collaboration at the highest level [4–6] where teachers and TLs work together on an embedded information literacy program across the school is rarely realized in Australia. Recent

research confirms the essential but elusive nature of collaboration at the international level [7] and in Australia [8].

The purpose of this research was to explore collaboration between Australian teachers and TLs while planning, delivering, and assessing inquiry units supporting information literacy skills. This research sought to address the following questions:

- How do Australian TLs and teachers describe and perceive their shared experiences engaging in an inquiry unit through the planning, delivery, and assessing stages?
- What are common elements of successful and unsuccessful collaborative inquiry units identified by experienced TLs and teachers?

This research uses the lens of Montiel-Overall's four models of collaboration [5] to examine the experiences of our teacher and TL participants in Australia.

2 Literature Review

2.1 The Need for Information Literacy Skills in a Post-truth World

At a time when inquiry-based learning and information skills are now embedded into global curricula [9–14], there has been a corresponding bombardment on social media channels of news that is manufactured and unreliable - false information. Students need to develop skills to find their way through a maze of unreliable material, and there has been a growth in publications helping teachers and TLs to educate students in critical thinking skills in the age of fake news [15]. In an environment of increased information uncertainty, the central traditional role of the TL to support information literacy is not being used enough [16, 17] and/or is being misunderstood [18].

The best way to ensure that students learn the critical thinking skills demanded by the present and the future is through teams of teachers and TLs collaborating to design, present, and assess inquiry units where critical skills are embedded. That collaboration is difficult to achieve at its highest level, because of the misunderstood role of the TL; pressures of time and accountability felt by Australian teachers; and reduced numbers of trained TLs and reduced funding for school libraries across Australia.

2.2 The Misunderstood Role of the Teacher Librarian

TLs in training in Australia are taught that they are three in one – Teacher, information specialist, and leader [19]. Sheerman asserts:

The teacher librarian (TL) holds an important yet rarely understood role in the school community. A TL's primary role is that of an information specialist, trained in the teaching and integration of information literacy skills and inquiry skills across the curriculum, as well as being a library collection manager [19, p. 4].

Sheerman goes on to show that it is through a program of Guided Inquiry [20] at her school that she is able to fully realize the potential of the TL role [19]. When aspiring TLs reach schools, the reality is frequently quite different. There is often no expectation that the TL will be involved in an inquiry learning program at all, and the role is often

delegated to a subsidiary one where, for example, teaching time relief for the classroom teacher (in Australia known as Release from Face to Face or RFF) becomes a main part of the TL role. Reasons for the discrepancy between the TL theory and the actual practice in schools are various, possibly the most pressing being lack of time for teachers to collaborate with TLs at all, or not enough time to set up and maintain collaboration at its highest level [18]. Additionally, there is widespread ignorance amongst teachers and school leaders as to the role of the TL. As Montiel-Overall states:

Almost no information is available about educators’ awareness of the role of librarians as collaborative partners in developing and implementing curriculum...In general, teachers do not appear to be aware of how teachers and librarians are expected to work together nor of the underlying reasons for teacher and librarian collaboration. [21, p. 32].

2.3 Pressures of Time and Accountability for Australian Teachers

Despite the obvious need for the development of critical literacy skills, there has been a paradoxical increase in emphasis on content at the expense of skills in the Australian Curriculum and in the state of New South Wales (NSW) according to the New South Wales Educational Standards Authority (NESA). Many teachers are finding the work of ‘getting through the syllabus’ difficult. Also, the Australian Institute of Teaching and Learning (AITSL) has rigorous accreditation requirements all teachers must meet and maintain, and the process of doing so is very time-consuming. These factors were some of the reasons for the recent NSW Curriculum Review [2]. Key new directions for a re-designed curriculum for this state include “more time for teachers to focus on teaching and learning by reviewing extra-curricular issues and topics, and streamlining compliance-related requirements” [22, p. 13]. The report also concluded that there is too much clutter in most syllabuses, meaning less time to focus on the basics [22, p. 8]. The process of re-designing the NSW curriculum is just beginning, but will roll out over the next decade.

2.4 Reduced Staff and Reduced Funding for School Libraries in Australia

The annual Softlink survey of school libraries and TLs notes considerably reduced funding for school libraries across Australia [23]. The Students Need School Libraries (SNSL) campaign, an advocacy body for school libraries in Australia, notes a steady decrease in TL positions [24]. The mission statement for SNSL reads:

In the face of Australia’s falling ranking in educational outcomes among OECD countries and rapidly changing expectations for the future workforce, a coalition of Australian school library associations formed to advocate nationally for the reinvigoration of school libraries. We believe that all children need excellent school library services delivered by qualified staff to learn the digital and information literacy skills required to succeed in the 21st century [25].

2.5 Potential of Collaboration

Against this background of increased need for the teaching of vital digital literacy skills, the pressing issue of the workload of teachers, and the continuing devaluation of the role

of the TL, collaboration stands out as key to solving the dilemmas of overworked teachers and under-utilized TLs, while advancing the information literacy skills of students in inquiry learning programs. Collaboration has been much studied in the TL literature as it has been a ‘holy grail’ for the best achievement of a school library mission for a long time, yet is difficult to achieve and sustain [5]. A definition of collaboration between teachers and TLs follows:

Collaboration is a trusting, working relationship between two or more equal participants involved in shared thinking, shared planning and shared creation of integrated instruction. Through a shared vision and shared objectives, student learning opportunities are created that integrate subject content and information literacy by co-planning, co-implementing, and co-evaluating students’ progress throughout the instructional process in order to improve student learning in all areas of the curriculum [5, p. 4].

Montiel-Overall [5] posits four models of collaboration, that are derived from Loertscher’s taxonomy [4] and shown below in Table 1. The models are distinguished from each other by the amount and level of collaboration entailed. The highest level at Model D is characterized by full integration of an information literacy curriculum across the school, defined in this study as TLs working with teachers to plan, deliver, and assess inquiry learning units.

The top level collaboration described in Model D appears to be very difficult to achieve in practice. Langford notes that often the relationship between teachers and TLs “is built on the principle of separation, rather than co-creation” [26, p. 33]. This is exacerbated in Australia by the focus on RFF. The pedagogical knowledge and educational experience of the TL becomes lost as the teacher seeks out the TL’s knowledge on resourcing instead of teaching [26].

Langford attributes Fullan in believing that collaboration originates with a shared moral purpose, with teacher and TL equally engaged in the intellectual excitement of designing learning experiences through inquiry [27, 28]. Williamson, Archibald, and McGregor found that it is the intrinsic interest felt by collaborating teachers and TLs that is a key motivator for high level collaboration [29]. There are substantial obstacles in the way of such true collaboration, such as lack of time to plan, deliver and assess inquiry units, lack of understanding of the TL role in inquiry, and an emphasis on content at the expense of skills in the current version of the Australian Curriculum.

Mardis comments on the continuing difficulties TLs have with achieving full collaboration with teachers, despite research and models supporting it and cites school context as a major impeding factor [7]. “School librarians have not often been able to establish collaborative relationships in environments where working together is not valued or supported. Indeed, for many school librarians, true collaboration is “more of a grail than a goal” [30, p. xvii]. Mardis’ international review of research on collaboration identifies facilitators such as agency provided by the principal and teaching faculty as well as the importance of TL and teacher preparation [7]. Haycock agrees that teacher preparation programs should highlight the skills of TLs because they are skilled teachers and can demonstrate personal qualities such as leadership [31]. Haycock also calls on TL training to include learning how to collaborate on instructional design, teaching and assessment, and putting that into place in practicums [31, p. 250–251].

Table 1. Attributes of collaboration [5, p. 20]

Examples of descriptors			
Model A: coordination	Model B: cooperation	Model C: integrated instruction	Model D: Integrated curriculum
Shallow trust Congenial Collegial Friendly Communication	Shallow trust Respect Congenial Collegial Friendly Communication Dialogue Propensity to share	Deep trust Commitment Respect Congenial Collegial Friendly Communication Dialogue Propensity to share	Deep trust Commitment Respect Congenial Collegial Friendly Communication Dialogue Propensity to share
Examples of activities involved in collaboration			
Gather resources	Gather resources Share resources Support Help Assist Contribute Aid Share funds Share space Share collection Share time Share students	Gather resources Share resources Support Help Assist Contribute Aid Share funds Share space Share collection Share time Share students Share objectives Share thinking Share problem solving Share creation of something new Share knowledge Co-plan Co-implement Co-evaluate Co-execute integration of classroom instructions and library instruction	Gather resources Share resources Support Help Assist Contribute Aid Share funds Share space Share collection Share time Share students Share objectives Share thinking Share problem solving Share creation of something new Share knowledge Co-plan Co-implement Co-evaluate Co-execute integration of classroom instructions and library instruction across the curriculum
Attitude			
		Partners are equal	Partners are equal

Merga explored TLs' views on collaboration to improve students' literacy achievement and how such collaborative relationships can be strengthened [8]. She notes that there is considerable international research on collaboration in the school library field but very little in the general education field. These findings suggest that there was not a uniform expectation of collaboration with the TL on the part of the teacher, that the quality of collaboration was variable, and that classroom teachers do not see the TL as a co-teacher. Merga notes that "successful collaboration is directly related to quality of relationships, goals and rewards" as well as the context and culture of the school [8, p. 17], elements of collaboration echoed in Montiel-Overall's models as well [5].

While Merga's research focused on collaboration with teachers and TLs in literacy, the emphasis on inquiry learning and information skills in the Australian curriculum (and globally as well) calls for research focused on collaboration with teachers and TLs in this area. Evidence supporting the potential of the TL in promoting these skills through collaboration with teachers is the focus of the present study.

3 Methodology

The purpose of this research is to explore collaboration between Australian teachers and TLs while planning, delivering, and assessing inquiry units supporting information literacy skills. Researchers used a phenomenological design as the foundation for this study in order to investigate the lived experiences of teachers and TLs during collaborative units [32]. This methodological approach is non-directive and leaves the questioning open so that themes emerge naturally throughout the data collection process [33]. This project consisted of two phases: (1) an online questionnaire for TLs; and (2) interviews with TLs and the teachers with whom they have collaborated. The research questions guided the content of the questionnaire and interviews. This paper focuses solely on the interview data where we delved deeper into the collaboration process with our participants and does not address the broad data on inquiry learning in Australia collected from the questionnaire.

In the first phase, questionnaire respondents had the opportunity to identify themselves, giving their name and email for follow-up interviews with their collaborating teachers. Of the 110 respondents for Phase One, 26 TLs supplied their contact information and researchers emailed them directly to arrange interviews. Of these initial 26 respondents, only six TLs and two collaborating teachers agreed to be interviewed. With such a small sample, the researchers decided it was necessary to use a case study methodology [33], examining in depth the two teacher/TL pairs and the four individual TLs, utilizing their questionnaire and interview data in addition to artefacts from their inquiry teaching units where available (e.g., lesson plans, student assessments, worksheets).

As shown in Table 2, our eight participants taught in six diverse types of schools (e.g., primary/elementary and/or secondary/high, government/public or independent/private) across three states including New South Wales (NSW), South Australia (SA), and Western Australia (WA) along with the Australian Capital Territory (ACT) in Australia. All six TLs had over ten years of teaching experience and both teachers had five to ten years of experience as well. The participants used a variety of established inquiry methods including The Big6 developed by Mike Eisenberg and Bob Berkowitz [34] the Guided Inquiry Design (GID) process developed by Kuhlthau, Maniotes, and Caspari [35], Project-based Learning (PBL), Library Learning Path [36], International Baccalaureate’s Primary Years Program (IB PYP), and individual state processes in WA and NSW based on the Information Search Process (ISP) developed by Kuhlthau [37]. The participants range in delivering from two to over six inquiry units per year and, as noted in the far right column of the table, have unique elements to their school’s culture that prohibit and support inquiry learning and collaboration. Participants chose their own pseudonyms.

In analyzing the findings, we used Montiel-Overall’s Models of Librarian and Teacher Working Relationships [5, p. 20] as described in the literature review and shown in Table 1.

4 Findings

In a case study approach, Patton notes that first the individual cases must be analyzed and then a “cross-case pattern analysis” is used to find emerging themes among the cases [33, p. 447]. Thus, our findings are presented in this way, detailing each of the six cases (four single TLs and two TL/teacher pairs) within the lens of Montiel-Overall’s Models and then connecting the patterns among these cases [5].

4.1 TL Alexandra

Alexandra was a TL in an International Baccalaureate Primary school in ACT, and was a very experienced teacher and TL. The school used the IB PYP as their inquiry method. The main advantages of IB PYP for collaborating for inquiry purposes were that all units of work were by inquiry and that teachers gave two periods a fortnight for planning. Alexandra notes:

And so the team will meet each fortnight with our curriculum planner who is our PYP coordinator and... plan out...the curriculum requirements and talk together as a team. And as TL, I go to that meeting as well so I know exactly what’s going on in their classrooms and what they are doing and then where I can tap in to help them.

This did not automatically include Alexandra as TL, and she worked hard to make sure she was included in the planning meetings. As she said, “I find by jumping in and suggesting how the library team can help with that idea is the best way to make your presence known and to work with them.” As noted by Montiel-Overall [5], Alexandra believed that relationships are important to high level collaboration: “Collaboration... boils down to relationships, in the most simplistic way, some teams are really open to it and some are not always so open to these sorts of things.” Because inquiry as an approach

Table 2. Description of teacher and TL participants

Position and pseudonym	State and type of school	Years of teaching experience	Inquiry methods and general experience	Unique elements to school culture
TL Alexandra	ACT, Primary and Secondary, Independent	10 plus years	Used a combination inquiry method influenced by the IB PYP; Delivered 6+ units per year	As part of the IB PYP, collaboration is an expectation built into the teaching and learning at this school
TL Canowindra	WA, Secondary, Government	10 plus years	Used WA Inquiry Process; Delivered 3–5 units per year	There are big funding issues in this state affecting teaching and time to work with teachers as well as the TL position being at risk
TL Emma	NSW, Primary and Secondary, Independent	10 plus years	Used GID and NSW ISP; Delivered 6+ units per year	At the time of interview, this school had a schoolwide culture of using GID
TL Snowy	NSW, Primary, Government	10 plus years	Used Library Learning Path; Delivered 2 units per year	Snowy was in a new school with an administrator unfamiliar with the role of the TL so she included collaboration as a professional development goal for the year on her individual plan to show its importance to her
TL Annie	NSW, Primary and Secondary, Independent	10 plus years	Used GID, NSW ISP, and PBL; Delivered 3–5 units per year	There was lots of support from this school for collaboration with inquiry methods embedded into the school culture and teaching expectations

(continued)

Table 2. (continued)

Position and pseudonym	State and type of school	Years of teaching experience	Inquiry methods and general experience	Unique elements to school culture
Teacher Amy		5–10 years	Used GID, NSW ISP, and PBL	
TL Maggie	SA, Primary, Government	10 plus years	Used GID and Big6; Delivered 3–5 units per year	Maggie and Suzanne were friends first and wanted to work on a unit together. They taught in a metropolitan school with students from low socio-economic backgrounds
Teacher Suzanne		5–10 years	Used PBL; Delivered 3–5 units per year	

to learning was central to the curriculum in her school, the level of collaboration she could achieve is potentially at Model D Integrated Curriculum, were it not for the fact that she had to work hard to ensure that the TL was included at all phases of inquiry, and that there was work to develop on including the TL in assessment. She talked about feedback to teachers as being “rushed; we will often talk about the challenges we had today, and I guess that’s something we need to refine.” Nevertheless, there was ample evidence in her responses of Model C Integrated Instruction, with potential for growth to Model D Integrated Curriculum.

4.2 TL Canowindra

Canowindra was a TL in a WA secondary government school and had been a TL for over ten years. She used the WA Inquiry Process (similar to the Big 6) in the inquiry units she delivered three to five times a school year. A unique element in Canowindra’s school context was that WA was delivering massive budget cuts to schools that have meant many were losing their teacher librarians and libraries. She noted “the support mechanisms for teachers are gradually being pulled away with all of the cuts to education. We have teachers who are exhausted because they are not getting support from the department...they’re pulling support from everywhere, so that there are very few TLs in schools now.” Further, since she (as all qualified Australian TLs) had a teaching degree in other subject area(s), she was pulled out of the library to teach classroom subjects like English and Social Studies. This limit on her time caused problems in implementing Model D Integrated Curriculum [5].

Nonetheless, the collaboration on inquiry units described by Canowindra showed attributes of Montiel-Overall’s Model C Integrated Instruction [5]. For example, like Alexandra, she noted the importance of relationships: “It’s very much a relationship issue

in building a trust with other teachers that you have the best interest of their learning area, and their students at heart.” This was in line with the “Deep Trust” and “Collegial” descriptors Montiel-Overall included in Table 1 [5]. Canowindra also described the importance of being helpful and supportive to time-poor, “exhausted” teachers dealing with a crowded curriculum by offering to mark assessments: “In 30 years, I have been saying to teachers, ‘I’m quite happy to help you mark’ ... I’ve never had a teacher take it up, but I think the mere fact that...the offer is always there, it’s a plus.” Also, the teaching notes for Canowindra’s latest unit on Ancient Civilizations listed responsibilities for library staff and teacher that help make the roles and responsibilities of each clearer throughout the unit. These aspects of Canowindra’s teaching and collaboration practices were evidence towards a defining component of Montiel-Overall’s Model C Integrated Instruction as TL and Teacher “Co-execute integration of classroom instructions and library instruction” [5, p. 20].

4.3 TL Emma

Emma was Head of Information Services at an independent Christian school in NSW in a suburban area. She had more than 20 years of experience as a teacher and 15 years as a TL. She delivered over six units a year within Montiel-Overall’s Model C and some Model D [5]. Emma’s inquiry program was one of the closest of any of the participants to achieve Model D Integrated Curriculum based on Guided Inquiry Design across the entire school and curriculum.

Emma emphasized the importance of planning, delivering, and assessment being all covered at planning, saying “[these elements] are all wrapped up with the planning, because in the planning, if you don’t think about the delivery and the assessment, of course, it’s all going to fall flat.” She noted that she tended to write the inquiry units and ensure there are suitable resources throughout, working with teachers to create an inspiring opening to the unit. Finally, she said that it was important that teachers understand inquiry theory and practice, using the example of a teacher who wanted to work with her on a Guided Inquiry unit. She said she would but only if he read Kuhlthau, Maniotes, and Caspari’s book *Guided Inquiry: Learning in the 21st Century* [20] first. Emma told the teacher:

“...you see the yellow tags? particularly read them!” and I had about 30 yellow tags, and you know the Christmas holidays he did and he came back and said “I’m ready, let’s go!” Because he understood the theory, he was right there the whole time doing everything just how it should be done in terms of guiding the kids... it was one of those outstanding inquiries where the kids were on fire.

Emma’s anecdote also spoke to her reputation at her school as an expert educator and mentor to other teachers developed through time and experience.

4.4 TL Snowy

Snowy was a TL in a NSW primary government school and had worked as a TL for over ten years. She delivered two collaborative inquiry units per school year and used an inquiry process called the Library Learning Path [36]. This process was developed by teacher librarians in a coastal region in Australia north of Sydney and is used widely

in that area. At the time of Snowy’s interview, she was in a new school with a principal unfamiliar with the role of the TL or the potential impact a TL can have on supporting students and teachers. Snowy took this as an opportunity to include collaboration with teachers as a professional development goal for the year on her individual plan to show its importance to her principal.

Snowy’s determination and ingenuity in pursuing collaborative opportunities with her teachers defined Montiel-Overall’s Model C Integrated Instruction [5]. This was evidenced in numerous ways through Snowy’s interview and survey responses. Like Canowindra, in the planning document for the inquiry units, Snowy added a responsibility column to make the roles the TL and teacher will follow throughout the unit more transparent. Snowy’s description of one unit’s “planning day” shares examples of activities from Montiel-Overall’s Model C: “So on the planning day...I approached them and had some resources and had a scaffold and some ideas and sat down and had a discussion with them. And they had some resources as well they showed me.” Snowy noted the teachers are:

Very grateful to take, if we take some of the teaching load from them. And research skills are a tough thing to do when you’re a classroom teacher...But I think what I’m seeing is that, once you take the load off an individual and you share it, people feel a lot more relaxed. And they see somebody else with skills and they go, “Ah yeah.”

4.5 TL Annie and Teacher Amy

TL Annie and Teacher Amy came from an urban Christian all-boys independent school in NSW with a long history of inquiry and collaboration. TL Annie had over ten years of experience and delivered between three and five inquiry units per year using Guided Inquiry Design, Project-based Learning, or the NSW Information Search Process. Teacher Amy described TL Annie:

The TL at this school is a phenomenally experienced and talented teacher and so drawing off her wealth of knowledge and the great ideas she comes up with, it’s fantastic. Collaborating with someone who has a lot of ideas is empowering. And the boys benefit from having a shared knowledge and shared teaching experience.

This was a school where collaboration had been going for a long time, and as Annie said: “It’s also been the culture of the school that that’s how the library works. So there’s no choice about it really.” This is a Guided Inquiry school, that should mean that the unit of work was all done by inquiry, but this did not always happen. The inquiry task was often only a small part of the content of the unit, which was not true inquiry. As Annie said about planning and in our paper’s title: “I’d say planning is a big problem. It’s often ‘on the fly’ is the honest truth.” Unfortunately, Model D was not achieved because of the impact of time and the crowded curriculum to carry out inquiry units- the shortage being felt at all three stages (planning, delivery, and assessing) of the units. A shortage in planning time made the teaching team usually choose an already written unit with just a small aspect of the unit focusing on inquiry. As Teacher Amy said:

It is a bit tricky because you don’t want to be doubling up on the content you are teaching so we just sort of marked off an area of the program that would be for this inquiry-based unit and we are going to do an inquiry study on a native Australian animal and that will be the inquiry process.

Like TL Emma, time shortage forced TL Annie to be the creator of the inquiry part of the units, often developing a booklet guide for students to use during the unit based on the phases of the Guided Inquiry Design process. Annie said, “I always feel the start of it is really important so I always try to be involved and deliver the beginning of it.” She felt she often had to let go after the initial Open/Immerse/Explore stages, because of the volume of inquiry units she was doing in the school. But she did not like this, and regarded it as an area she could improve on, like developing the whole inquiry unit across the curriculum. Further, assessment was not part of her TL role in inquiry, and reflection was limited also because of the impact of time on this part of inquiry learning. Teacher Amy says, “We often don’t spend time reflecting on what it is that we did. Because you are organising the next one. But yea, look we are a little time-poor as teachers.”

4.6 TL Maggie and Teacher Suzanne

TL Maggie and Teacher Suzanne worked in a primary government school in South Australia in a metropolitan area with students from low socio-economic backgrounds. TL Maggie was an experienced educator with over ten years in the library and education while Teacher Suzanne was a bit more of a novice with five to ten years of experience in education. They both delivered three to five inquiry units a year and while TL Maggie used and preferred Guided Inquiry Design and the Big6 inquiry processes, Teacher Suzanne preferred Project-Based Learning in her classroom. Despite many schools in SA not having TLs as the government does not fund them specifically, this school obviously valued the role of the TL and the library resource centre for learning. Maggie noted, “the school is very strong on research-based learning and using the resource centre [library] for what it is there for.” As noted by some of the other participants in our study, the collaboration between TL Maggie and Teacher Suzanne grew because they had “developed a really good relationship” as Suzanne said. They were friends in their school and they decided they wanted to work more together.

In their interviews, TL Maggie and Teacher Suzanne described a collaborative inquiry unit spanning various areas of the curriculum and showing aspects of Montiel-Overall’s Model D Integrated Curriculum [5]. They delivered this with Year Four/Year Five students exploring and creating an Australian indigenous plant garden throughout the 2018 school year. This topic was chosen to honor the Aboriginal Education Officer at their school who was terminally ill with cancer. Suzanne described “One of her things she’d always wanted to do for the school was develop an indigenous food garden, so it could be used with the other kitchen garden projects. It was another way to tie Aboriginal culture to the school.” With the culminating project being an actual garden, this unit was highly complex and integrated various subjects from English, mathematics, science, and Indigenous Australian culture and history. The students identified and wrote letters to community stakeholders to raise funds for the project, used high level measurements and geometry to design the garden, and worked with the kitchen garden teacher to choose appropriate plants. Maggie and Suzanne worked together to plan, deliver, and assess the students as they completed various milestones at the end of each of the four school terms, culminating in the unveiling of the garden at the end of the school year. This unit exemplified Model D with the integration of various topics across the curriculum [5].

5 Case Comparisons and Conclusions

Despite the drive of many of our TLs in creating a curriculum-wide culture of collaboration school-wide, most were operating at Montiel-Overall’s Model C Integrated Instruction instead of the “holy grail” described in Model D Integrated Curriculum [5]. As defined in the literature review and shown in Table 1, the main difference between these two models is the integration of collaboration “across the curriculum.” Findings across our six cases identified two themes as having the biggest impact on this issue: schoolwide culture (including an understanding of the nature of information literacy and the role of the TL) and time (often hindered or supported by the schoolwide culture.) An example of the importance of schoolwide culture came from TL Emma’s school. At the time of our original interview with Emma in 2019, her school had an administration supportive and vocal about inquiry learning across the curriculum and many inquiry units were happening at all levels. In a recent discussion with Emma, she described a new administration at her school that has shut down the inquiry programs to focus back on explicit teaching. In regards to time, our respondents describe “on the fly” collaboration, as TL Annie’s quote from our paper’s title, carried out at a low level. Model D collaboration [5, 6, 21], where planning, delivery, and assessment of inquiry units happens at the level of shared thinking, shared problem solving and shared creation of integrated instruction was rare amongst our respondents - described by TL Annie as happening “once in a blue moon.” At the same time, the researchers recognised that Model C was second best and a positive outlook for these schools; however, it was also clear that the TLs in this study were experienced educators who worked hard to build their school library programs and inquiry culture. In volunteering for this research, they showed their feelings of support for the TL profession and security in their collaborative roles.

A further critical issue was the decline of school library budgets and TL staff allocations [24] as described by TL Canowindra as a big problem in her state. However, at the same time, one of the only examples of Model D was with our TL Maggie and Teacher Suzanne who described an elaborate inquiry unit where students created an indigenous Australian plant garden. Their state was also suffering budget cuts and TL position losses, but at this particular government primary school in a low socioeconomic area, collaboration was thriving due to a supportive administration and schoolwide culture of working together as noted by TL Maggie: “there’s a lot of collaborative teaching, there’s a lot of collaborative learning...it is a brilliant school to work at.”

Many of our participants also highlighted the difference between primary and secondary schools in relation to inquiry and collaboration. TL Maggie identified that “primary schools have that freedom to explore the design, a unit of inquiry-based learning across a full year and across a full class and curriculum.” TL Annie and Teacher Amy described something similar when they discussed how the primary curriculum and syllabi naturally integrate different elements of inquiry in contrast to the secondary syllabi. TL Emma’s school is across primary and secondary levels so she had a unique perspective on this:

I find the secondary teachers are so focused on their senior classes that to even concentrate long enough to have a conversation with you is very difficult whereas with primary because, say these primary teachers, they integrate. Our primary teachers are

just amazing and they work in teams and they do collaborate within their teams for everything anyway.

This was a problem as Canowindra discussed seeing a decline in the information literacy skill level students were bringing to secondary school and that teachers were not ready to teach these extra skills. She noted, “The expectation is, with the general classroom teacher, the kids are still coming with the skills that they’ve always come with, which isn’t the case.” This may also relate to the funding issues described by Canowindra earlier; either way it is a concern and even further drain on already time-poor Australian teachers and disappearing TLs. TL positions need more security and better definition in Australian schools as well as in the pre-service training of teachers and administrators to support information literacy learning.

The role of the TL as an information literacy expert is even more critical in a post-truth era. As Keyes noted, “In the post-truth era, borders blur between truth and lies, honesty and dishonesty, fiction and nonfiction. Deceiving others becomes a challenge, a game, and ultimately a habit” [38]. We have answers to disempowering the post-truth era in teaching youth how to think critically. The TL and the school library, working in collaboration with teachers, is one of these answers.

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Student Perception of Online Information Literacy Training Through a Massive Open Online Course

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Abstract. This study aims to examine how students perceive online Information Literacy (IL) training through Massive Open Online Courses (MOOCs), based on semi-structured interviews of University of Hildesheim students who participated in the Information Literacy Online (ILO) MOOC. The results show that students especially valued content on information searching and scientific writing. Contents on how to deal with social media were perceived as less relevant and too basic. Regarding the instructional design of the MOOC, the students especially valued parts where a common persona was introduced whose information problems defined the content and examples. From a general perspective the students perceived IL as valuable for their studies, but less for their daily life or future job. The approach of learning through a MOOC was especially valued for being flexible in terms of place and time.

Keywords: Information literacy · Online learning · MOOCs · Student perception

1 Introduction

Information literacy (IL) describes “the set of integrated abilities encompassing the reflective discovery of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning” [1]. Various studies have identified fundamental deficits in IL skills of students and called for intensified IL training [2–4]. One possible answer are Massive Open Online Courses (MOOCs). MOOCs are freely available online courses with no entry barrier aiming at unlimited participation [5]. Meanwhile there is a growing number of MOOCs aiming to facilitate IL skills [6].

Previous research found that online IL instruction can be effective for improving students’ IL skills [7–9]. While there are several studies that discuss the implementation of online IL courses from an instructor’s viewpoint [10–12], there are fewer studies reflecting on the student perception. Recent studies on student perception of online IL trainings showed that students perceived the teaching format well, but also perceived

the teaching material as too long and acknowledged challenges regarding maintaining active student engagement [13–15].

However, there is little research on the student perception of online IL training through MOOCs. A better understanding could show which parts of IL training require more didactical efforts in order to ensure an improved learning experience and higher learning success rates. A recent example of a MOOC to promote IL for students is Information Literacy Online (ILO). The multilingual ILO MOOC is structured into the six generic modules (1) *Orienting in an information landscape*, (2) *Research is a journey of inquiries*, (3) *The power of search*, (4) *Critical information appraisal*, (5) *Information use: the right and fair way*, and (6) *Let's create something new based on information and share it!*, and two discipline-specific modules for Psychology and Business Administration. The ILO MOOC is designed to be attended self-paced without instructor presence, including learning texts, videos, exercises, and quizzes. The MOOC can be accessed through <https://informationliteracy.eu> [16]. This study aims to examine how students perceive online IL training through a MOOC, based on interviews of participants of the ILO MOOC.

2 Literature Review

MOOCs can be considered as one way of online IL training. There is already a considerable amount of literature on online IL training. Various studies discuss the implementation of online IL courses from an instructor's or librarian's viewpoint. A study analyzing the implementation levels for online IL instruction among university libraries in Mexico found that IL instruction in general and in online instruction in particular were limited in development, despite the recognition of its importance and usefulness [10]. Another recent paper reported on the implementation of a process of peer evaluation of teaching to assess librarian instruction in a high-enrollment online IL course for undergraduates [11]. Reports also exist on the updating of online IL courses, describing the rationale, changes, and involved challenges [12], as well as an analysis of content-wise similarities and differences between two asynchronous online IL courses [17].

Another group of previous studies analyzed the impact of online IL training on the IL skills of students. An evaluation of the impact of an embedded online IL module into the learning management system (LMS) of a first-year university business course showed that the resource contributed to student success [18]. Previous research also examined how students rated themselves in both metacognitive and social metacognitive awareness after a collaborative project in an IL course offered face-to-face and online. Students in the face-to-face version of the course rated themselves as having higher social metacognitive awareness, though metacognitive awareness scores were similar [8]. An analysis of bibliographies from student papers showed that students that had attended an online IL course had higher quality bibliographies than those students who received a one-session face-to-face instruction [7]. In another study particularly the flexible, self-paced delivery of online IL training was found to be an effective way for students to develop IL skills [9]. A survey among Washington State University students found that participants of the online IL training were afterwards more confident of their IL skills than a comparison group taught in a traditional setting on-campus [19].

There are also already a few studies analyzing the student perception of online IL training. A comparison of two student groups having either received a one-shot IL instruction using a flipped approach or a traditional one-shot instruction, found no difference between the two groups on a pre- and post-test analysis; however, an analysis of students' final papers from the flipped section showed more bibliography citations to scholarly journal articles. The majority of students acknowledged their preference for the flipped approach [20]. A study among 162 undergraduate students at the University of Missouri at Columbia analyzed through surveys the student perception of multi-modal media objects in an online IL class. It found significant relationships among computer skills, teaching materials, communication tools, and learning experience and concluded that multi-modal media objects and communication tools are needed to strengthen course interactions and student engagement [13]. An evaluation of an online IL unit among 220 undergraduate students at The University of Western Australia used a survey to analyze student perceptions. It found that students perceived that the searching skills they learned were useful for short and long research tasks. The most common suggestion made by students was to make the unit and quizzes shorter. A few students also complained about technical issues when trying to access the online unit [14]. A study among first-year students analyzed the student perceptions after completing an online IL tutorial. It found that the students in general liked learning through an online tutorial but students would have preferred shorter modules and the addition of video and audio content. Few students found the content of the *Copyright, Plagiarism, and Citing Sources, Evaluating Resources*, and *Types of Information* modules important. The students also suggested topics for additional tutorials: how to use library databases and Microsoft Excel; how to evaluate the quality of information; how to cite references in a bibliography; and how to find statistics [15]. All of these studies can be particularly helpful for other teachers seeking to develop online IL courses.

However, there is still a lack of research on the student perception of online IL training through MOOCs. Recent evaluations of the ILO MOOC focused on the impact on the students' IL skills after completing the MOOC as well as the user experience: First, the students completed a self-assessment questionnaire and a shortened standardized IL test. Second, the ILO MOOC was completed by the students. In the third step, the students completed the full version of the standardized IL test and a questionnaire on user experience. The evaluation showed a significant increase in the IL test results after completing the MOOC as mandatory coursework and that the usability was perceived positively [21, 22]. While these previous studies provided insights into learning gains and the perceived general usability based on surveys, they did not provide deeper insights into the students' perception of the MOOC. Accordingly, this study aims to examine how students perceive online IL training through a MOOC, based on interviews of participants of the ILO MOOC.

3 Methodology

In order to examine how students perceive the online IL training through the ILO MOOC, this study focuses on four research questions:

1. Which is the perceived relevance of the contents of the ILO MOOC?

2. After completing the ILO MOOC, do students see an added value in IL promotion and training?
3. How are the navigation, structure, and user interface of the ILO MOOC perceived?
4. What contents of the ILO MOOC should be improved from the participants' perspective?

We used semi-structured interviews [23] to interview participants of the ILO MOOC. In a first step, we developed and optimized an interview guide following two pretests. The interview guide contains 14 sections that are divided into four phases. The first phase introduces the interviewee in the background of the study. The second phase is intended to facilitate the entry into the interview situation and promote the flow of speech. The third and main phase intends to answer the research questions. The concluding fourth phase allows the interviewee to reflect and make possible additions. Accordingly, the 14 sections of the interviews were:

1. Introduction
2. Personal questions
3. Understanding of IL
4. Added value through IL training
5. Importance of the MOOC content
6. Difficulties with the MOOC content
7. New and already known content
8. Navigation
9. User Interface
10. Didactic design
11. Level of MOOC completion
12. Satisfaction and suggestions for improvement
13. Additional aspects
14. Conclusion of the interview

Examples for interview questions were “Which MOOC content did you perceive especially important and useful?” and “Did you have difficulties in navigating through the MOOC?”. Ten students of the University of Hildesheim in Germany were interviewed after they attended the ILO MOOC in the period from July to October 2019. These students studied International Information Management, Social and Organizational Pedagogy, Social Work, and Economics as well as Sports and Chemistry and were either in the final year of the Bachelors program or the first year of the Masters program. We conducted the interviews in a quiet environment, in order to avoid disturbing environmental stimuli. At the beginning, the students had five minutes to look at a list of the ILO MOOC contents, which was intended to refresh their remembrance. Immediately afterwards, a data protection declaration was signed in which the students agreed to the recording of the interview. In the main phase of the interviews, we first asked the students about their understanding of IL after they have completed the MOOC. They also stated their perceived value of IL training in general and the perceived value resulting from the MOOC. Afterwards we asked about their perceived usefulness of the MOOC contents, which contents were to them new or familiar, and whether any

difficulties were experienced during attending the MOOC. If necessary, we asked for further explanations. After addressing the content of the MOOC, we asked the students to express their opinion on the navigation, user interface, and didactic design, particularly the distribution of theoretical and practical contents. In order to address the issue of usually low completion rates of MOOCs [24], we asked students whether they had finished the MOOC completely. If they stated they had not finished the MOOC, we asked them for the reasons. Finally, we asked about their overall satisfaction with the MOOC and for their suggestions for possible improvements. During the interviews, we purposefully incorporated deviations in the sequence of the questions and individual inquiries. This ensured that sufficient data was collected for each question.

As the focus of the data analysis was on the content level, we transcribed and analyzed the data obtained in the interviews using a summarizing content analysis [25]. In the first step, we transcribed each interview was transcribed, following the sections of the interview guide. Since the focus was on the perceptions, we made selective transcriptions without elaborate notation [25]. In the second step, we summarized the considerable findings from each interview in a template, structured according to the interview guide and time stamps. In the third step, we further aggregated the findings into one template including a summary of the main findings. We combined similar statements in order to reduce the volume of data and avoid redundancies. As a result, the templates of the single interviews (second step) and the summarized template (third step) built the basis for the data interpretation.

4 Results

4.1 Perception of the Content

All students specified that they attended the MOOC in full before the interview. In general, the students perceived the contents as relevant and to add value in the context of their studies. Content on information searching and academic writing was rated as relevant by half of the students. This includes, among other aspects, the narrowing of a research topic and the formulation of a research question as well as the use of literature databases. In addition, they evaluated the presented software solutions to support literature management and self-organization (for example, Zotero, Evernote) as useful. Students found that an early promotion of IL during their studies created a significant added value for writing term papers and the Bachelors thesis. This aspect was perceived especially important by students who acknowledged to have little experience in scientific writing. In several units of the ILO MOOC the common persona of *Marco* is used for examples – a fictional student that has to complete a research assignment on solar energy. The students appreciated that this persona was on their same educational level. They perceived this to be helpful in identifying with the presented problems and in reflecting on the learning content in terms of their own personal context. The majority of the students stated that they had been already familiar with the contents of the ILO MOOC. Nevertheless, they considered repetition through the MOOC to be useful.

Most students found the MOOC contents related to social media as less relevant. The students stated that this topic was addressed too intensively and that they could not see a connection between the use of social media and IL. One student also felt that the

introductory overview of social networks was not necessary and too basic. Furthermore, the contents concerning plagiarism were perceived as less relevant. Many students stated that they were already familiar with this topic. One student found this to be part of basic education all students should have anyway. Also, some content on information retrieval, specifically Boolean operators and stemming, and introductions into how to cite were perceived as less useful. Students stated that this perception was due to their existing sound knowledge of these aspects. One student also found the content on information visualization and other content on the criteria for evaluating sources as less relevant. Only two out of the ten students did not perceive any content as less relevant. These two students argued that they felt that perceived relevance depended on the individual learners' context and previous knowledge.

4.2 Perception of Information Literacy in General

The students found it difficult to give a tangible definition of IL. However, the students were able to name certain aspects of IL. Nine students mentioned the evaluation, filtering, visualization, and re-use of information and five students named information retrieval. Also they mentioned formulation of search queries, knowledge about search engines and literature resources, plagiarism, misinformation, and copyright.

Nine out of ten students did not find it necessary to explicitly introduce definitions for IL in the MOOC. They explained that the learning content of the MOOC itself would be enough to get a general idea what IL includes and that there were too many different definitions.

All students perceived the promotion and training of IL as useful and stated that they recognized this as an added value to their studies. Specifically, they saw the added value of scientific writing and information retrieval. One student added that he would see the value of the MOOC for his studies only if it would provide credit or was a voluntary task within a course. Other students found that such MOOCs should be included in the curriculum of their studies, especially for freshmen students. One student outlined that he did not write many term papers in his previous studies and he would appreciate such MOOCs or similar online training modules to better prepare for paper writing. Just four students saw a value of the MOOC for their professional career and just two students named dealing with fake news and information overload as possible use of the MOOC content in their daily life.

4.3 Perception of the Navigation, Structure and User Interface

Only three students reported experiencing difficulties with the navigation in the MOOC. They had problems in accessing the module from the course welcome page because there was no direct link. The navigation within the modules was otherwise perceived as clear and simple.

The structure and distribution of the content received mixed feedback. Six out of the ten students found the distribution of theoretical and practical content as balanced. But others criticized that the proportion of theoretical content was too high and that a more balanced distribution would be better. One student each found that some units had too much text and that the amount of theoretical content made it harder to concentrate.

They felt that more practical contents would enhance understanding. Students generally perceived the videos in the MOOC as positive. They described the videos as a varied and helpful summary. Only one student criticized the videos as too long and with low quality. Also, the students gave positive feedback on the practical assignments and exercises in the MOOC, including the multiple choice quizzes. Students found them motivating and helpful to self-check their learning progress. One student found the exercises less helpful due to missing individual feedback.

The user interface received a broad spectrum of different feedback, ranging from comments that found the interface *neutral and functional*, to *simple and old fashioned*, and *modern and appropriate*. Three students found the user interface neutral and functional. Two students found it as too simple and old fashioned and one additional student found that it could be more modern. One student wished for a more playful design. Two students found the user interface as modern and appropriate. One said they found it to be typical for an online course.

The students rated the didactic approach of the MOOC positive. They especially mentioned the flexibility and independence of learning with the MOOC that allowed them to pause, go back, and repeat content at any time. One student found that the structure of the content into various learning modules as helpful. One student pointed out that the format allowed him to constantly actively participate, compared to educational videos, which only allow passive listening.

4.4 Perceived Suggestions for Improvement

When asked about the content that could be improved in the MOOC, the students again mentioned that adapting the content to the target group would be essential. In addition, the students had difficulties answering quiz questions on Boolean operators because they had no previous knowledge, and they found the questions too difficult.

Furthermore, some students criticized the MOOC as too long, depending on the context of use. Two students stated the length was appropriate for use in the context of a seminar. The students preferred compression of the contents, since they perceived the content in many parts of the MOOC as repetitive and familiar. As another further area of improvement, they mentioned the potential usability of the MOOC on mobile devices. One student reported difficulties in completing the MOOC on the mobile phone.

5 Discussion

The interviews showed that the students in general perceived the contents of the MOOC as relevant. The highest perceived relevance was found for the content on information searching and academic writing, including, among other aspects, the use of literature databases and software for literature management and self-organization. But the students perceived some content elements also as less relevant, particularly the content on social media. Additionally, they perceived content on plagiarism, Boolean operators and stemming, introductions into how to cite, information visualization, and quality criteria for evaluating sources as less relevant. Some of these findings are in agreement with previous research where students participating in an online IL tutorial also perceived

the contents on copyright, plagiarism, citing sources, evaluating resources, and types of information as less important [15]. On the contrary, in the same previous study students suggested more content on Microsoft Excel, while participants of the present study found the content on information visualization through Microsoft Excel less relevant. This leads to the conclusion that perceptions of content might be also influenced by the individual background and previous knowledge of the students. The students participating in this study stated that they already had previous knowledge on the content of the MOOC. This is supported by student statements arguing that they found content on how to cite and plagiarism as less relevant due to their existing knowledge. For the use of existing MOOCs in teaching settings, this implies that the alignment of the chosen MOOC with existing previous knowledge of students might be of critical importance for their perceived relevance of the learning content. In cases of greater overlaps with assumed pre-knowledge, teachers might select only relevant content pieces of the whole MOOC.

Content-wise, the findings confirm that participants appreciated the approach of the ILO MOOC to not directly introduce various definitions of IL. Only one out of the ten interviewed students indicated that they would find this useful. Despite the fact that this information was not included in the course, all students had an idea IL meant and could name some IL skills. An interesting aspect is that the students especially valued parts where a common persona was introduced – specifically the student *Marco*, whose information problems defined the content and examples (Fig. 1). The students perceived this to be helpful in identifying with the presented problems and in reflecting on how the learning content related to their own personal context. This implies that the use of personas could be a useful design element for MOOCs to help students to identify with the learning content. Indeed, previous literature has suggested the possible powerful impact of personas on understandability and accessible design of learning contents when implemented in MOOCs [26].

Course > Module 2: Research is a journey of inquiries > 2.1 How to identify topics and formulate research questions? > 2.1.2



2.1.2

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VIEW UNIT IN STUDIO



On this journey, you will have a friend Marco.

In the given scenario, through examples to which you can relate, you will follow student named Marco and observe how can he start his research from a broader topic in order to arrive to the concrete research questions that will guide him in his further research.

We hope you will enjoy your journey and we wish you a pleasant exploration.

STAFF DEBUG INFO

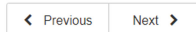


Fig. 1. Introduction to the fictional student Marco in the ILO MOOC (Source: <https://informati.onliteracy.eu/>)

That the MOOC did include videos was generally perceived positive. But the students also described the videos as too long. They also mentioned length as a general criticism when units had too much text or a too high proportion of theoretical content. Previous evaluations of online IL training also found students to appreciate video content but to criticize the learning content as too long [14, 15]. This might be partly explained by the fact that students claimed to already have had basic knowledge of the MOOC contents. Another possible reason that students brought up in the interviews was the context of use. For the purpose for this study, the students attended the MOOC voluntarily before the interviews, which might have influenced their motivation and amount of time willing to spend on the MOOC. Two students admitted that they would find the length appropriate if the MOOC was part of a credit-bearing course. This implies that the MOOC content should be kept as short and straightforward as possible, especially in the case of videos. This is in accordance to didactic guidelines for MOOC development [27] that also recommends the use of short videos.

The feedback on the user interface, which was mainly perceived as functional, simple, and old-fashioned leads to the conclusion that the design of the ILO MOOC might be updated to be more colorful. This comment was also supported by two students who wished for a more modern and playful design. An example of the user interface at the time of the evaluation be seen in Fig. 1. Thus, future MOOCs might follow this simple and functional design of the ILO MOOC but make the overall design more colorful.

The findings indicate that the participants rated the MOOC as useful and recognized it as an added value for their studies. This was supported by the fact that several students expressed their wish to have a MOOC or a similar online training for IL included into their curriculum, especially in the first year of their studies. But the comments also showed that some students would not use such a voluntary offer and would only participate in a situation where taking the online course would be mandatory. This agrees with previous research that found some students struggled with the voluntary and self-paced format of online and blended learning environments [22, 28]. Possible reasons for students to not recognize the value of the MOOC for their daily life and future job might be a lack of job experience and that the content of the ILO MOOC is tailored for undergraduate students. However, several students also indicated that they especially valued the flexibility and independence of learning with the MOOC that allowed them to pause, go back, and repeat at any time. This flexible, self-paced delivery of online IL training, as implemented in a MOOC, was also found by previous research as an effective way for students to develop IL skills, leading also to better learning results [9, 21, 22]. Thus, teachers might provide active supervision for students attending a self-paced MOOC or integrate elements of a MOOC as mandatory learning tasks into a supervised course to help students struggling to keep motivated in such a format, while still preserving the flexibility of a MOOC.

6 Conclusion, Limitations and Outlook

The aim of this study was to examine how students perceive online IL training through a MOOC, based on interviews of participants of the ILO MOOC. We used semi-structured interviews to interview ten students of the University of Hildesheim in Germany after they attended the ILO MOOC. The results show that students especially valued content

on information searching and scientific writing, including introductions into literature databases and bibliographic software. Students perceived content on how to deal with social media as less relevant and too basic. Regarding the instructional design of the MOOC, the students especially valued parts where a common persona was introduced whose information problems defined the content and examples. Students appreciated the availability of practical assignments and exercises within the MOOC, although they would have liked more exercises and less theoretical learning content. From a general perspective, the students perceived IL as valuable for their studies but less useful for their daily life or future job. The approach of learning through a MOOC was especially valued for being flexible in terms of place and time. The findings of this study can provide avenues for the development and improvement of online training courses for IL.

This study has several limitations, which in turn open up paths into further research. First, this study was based only on the analysis of a single online IL training offer – the ILO MOOC. Second, the sample consisted of University of Hildesheim students from six degree programs. This might reduce the generalizability of the findings. This seems in particular relevant as previous research has shown disciplinary and institutional differences in IL skills [4, 29]. Third, due to the qualitative research design, this study was based on a sample of ten participants. Using the findings of this study, focused questionnaire items for future follow-up studies could be designed.

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A Framework for Implementing Mindfulness into Information Literacy Instruction: Strategies for Mindful Information Literacy

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Abstract. This paper presents a framework for implementing mindfulness, the concept of active engagement in the present moment, into Information Literacy (IL) instruction. The schema is grounded in the library and information science (LIS) and education literature that explores the tenets of mindfulness and concerted efforts at application. It is informed by findings from an original survey of the most preferred IL teaching strategies by a sample of academic librarians in North America. The resulting Mindfulness Nuance Framework can be used as a heuristic tool to integrate mindfulness into IL instruction.

Keywords: Information literacy instruction · Mindfulness

1 Introduction

Mindfulness is the process of actively embracing the moment in order to develop full awareness of current surroundings. Although mindfulness has been practiced for centuries by different cultures and disciplines, it entered the field of education only recently as a contemplative pedagogy. According to Nelson [1], contemplative pedagogy can be defined as the integration of mindfulness practices into the classroom to facilitate a quality learning experience. This paper presents the Mindful Information Literacy Framework (MILF) for implementing the concept of mindfulness into IL instruction. It is the integration of findings from our recent survey of teaching strategies of North American academic librarians into a structure of mindfulness as described in the Information Literacy (IL) literature.

Despite numerous mindfulness studies, there is no consistent evidence on how to implement mindfulness into IL instruction. Therefore, we designed this study to explore three key questions: 1. how do librarians provide LIS services in general to facilitate mindfulness? 2. What are the most current IL teaching strategies used by academic librarians, and 3. How can we integrate mindfulness into these contemporary IL teaching practices?

The process began with a comprehensive literature review on mindfulness in general and its integration into pedagogical practices and theories. We adopted the definition by

Kabat-Zinn [2] that there are three key nuances of mindfulness related to contemplative pedagogy: 1. paying attention on purpose, 2. being present in the moment and 3. being non-judgmental. Each of these nuances consists of three elements for a total of nine different tenets. We then conducted a survey of the IL instructional practices of academic librarians in North America. The MILF integrates mindfulness into IL instruction based on the supporting literature, the definition of mindfulness according to Kabat-Zinn, and our findings of the IL teaching practices of North American academic librarians. We integrated the array of strategies generated into the three nuances and nine tenets of mindfulness. Our criteria and decisions when constructing MILF are supported by the literature. The findings of this study could be extended through a follow up qualitative research study where the nine mindful tenets of contemplative pedagogy are examined within academic librarianship.

2 Review of the Literature Review

2.1 Definitions of Mindfulness in Education

The concept of Mindfulness has been adapted from various spiritual practices which uses meditation to focus on being intensely aware of sensations, and feeling in the moment without interpretation or judgment. Methods include purposeful breathing, guided imagery, and other practices to relax the body and mind and help reduce stress [3]. Researchers have studied the benefits of incorporating Mindfulness practices in the fields of medicine, neuroscience business, and education. In the multiple studies reviewed by Meiklejohn et al. [4] the effects of mindfulness training to teachers and students, show “improvements in working memory, attention, academic skills, social skills, emotional regulation, and self-esteem, as well as self-reported improvements in mood and decreases in anxiety, stress, and fatigue,” [4, p. 291].

2.2 Mindfulness Practices in Libraries

Ajit Pyati [5], from the University of Western Ontario, presents an innovative framework for public libraries to serve as contemplative spaces. He believes that public libraries have a central role in cultivating the inner lives of their patrons and encourages programming to support such an environment. Charney and Colvin [6] state that libraries are neutral places with a unique role of healing patrons recovering from traumas.

Various academic libraries have reported on initiatives that incorporate mindfulness activities for their students and users. Examples include free yoga sessions to students and staff at the University of Utah Health Sciences Library who were experiencing high level of stress in order to ease burnout and facilitate mindfulness [7]. Harvard Law Library created a program called, “Harvard Law School Mindfulness Society” to facilitate gentle yoga and mindful practice in silence [8]. Similarly, Cook and Croft [9] presented Sparq Labyrinth and a practice of labyrinth walking as a stress reduction tool in the library setting.

Mourer and Karadjova [10] created a “Library Brain Booth” in the Humboldt State University where they could explore the campus community regarding mindful practices.

Results of their research showed significant interest among patrons in mindfulness tools and activities within this academic library setting. The researchers further suggested that this might have a positive impact on academic and workplace success for their students and staff. Diamant-Cohen and Scherrer [11] argued that mindfulness should, perhaps, be integrated in the earlier stages of IL acquisition. They investigated embedding mindful moments into the work of public librarians with children. While none of these studies provides a guidance as to how to implement mindfulness into the work of librarians or librarians themselves, they show that given the transformative potential of mindfulness there is a need for a framework if this transformative potential is to be realized.

In the academic context, Bush [12] examined the introduction of mindfulness into higher education course curricula. The courses were taught by a group of scholars affiliated with the Center for Contemplative Mind in Society. Educators focused on calming their students, reducing their stress level, and eventually having them present in their classrooms. Some argued that their students needed to think about the meaning of new information they acquired during the instruction and connect it to what they already know. In order to achieve this goal, some of the instructors simply introduced a few minutes of mindfulness at the beginning as well as at the end of each class. The courses studied by Bush represented almost every discipline except LIS. How can we introduce the mindful awareness presented in these earlier studies into the core IL teaching pedagogy? Integrating IL education with the larger movement known as contemplative pedagogy may be a key. Kabat-Zinn [2] has identified three key nuances of mindfulness related to contemplative pedagogy: 1. paying attention on purpose; 2. being present in the moment; and, 3. being non-judgmental. We build upon this idea below and use it to structure the Mindfulness Nuance Framework for IL instruction.

2.3 Mindfulness Nuances Framework (MNF)

Cognizant of the definition of mindfulness offered by Kabat-Zinn [2] we expand upon it by using examples from the literature to propose the following framework to implement mindfulness to IL instruction. Mindfulness is composed of nine elements, and these can be classified into three operational categories. As these categories reflect subtle behavioral practices, they are described as “Nuances.”

- Nuance 1: Paying Attention, reflects three behaviors, two are drawn from the work of Mourer and Karadjova [10], concentration/focus and openness to new experience in the context where the attitude of mindfulness was set. The third, from the research of Simmons and Cortney [8], is letting go of anger and achieving a clear mind.
- Nuance 2: Being in the Present Moment, is derived from the work of Casucci and Baluchi [7], Diamant-Cohen and Scherrer [11], and Cook and Croft [9], include the actions of mindful moment, deep breathing, and mindful stretching.
- Nuance 3: Being Non-Judgmental, encapsulates the findings of Pyati [5] and Anzalone [13] related to laying the ground for learning, establishing a judgement free zone where you connect and accept with gratitude.

These nine major constructs provide a performative framework for mindfulness (Table 1). Through embedding these nine practices in the IL classroom, students/instructor engagement and learning can be enhanced.

Table 1. Mindfulness nuance framework

Nuance 1 Paying attention	Nuance 2 Being in the present moment	Nuance 3 Being non-judgmental
Element 1: Concentration/focus	Element 4: Mindful moment	Element 7: Ground for learning
Element 2: Open to experience	Element 5: Deep breathing	Element 8: Judgement free zone
Element 3: Clear mind	Element 6: Mindful stretching	Element 9: Gratitude/acceptance

In order to integrate these concepts into IL instruction, we surveyed academic librarians in North America to learn the teaching and assessment strategies most commonly deployed already, which we then place into the nuances and elements above, producing an inductive framework. It is important to note that the mindfulness approach needs to be taken at the local level where most adaptation will take place. Therefore, a set of assumptions of how such a typical IL instruction occurs were derived based on the findings below.

3 Survey Methodology

Six hundred librarians in North American academic institutions responded to our survey of their IL instructional practices in winter 2019. The questionnaire consisted of 11 questions in which we gathered demographic data, details about the learners they usually teach, location of instruction, types of collaboration they practice, and the instructional and assessment strategies they employ. Nearly half of the respondents (47.5%) worked at doctorate-granting universities, but librarians from other kinds of colleges and educational institutions participated.

The empirical data used to construct and validate the mindfulness conceptual framework were collected using SurveyMonkey, an online survey platform. The survey invitation was posted to the Information Literacy Instruction list serve (ILI-L) and distributed via personal networks of the authors, a convenience sample. The survey remained open for six weeks in winter 2019. 600 of the 700 responses were complete or nearly complete, and thus integrated into the mindfulness framework. This survey study received approval from both Long Island University and UCLA Institutional Review Boards (IRB) boards.

3.1 Survey Results

The majority of the academic librarians worked at a doctorate-granting institution ($n = 285$), followed by twenty-one percent ($n = 125$) at Associate's college/CEGEP/2-year

post-secondary, eighteen percent ($n = 108$) worked at master's college/university, and nine percent ($n = 54$) at a baccalaureate college. Four percent ($n = 21$) stated that they worked at other type of institutions.

When asked to indicate the types of students to whom they teach IL, the majority of respondents (97%) stated undergraduate students, graduate students (56%), and international students (47%). The majority of the respondents stated that they do regularly collaborate with a colleague when they teach an IL session but they use curriculum and teaching/lesson plans that they have developed or personalized ($n = 498$). The majority of responses also indicated that the class size ranged between 11–30 students. The IL sessions are delivered face-to-face.

Table 2. Teaching strategies used in IL instruction

Teaching strategy	Percent (%)	Frequency
Hands-on/interactive	90	537
Integration of audio and/or visual aids	81	482
Socratic method	68	403
Collaborative/cooperative learning	50	296
Use of background knowledge	44	261
Problem based learning	38	229
Realia (bringing real objects to the class such as books or journals)	38	227
Leveled questions	31	187
Flipped classroom	21	127
Word wall	13	78
KWL charts (current knowledge, desired knowledge)	7	40
Story reenactment	2	12

Only 13% ($n = 78$) of the respondents had completed B.Ed., M.Ed., E.D or an academic certificate in Education or an Educational field. Librarians reported that they participate in ongoing learning and professional development by: Participating in professional development workshops 82% ($n = 484$); Attending conferences 75% ($n = 442$); In-house training 49% ($n = 291$); Online courses and webinars 60% ($n = 358$); Pursing educational and related certificates 18% ($n = 105$); and reading the related literature 76% ($n = 452$). The majority of the respondents have taught information literacy more than five years.

Respondents were asked to indicate their most preferred teaching strategies from among a list compiled from IL and educational literature. Definitions of the styles were provided in the texts. The most common strategies among these academic librarians were Hands-on/interactive, Integration of Audio and/or Visual aids, and Socratic Method. Table 2 lists all responses.

4 Discussion

Epistemologically and pedagogically, how can mindfulness enrich IL instruction? This section discusses each of the nine elements derived from the literature review in an inductive framework of 12 IL teaching strategies and scenarios that emerge from the empirical survey data.

4.1 Concentration/Focus

IL acquisition requires intense and sustained cognitive effort. Students must be able to pay attention and to concentrate for a predetermined period. Unfortunately, in a typical undergraduate IL classroom attention is divided into multiple tasks and presents simultaneous distraction. While all of the IL teaching strategies may benefit greatly from enhanced concentration and focus, four are examined here: 1. hands on/interactive, 2. flipped classroom, 3. word wall, and 4. Realia, to discuss how concentration and focus may enhance these strategies.

Hands-on/interactive teaching strategy is when students are engaged and doing something hands-on to aid IL acquisition such as searching the library database while interacting with a librarian. Enhanced concentration and focus is essential when learning by doing and actively processing information. Another teaching strategy cited by academic librarians is “Flipping the classroom;” in this scenario students gain access to IL resources prior to class, usually via an online learning platform, and then use class time to do the harder work of assimilating those resources. Concentration is necessary and important for both of the components. The third teaching strategy discussed in this vein is Word Wall. A Word Wall in IL instruction offers an effective mechanism to support acquisition of new vocabulary visually as well as cognitively. This strategy requires sustained cognitive effort where concentration is crucial. The fourth approach, Realia, involves bringing real objects to the class such as books or journals. The use of realia has been one of the most popular strategies in IL instruction for decades. Using realia – real things – to build background knowledge and new vocabulary makes the learning experience sensory for students. Students can touch and feel the new type of resource while at the same time learning the new IL vocabulary.

4.2 Open to Experience

Some students are uncomfortable asking questions in the classroom. Being “open to experience” means keeping an open mind and embracing new experiences in the classroom. The different nature of IL instruction may be intimidating. Some of the IL teaching strategies that may enhance being open to experience are: 1. using audio/visual aids, 2. Collaborative/cooperative learning, 3. the use of background knowledge, and 4. story enactments. Audio and/or Visual aids are sensory tools and both sound and picture as well as the use of instructional content involves auditory and visual stimuli. What students hear and see during the IL instruction may be different from their previous experience. Students with lower openness to experience may feel overwhelmed during this sort of IL instruction. The use of Collaborative/cooperative learning may help alleviate this.

Cooperative learning in the IL classroom can take many forms, but one of the most popular ways is the use of small group work to supplement lectures. This can be an optimal learning environment for students. The use of background knowledge questioning of the students about what they know related to the topic prior to delivering the lecture can help assess their background knowledge. This can also create an interactive friendly ice breaking moment in the class. Story re-enactment is a strategy in which students are encouraged to act out stories after they have read them. A good example of this strategy from IL classrooms is re-enacting a plagiarism story. Likewise, being open to experience may enhance students IL acquisition and connect them with the story being analyzed.

4.3 Clear Mind

A clear mind is the foundation of concentration. In an ideal environment, the students come to the class with a clear mind, just like a clean glass where there are no impurities to taint or distort the learning process. The trick is to experience each learning moment with a clear mind and open heart. This would require a return to the present moment as well as being able to listen with a clear mind. Librarians should be able to help students develop a clear mind in order to apply new IL learning. Students use this to fairly and fully comprehend and assimilate the messages being imparted in the lecture. Students should be encouraged to have a clear mind and cognition in any type of IL classroom. The four IL strategies that can be used in this matter are: (1) Socratic method, (2) Problem based learning, (3) KWL chart, and (4) Leveled questions.

The Socratic Method involves the performance of knowledge construction. In these instances, what is happening is that “the teacher – the Socratic figure” takes the student on a journey or discovery. The instructor knows the outcome (final conclusions or take-away) he or she is hoping the student will arrive at and uses a process of questioning involving analysis of student responses to questions to generate new questions and drive the discussion toward the intended intellectual outcome. Asking and answering questions during the instruction stimulates critical thinking and greatly challenges what they hear. Students need time to think and should be comfortable with silence. A clear or receptive mind is essence of this strategy.

Problem based learning consists of challenging students to use problem-solving techniques to solve open-ended IL problems. This warrants critical thinking, analysis, and researching the problem with a clear mind. The letters KWL are an acronym for what students already Know, what they Want to know, and ultimately what they Learned. The KWL Chart uncovers what students already know about the content and background knowledge, and what they would like to learn. By using this strategy, librarians can activate background knowledge and connect it with their IL lesson plan. Asking and answering questions in the IL classroom is a key ingredient in the learning process. Leveled question information strategy involves slowing the session slightly to include more wait time and repeating questions again on a level that students can understand. This requires instant diagnosis of students’ IL levels.

4.4 Mindful Moment

An example of a common ritual to lead a mindful moment during or before the instruction is to invite students to pause, breath, and perhaps fully consider being present in the very moment. The first step to facilitate the mindful moment is to urge students to ground their body awareness in the IL classroom, on their chairs, or by recognizing their feet on the floor. Some may practice a pause during or before the instruction to enjoy a dedicated quiet moment as well. The Mindful moment may enhance the effect of any teaching strategies but four are cited here. These are: 1. Socratic method; 2. problem-based learning; 3. leveled question; and, 4. background knowledge. Socratic Method requires substantial devotion to the continuous communication among the parties. A mindful moment may enhance this journey. Problem based learning uses a technique to motivate students to solve open-ended questions. A mindful breath may alleviate the stress during this intense learning. Leveled question strategy requires continuous questioning of students on the subject matter so a mindful breath could lessen stress.

4.5 Mindful Breathing

Mindful breathing enables a brief engagement with a mindful moment, allowing the breather to refocus their attention to the present moment. It is an experience of relaxing the body, quieting the mind, and awakening the spirit by deepening of consciousness. Mindful breathing also enables relaxation by producing a mindful state where deeper understanding of IL content can be facilitated. In this vein, 1. flipped classroom, 2. word wall, 3. audio visual, and 4. hands on/interactive are effective approaches. Mindful breathing is essential in transitions between learning modes such as flipped classroom model. Mindful breathing may help transition from cognitive to visual acquisition of new IL vocabulary while auditory and visual stimulus transitions are the key in this strategy. Mindful breathing can facilitate the effectiveness of each of these experiences.

4.6 Mindful Stretching

Mindful stretching consists of gentle stretching activities enhancing the awareness of bodily sensations. This is a moment-to-moment awareness of the sensations that arise as one puts his/her body into the described postures in order to bring present-moment awareness to their bodies through movement. Mindful stretching can be done during or before the IL instruction in any environment. Mindful stretching happens most constructively in contexts that provide the student with a point of reference, which generates a sense of 'marvel' or epiphany. As Aristotle once said, "In all things of nature there is something of the marvelous." Four strategies that can benefit from mindful strategies are: 1. collaborative/cooperative learning, 2. KWL charts, 3. story reenactment, 4. Realia. Mindful stretching can be used during transition of to all these strategies such as in between lecturing and group discussions, while discussing what is known versus what will be learned, as well as between the instruction and story reenactment, or before introducing the new objects during the IL instruction.

4.7 Ground for Learning

Establishing a common and a fertile ground for IL acquisition, perhaps a more significant and permanent one, is the goal of every librarian. In this sense, the librarian's role becomes one of preparing the ground for learning. Understanding that the everyday life of the students is an important aspect of this process. Four strategies can particularly benefit from preparing a ground for learning: 1. hands on interactive, 2. audio visual aids, 3. KWL charts, and 4. Socratic method. Hands on interactive teaching strategy involves using an example relevant to their class or lives. Audio visual aids are relevant for any auditory or visual stimulus during the preparing the ground for IL acquisition. KWL charts reveal background knowledge. The Socratic Method establishes the common and fertile ground for learning by listening to students and their answers while giving them time and space during this process.

4.8 Judgement Free Zone

In an ideal library classroom, each member of the class understands that it is a judgement-free zone and anyone can present their ideas and opinions at their desired speed with their choice of phrasing and examples, in their own "voice", since every student's learning pace is different. In a judgement free zone, students feel welcome, safe to learn new skills, and free to express their opinions. This is essential in an environment where librarians teach students who come from diverse backgrounds such as international students. Our sample showed that 47% of the respondents teach international students. Therefore, students must be reminded that librarians are available to support their learning and do so in the context of the library as a judgement-free zone. In a judgement free-zone, students would not hesitate to share their background knowledge. Leveled question strategy requires asking multiple levels of questions to students based on their knowledge level without prejudice or judgement. Collaborative/cooperative learning using peer interaction and collaboration flourishes respect between the peers is established, as does story re-enactment. Judgement free IL classroom is an ideal environment of trust where all students' contributions are valued.

4.9 Gratitude and Acceptance

Gratitude in this context is attained by increasing resiliency and generating more positive feelings than negative ones in the IL classroom. When an individual attends to his thoughts and feelings with acceptance and nonjudgmental awareness, s/he broadens his/her capacity to respond to adverse circumstances with equanimity. Another expected role of librarian in the classroom is that cultivating proactive attitudes and positive coping skills such as gratitude and acceptance. Thus, nonjudgmental acceptance can be very helpful. The four strategies that benefit here are: 1. problem-based learning, 2. flipped classroom, 3. Realia, and 4. Word wall. A word wall can be an organized collection of words (and sometimes phrases) displayed on a wall or other space in the IL classroom. Problem based learning strategy aims to generate potential ideas to solve problems and librarian helps ensure that all the students are involved in the IL discourse. A typical IL scenario would be a short case scenario about a final paper and questions

asking for the arrangements of the citations. Flipped classroom strategy requires active participation in the class with acceptance of every individual's thoughts and feelings. Realia, using real items in the classroom such as visuals including pictures, diagrams, and illustrations are essential to a mindfully designed IL instruction. Word wall presents visual stimulus where students acquire IL concepts visually. The fulfillment of all these desired IL teaching strategies closely connected to gratitude and sense of appreciation in the classroom.

5 Conclusion

This article has presented the process used to create a framework to implement mindfulness into IL instruction. Explorations of mindfulness in the LIS literature and the analysis of data from a survey of the IL teaching strategies among North American academic librarians were the building blocks for construction of this framework. Twelve IL teaching strategies placed into nine elements of "Mindfulness Nuance Framework" building on the high level of work of Kabat-Zinn [2] through refinements distilled from a range of scholars from Mourer and Karadjova [10] to Anzalone [13]. This method generates a sensible framework to implement mindfulness into IL instruction. Table 3 below summarizes the integration.

The significance of the survey conducted specifically for this framework is the data gathered from 598 academic librarians who regularly engaged library instruction in an academic library in North America (the largest response rate in the literature after Julien et al. [14]). All the 12 teaching strategies examined are situated within the appropriate nine elements of Mindfulness Nuance Framework. For instance, each element within the framework is linked to four IL teaching strategies. The advantages of the proposed implementation are improved concentration/focus and being in the classroom with a judgement free intention. Some weaknesses and limitations remain of this proposal is that it is theoretical and must be tried applied in live sessions to test its applicability and practicality. It may not work for everyone. The most important lesson from the study is that there are many ways to teach IL. One must argue that, no set of IL teaching strategies can generate sustained growth unless it is accompanied by the countless small discoveries, such as mindfulness in this case study. In addition, mindfulness is connected to the foundations of the ACRL Framework as a holistic understanding of how information can be used to improve the life quality of our stakeholders [15]. When it is implemented, academic librarians may derive important gains as well.

The findings of this study could be extended through a follow up qualitative research study where the nine mindful tenets of contemplative pedagogy are examined within academic librarianship. Perhaps some experimental scenarios as a mechanism for analysis may also be used. The authors hope this study will stimulate the imagination, inspire others to move toward contemplative IL instruction, and will improve the performance of our students and our own professionalism.

Table 3. Mindfulness nuances framework with IL instruction

Nuances	Elements	Teaching strategies
Paying attention	Concentration/focus	Hands-on/interactive Flipped classroom Word wall Realia
	Open to experience	Audio/visual aids Collaborative/cooperative Background knowledge Story reenactment
	Clear mind	Socratic method Problem-based learning KWL charts Leveled questions
Present moment	Mindful moment	Socratic method Problem-based learning Leveled question Background knowledge
	Mindful breathing	Flipped classroom Word wall Audio/visual aids Hands-on/interactive
	Mindful stretching	Collaborative/cooperative KWL charts Story reenactment Realia
Non-judgmental	Ground for learning	Hands-on/interactive Audio/visual aids KWL charts Socratic method
	Judgement free zone	Background knowledge Leveled questions Collaborative/cooperative Story reenactment
	Gratitude/acceptance	Problem-based learning Flipped classroom Realia Word wall

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The “Real World” Relevance of Information Literacy: Part 2 – The Factors that Make Information Literacy Relevant in a Post-truth Era

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Abstract. As students in higher education apply information literacy to academic work in the post-truth era, the findings from Kaufmann’s doctoral study uncover the student academic information experience perceptions of the sociocognitive relevance of information literacy. The Information Literacy Relevance Factors, that is, what makes information literacy relevant to students, are identified. The sociocognitive relevance of information literacy is further described and how information literacy sociocognitive relevance is measured is discussed. Information Literacy Relevance Factors in the post-truth era are explored and ways to take the research findings and apply these Information Literacy Relevance Factors in the “Real World” and in academic contexts and praxis are shared.

Keywords: Information literacy · Relevance · Sociocognitive relevance · Post-truth era · Higher education · Teaching · Asset-based pedagogy · Metacognition

1 Introduction

As students in higher education apply information literacy (IL) to academic work in the post-truth era, understanding what makes IL relevant is of keen importance. The findings from Kaufmann’s doctoral study [1] uncovers the student academic information experience of applying IL to complete an academic assignment. The application of IL as SCR to complete an academic task was described by students in the qualitative stage of the study. Student perceptions of sociocognitive relevance (SCR) of IL was measured in the quantitative stage of the study using a pragmatic epistemological approach. Using sociocognitive relevance (SCR) operationalized terms was used to measure subjective relevance and identify what makes IL SCR to college students. This paper aims to present the SCR factors of IL in the context of the post-truth era.

Sociocognitive relevance is the perception of something being useful and meaningful [2]. Findings from Kaufmann’s doctoral study [1] provides new data that is evidenced using the operationalized terms useful and meaningful. These terms were defined and

operationalized to learn how students when applying IL to complete an academic assignment identify the sociocognitive user-view of relevance. The *Information Literacy Relevance Factors* reflect student perceptions of IL as meaningful (cognitive) and useful (socio) [3–6] in relation to academic work while using IL in the context of the post-truth era. The “implicitness” and multi-dimensionality of meaning of relevance as perceived by users were empirically identified in this study [1].

Using relevance theory as the theoretical framework, and applying theory to instructional practice, the user relevance perceptions of information literacy were investigated in the doctoral study.

The primary research question for this mixed methods sequential study asks:

- How is information literacy relevant to undergraduate student academic work, from a sociocognitive user view?

The secondary research questions ask:

- What are undergraduate student perceptions of the sociocognitive relevance of IL competencies to their academic work?
- What are factors impacting the sociocognitive relevance of IL competencies to academic work?

The first paper presented at ECIL on this topic by Kaufmann [7] provided preliminary thematic analysis of four focus group transcripts which unveiled one overarching or *Uber Factor* and six *Key Factors* of SCR to IL. Related to these *Key Factors* of SCR, fourteen *Dimensional Factors* of SCR to IL were identified. At the time the first paper [7] was written, the data analysis was still in progress, and two *Dimensional Factors* -personal relevance and professional relevance- were associated with the *Key Factor*, “Real-World Application”.

The *Key Factors* and *Dimensional Factors* and the interplay of meanings of these *Factors* are related, and intertwined. These *Factor* relationships are described as nuanced with shades of emphasis implicated by the language, context, and meanings that students shared in the second stage of the study using focus groups. The first paper [7] focused on the *Key Factor* described as “Real World Application”.

Information Literacy Relevance Factors [1] reflect the way students use IL to complete an academic assignment as a metacognitive “all at once” non-linear information experience. The intertwined, connected, and reflective metacognitive IL application, results in what is described as the Kaleidoscope Effect [1].

The top-level findings from Kaufmann’s doctoral study [1] are presented in this paper, in the context of the post-truth era.

2 Literature Review

2.1 Post-truth Era

The post-truth era and the notion of fake news is not a new phenomenon. Propaganda, gossip, political or social pressures influence how news is shared and is influenced by personal agendas and bias. Fake News tends to be sensationalist and extreme and designed to inflame passions and prejudices. Misinformation is information that is false but not

created with the intention of causing harm [8]. Disinformation, on the other hand is information that is false and deliberately created to harm a person, social group, organization or country. Disinformation carries the intent of spreading false or misleading information deliberately to deceive. This is a subset of misinformation [8].

Our post-truth era can be considered in context of an emerging information ecology where information is created, and abounds without filters [9]. In the recent past, before the internet and social media became easily accessible, news and information moved more slowly across populations and continents. False stories could be more easily filtered before being shared or propagated and perpetuated without questions or the processes to validate information avoided. As an information literate society applying critical thinking, the discipline of information literacy rises in importance for our academic, workplace and real- world successes.

“Post-Truth” was the chosen as the word of the Year in 2016 by Oxford dictionaries. Oxford Dictionaries [10] defines the term “post-truth” as “relating to or denoting circumstances in which objective facts are less influential in shaping public opinion than appeals to emotion and personal belief.” In short, people can believe whatever they want to believe as long as they *feel* it is right. The speed at which information is now shared has disrupted the traditional ways in which journalists corrected news that mistakenly was printed or reported. Apologies were part of that journalist culture, when or if appropriate.

Oxford Dictionaries president Casper Grathwoh referring to Post-Truth stated: [11].

“...Fueled by the rise of social media as a news source and a growing distrust of facts offered up by the establishment, post-truth as a concept has been finding its linguistic footing for some time.”

Metley, [11] writing for the online student voice, *ZU Media, Student Voice of Azuza Pacific University* states:

“If we live in a post-truth era, we need to become our own “fact checkers,” and make it our mission to be led by more than just feelings, but rather by a pursuit of the truth. Somehow having a wealth of information at our fingertips has made it more difficult than ever to be “certain” about anything. In an era of lies and delusion, let us all strive to be the exception to the post-truth era.”

Araujo postulates that post -truth is more than simply false information but rather a culture or ethos where there is a “disdain for truth” [12, p.27]. In our post-truth era information ecology, it is needful to recognize how information is collected, shared, content created and how traditional filters of information validity has transformed our cultures and the democratization of information. There are multiple factors at play in our new post-truth information era. Araujo notes that in the context of Information Science, there is a new “information reality” [12, p.1]. Traditionally in the field of information science, there were technical aspects of information retrieval, information systems and searching; and then social and cultural dimensions of information interactions and ecologies emerged. In the post-truth era, this has migrated to areas such as cognitive and confirmation bias, the disintermediation of information, the impact of social networks and algorithms, and the opportunity to reinvent truth based on individual opinions.

We can look across the globe to collaboratively work towards effectively addressing the post-truth era where fake news, mis- and disinformation are prevalent [13]. International Federation of Library Associations and Institutions (IFLA) has provided some very timely resources for our information literacy community to use and share globally. The first was a [How to Spot Fake News](#) Infographic, published in 2018, identifying eight steps for evaluating news sources and translated into multiple languages [14] and their recent update, published in 2020, addressing [Fake News the Covid-19 edition](#) [15] also translated into several languages.

2.2 Information Literacy as Relevant in the Post-truth Era

Charlie Warzel of the New York Times was recently quoted on the topic of the role of libraries in this age of mis/disinformation.

“Misinformation rides the greased algorithmic rails of powerful social media platforms and travels at velocities and in volumes that make it nearly impossible to stop. That alone makes information warfare an unfair fight for the average internet user.” [16]

A recent *WikiWisdom* report [17] identifies four recommendations or actions that public librarians, school librarians, academic librarians, special librarians and thought leaders may consider employing in order to address information literacy in the post-truth era. Each recommendation includes a statement of the problem, proposed solutions, and for each proposed solution evidence of why there is belief that the proposed solutions will work and measure of success.

Information experiences can lead us to understanding how to leverage and build on student “information assets” or their knowledge base for learning – something like how a kaleidoscope reflects and refracts light to adapt to new surroundings and “information”. Exploring the factors that make information literacy relevant to students in higher education can raise awareness and the consciousness of IL of how to teach and apply practical tools for students to use to evaluate information and identify potential bias, and differentiate between alternative facts and evidence-based facts.

An additional consideration is how “literacy” has also experienced an evolution in the post-truth era. In the last fifty years the term “literacy” has been understood as the ability to read and write but has emerged to include cultural situations, critical reflection, and draws on cognitive abilities, and one’s knowledge base informed by experiences [16]. As cited by Roostini [18, p. 3], Kern [19] identifies a sociocognitive view of literacy that encompasses seven principles that are situated in human communications.

These include:

- Interpretation
- Collaboration
- Convention
- Cultural Knowledge
- Problem solving
- Reflection
- Self-reflection
- Language use

These principles address how students work with the nuances of organizing their thoughts and learning of facts and address what Kern call the “second culture” [19, p. 17]. What Roostini identified by student interviews was that “if the learning is relevant to the students, they will actively participate and feel challenged, and will therefore be willing to learn.” [18, p. 7).

Budd [20, pp. 349–350] mentions the challenge for academic libraries in the post-truth era pertaining to information literacy instruction. Academic librarians can more intentionally consider theory, the concept of meta-literacies, and the essentiality of critical thinking as key components for future instructional work to teach and prepare an information literate society to support the democratization of information.

In terms of IL and relevance, Li [21] states that the more meaningful ILC are to the student academic experience, the greater the opportunity for student success, lifelong learning, and career success. Bruce [22] identified that information literacy is key for learning where there is continuous change in the scope, depth and breadth of information where learners are required to engage. This means that IL educators have the opportunity to capture what makes IL relevant and deliver IL instruction in a timely and dynamic information environment. This may be the catalyst for transforming the formal IL teaching and learning and connecting the dots explicitly to the everyday information and lifelong IL applications in “Real-World” information experiences.

3 Methods

This section will highlight the methods used in Kaufmann’s doctoral study [1] to investigate what makes IL relevant to college students.

This study used a mixed -methods, cross sectional two-stage sequential explanatory design to investigate the sociocognitive relevance of information literacy to students in higher education when used to complete an academic task.

Stage one used an online survey to gather quantitative data on undergraduate student perceptions of the sociocognitive relevance of information literacy competencies when applied to their academic work. There were ten information literacy competencies (ILC) identified and described for participants as listed below. These competencies were identified using both the *ACRL Standards of Information Literacy for Higher Education* [23] and the *ACRL Framework for Information for Higher Education* [24] which was in process of being adopted at the time the survey was executed. These ILC were mapped to the both the ACRL Standards [23], and the ACRL Framework [24] and then further refined using a pilot survey.

ILC as described in the online survey

1. Incorporate new information into your current knowledge.
2. Determine or identify the information needed for your assignment.
3. Select sources that meet your task (assignment) requirements.
4. Select sources that are academic created by experts or scholars and provide evidence for your writing making you a contributor to conversation in the academic community.
5. Evaluate information critically for its usefulness or ability to add value to your work.

6. Use information for your assignment considering economic, legal and social issues.
7. Recognize that information has value.
8. Use academic sources to follow your curiosity about the topic and expand your knowledge.
9. Use a process for information gathering.
10. Strategically explore and search, building a process of exploring, selecting and organizing information for academic work.

The first quantitative stage, measured “usefulness” [socio] and meaningfulness [cognitive] asking survey participants to rank the relevance of information literacy to the application of students’ academic work task using a four-point Likert-type scale. Scale reliability was analyzed using Cronbach’s alpha, resulting in a favorable .96 score. Usefulness was defined and operationalized in the study as the student perception of how valuable or essential the IL competency was when used to complete their academic task. Meaningfulness was defined and operationalized as to the importance of the IL competency when applied to the students’ academic task.

Stage two used focus groups to gather qualitative data to further describe, expound on and identify the factors that make information literacy competencies sociocognitively relevant to their academic work. The focus group data revealed more in depth descriptions of the student perceptions and information experience. Using thematic analysis of the qualitative data, the *Factors* that make IL sociocognitively relevant were identified. Thematic analysis is a method used for qualitative data analysis to identify, analyze and report patterns within data [25].

4 Findings

This section provides a summary of the findings from this this doctoral study investigating: What makes information literacy relevant to students in higher education?

4.1 Stage One: Quantitative Findings

Quantitative data was collected using an online survey for the first stage of the mixed methods study. More specifically by operationalizing the terms usefulness and meaningfulness the survey collected quantitative data to measure sociocognitive relevance. This provided new data and answers the first secondary research question: What are undergraduate student perceptions of the sociocognitive relevance of IL competencies to their academic work?

The purposive participant survey pool included 392 undergraduate students. There were 139 valid responses, providing for a 35% initial response rate. There were qualifying questions early in the survey and participants were instructed they were not obligated to answer all questions and could exit the survey at any time. Of the 139 initial responses, seven participants chose not to continue. The qualified participant pool for the survey was 132 students, and some of the questions have different participant response numbers as per the survey instruction parameters. Fourteen different classes that had writing assignments were represented by the participant pool from a variety of disciplines.

Overall, qualified participants ($n = 132$) indicated that ILC were relevant to the successful completion of their academic work, with slight variations for certain ILCs identified as more useful or more meaningful. On the 4-point Likert-type scale there were slight but important distinctions of perceptions of usefulness and meaningfulness of ILC across the spectrum of ILCs. Future examination and analysis is suggested for more in-depth understanding of the SCR elements and IL.

The survey data also shows that as students apply ILC to their academic work, there is a high percentage of self-reported improvement in ILC (C Improve Scale). Participants were asked to use a sliding scale to rank their perceived improvement. The average degree of improvement from participants who responded to this question ($n = 115$) was 59.46; median degree of improvement 60 and the mode was 50. Six participants indicated no degree of improvement. The standard deviation was 26.25.

The bivariate analysis using Spearman’s Rho (Rs) indicates weak associations of ILC to Required Sources, Competency Improvement Scale, Academic Status and Age. This analysis was used for rank correlation to measure the association between the SCR of ILC and ordinal/demographic/contextual variables.

The bivariate analysis using Lambda as an asymmetrical measure of association was suitable to use with the ordinal by nominal variables: Academic Programs, Student Status and Gender. The Lambda analysis data indicates there is not a strong association of any paired nominal variable to the SCR of ILC.

These bivariate analyses indicate that perhaps there are other factors not yet considered that may be more impactful to the relevance of ILC to student academic work. This allows for new understanding that these demographic and other descriptive types of student attributes are not necessarily the types of data that are most impactful for SCR of ILC, when applied to academic tasks. Rather, other factors may be more impactful to the relevance of ILC from a user or subjective relevance view.

4.2 Stage Two: Qualitative Findings

Qualitative data was collected using focus groups for the second stage of the mixed methods study. More specifically, focus group participants identified certain benefits, and provided descriptions, and insights of their information experience using ILCs to successfully complete their academic writing assignment. The analysis of this data provides some answers to the first secondary research question: What are factors impacting the sociocognitive relevance of IL competencies to academic work?

A general summary of the benefits of using ILC to complete their writing assignments emerged from the qualitative data.

- Students using ILC experienced faster completion of the assignments
- Students experienced less procrastination because they were more confident about applying ILC to complete the academic work assigned to them.
- Improved papers or improved final products were identified by participants who applied ILC to their academic work.
- Participants cited they were more confident in the evidence (finding and using authoritative sources) being produced in the academic writing assignment.

A thematic analysis of the qualitative responses, provide the following sociocognitive relevance factors that make IL relevant to students in higher education in our post-truth era.

There are ten *Information Literacy Relevance Factors* identified as *Uber* and *Key Factors* of SCR identified. Beyond the *Uber Factor – Knowledge Base*; and nine *Key Factors*, are eleven *Dimensional Factors* that can be utilized for more in-depth consideration.

Key Factors (9) reflected as the student experience include: Digital Literacy, Specific Academic Disciplines, ILC Awareness, Acquiring New Knowledge, Real World Application, Using a Research Process, Critical Thinking, The Scholarly Conversation, Engaging Curiosity-Passion-Motivation.

Dimensional Factors (11) reflected as student perceptions/views include: User Friendliness in Digital Environments, User experience in Digital Environments, Current Information, Authoritative Sources, ILC articulate, ILC Integration, ILC Instruction, Personal Relevance, Professional Relevance, Organizing Information, Comprehension.

The *Factors* that make IL useful and meaningful are non-hierarchical but are related and reflective lending to the notion of metacognitive information experiences. The shared origin of relationship stems from the *Uber Factor – Knowledge Base*. It is from this *Uber Factor* that all the *Factors* of IL SCR share an origin.

Key and *Dimensional Factors* then spontaneously emerge as part of the information experience (*Key*) and perceptions and views (*Dimensional*). The spontaneous *Factor* presence reflects the metacognitive way students experience and perceive IL to be useful and meaningful to their academic work. Here are some quotes to exemplify *Information Literacy Relevance Factors*.

Uber (Knowledge Base)

“Useful because you can use it [ILC]: meaningful because you can use it over and over, so now you know how [Knowledge Base], and it’s just useful for any of your other assignments.”

Key (Student Experience)

Key Factor: Digital Literacy

“Like when we would look for books that we would need for our project I felt it very important with the way the system was able to find those easily. I thought it was cool that it did seem rather easy to access the books (Useful). I feel that being able to search for information like the books, would be very relevant because otherwise you wouldn’t be able to research information at all. And then you wouldn’t be able to gain as much knowledge (Meaningful) and you wouldn’t do as well in college.”

Dimensional (Student Perceptions/Views)

Dimensional Factor: ILC Articulated

“The more we know the more (ILC) vocabulary we understand.”

“Yes, they (ILC and vocabulary) were more relevant when you went over examples of how to do this and that...”

“Maybe, if you’re going to be telling the students...you could tell them how it’s not just relevant for here at the college, but later in life you’ll probably need to be able to use information literacy being able to get good sources.”

As noted earlier, the information literacy competencies in this study were mapped to the Association of College and Research Libraries Information Literacy Framework [24] and Standards [23]. Using the theory of relevance as a framework, findings contribute to the growing literature in information literacy and the nascent space in information science literature on sociocognitive relevance [26–29].

5 Discussion

This discussion will highlight how sociocognitive relevance was measured as being useful and meaningful using quantitative analysis. Together with the qualitative data thematic analysis, *Information Literacy Relevance Factors* were identified that specifically address the sociocognitive relevance - a subjective type of relevance- of information literacy. The *Information Literacy Relevance Factors* help us understand a *Kaleidoscope Effect* that users experience that make information both useful and meaningful in the post-truth information era. The *Kaleidoscope Effect* is part of the metacognitive information experience that users have as their consciousness or awareness of information literacy as being useful and meaningful emerges. The factors will be explained and various applications of using these *Information Literacy Relevance Factors* will be identified.

5.1 Factors of IL Sociocognitive Relevance and the Post-truth Era

The *Uber Factor* is the overarching knowledge base that students bring with them to the learning landscape. This includes both disciplinary knowledge or background information as well as information literacy competency knowledge and their experiences using information to learn, research, write and cite. This tacit knowledge or the user knowledge base impacts the relevance of information literacy as they use IL in their information academic experience. Helping students identify this asset – what they know – can assist in building user relevance across disciplinary content while applying information literacy competencies to their academic work. This is indicated in the findings from the study as the study participants in the quantitative and qualitative stages were using IL across a disciplinary spectrum of programs [1, pp. 85–86].

Key Factors are experienced and perceived by users at different levels, in different ways, and may be intertwined, connected, influenced or somehow impact other *Key* or *Dimensional Factors* by users.

Dimensional Factors are identified by student perspectives, views or perceptions related primarily to a *Key Factor*, but not exclusive to that *Key Factor*.

This is the *Kaleidoscope Effect* [1, pp. 180–182] experience users expressed while using information literacy competencies to complete academic work. What emerges from the data is a kaleidoscope of *Factors* – *Uber*, *Key* and *Dimensional*. This information experience, in context of using IL to complete academic tasks, reflects the intertwined,

overlay and the ways students experience and perceive IL to be SCR. This may inform also, the way in which we can more effectively communicate the need for IL in our post-truth era. Enhancing critical evaluation of news and information, and recognizing the meta-literacies needed in our post-truth era information ecologies is essential. Paving the way with data as to what makes information literacy relevant situates information literacy as a more common part of the information ecology vocabulary. This raised awareness of what information literacy is and what makes information literacy relevant provides the opportunity for more intentional conversations in academia, the workplace and for a more informed information literate citizenship. The sociocognitive elements of relevance in our post-truth era provides a new paradigmatic approach in information science, such as raising the awareness in LIS curriculum [16, 17] and verifying authenticity of information sources [10, 13].

When considering the *Factors* that make IL relevant to students in higher education in our post-truth era and teaching with these *Information Literacy Relevance Factors* in mind, we may find ways to talk more explicitly in our higher education communities about ways to engage with information in our post-truth era. This is an opportunity to teach IL knowing what makes IL relevant to students in higher education so they are empowered and confident to critically analyze information that they engage with every day and in their academic work.

Poll and Payne [30] remind us that “The most prominent and consistent determinant of information literacy is student perception.” The factors that make IL sociocognitively relevant in our post-truth era are identified as student perception data using a pragmatic epistemological approach using the sociocognitive relevance lens, providing new data to understand this subjective type of user relevance as related to information literacy for academic work.

5.2 Information Science and Factors of IL Sociocognitive Relevance

Araujo [12] notes that over the past six decades of information science existing as a discipline there have been changes that include the initial information systems paradigm, to the systems and information retrieval paradigm, to the more recent cognitive and user centered paradigm. This evolution in information science had shifted or expanded information science to include the concept of the user view with research and exploration on how the user relates to information and their information experience. This emerging user view in information science and studies conducted in this area over the last few decades leads us to understanding that user’s lean-to the knowledge they already know, their current knowledge base. That knowledge includes both cognition and social and cultural influences. This has also impacted the epistemological views for information science as cited in Araujo [12].

Our post-truth era information ecologies provide new ways to think about teaching and communicating about information literacy in higher education and beyond.

6 Contributions

Using the *Information Literacy Relevance Factors* to inform our teaching pedagogies, students can identify their own information literacy assets – what they already know – starting with their Uber Factor - *Knowledge Base*. Hence, students can connect ways they use information in their “real world” to the academic information ecology and raise the relevance of information literacy for their academic work in higher education. This non-linear information experience is more explicitly identified as a metacognitive learning space, or a kaleidoscope experience. - *The Kaleidoscope Effect*.

The factors that make information literacy relevant may be used to inform practical pedagogical constructs and instructional design applications to instructional settings by combining information literacy relevance factors with asset-based pedagogy [31]. Situated in our post-truth information environment the *Information Literacy Relevance Factors* may prompt critical analysis and examination of these constructs and ways to further develop teaching and learning praxes. How students engage with information for their everyday needs in the “*Real World*” - may be the very assets that can be capitalized on in order to identify transferrable skills for students to use in their academic work.

Identifying *Information Literacy Relevance Factors* and applying them intentionally to teaching and communities of learning. More explicitly talking about *Information Literacy Relevance Factors* with educators and students is now more easily accomplished and handy for conversations in the classroom and in professional and academic circles. The conversations may be more conveniently and comfortably scoped around these *Information Literacy Relevance Factors* as applied and used every day in information experiences in the post-truth era.

7 Conclusion

Using the *Information Literacy Relevance Factors* combined with an asset-based versus a deficit-based approach to teaching information literacy; grounded in the *ACRL Framework* [24] we can explore how to mesh relevance theory into our teaching strategies and pedagogical strategies for a balanced approach to preparing students in higher education to engage with information in our post-truth era. The *ACRL Framework for Information Literacy for Higher Education* [24] defines six frames as threshold concepts and provides a pathway to situate teaching information literacy more intuitively, which unleashes a metacognitive information literacy learning experience. When the *Information Literacy Relevance Factors* are applied to instructional design, the likelihood of more engagement, critical thinking and analysis of the information students use in higher education in order to learn and compete academic assignments can be positively impacted, ultimately raising the relevance of information literacy in our post-truth era.

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Promoting Lifelong Information Literacy Throughout Schooling: The Role of Dispositions

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Abstract. The ultimate goal of information literacy (IL) theory and instruction is to prepare people who are first students and then adults to continue learning throughout their lives from the multitude of information sources that surround them. Academic librarians in the United States have adopted the Framework for Information Literacy that encompasses threshold concepts, knowledge practices, and dispositions. The Threshold Achievement Test for Information Literacy (TATIL) by Carrick Enterprises was developed to measure all of those pieces. I deployed two different modules of the test in an undergraduate course with over 200 students. I used the results of the disposition tests and overall information literacy to understand how information literacy theory can be advanced toward a more active focus on critical thinking and attitudes of students that will persist throughout their lives.

Keywords: Information literacy · Threshold concepts · Dispositions · Critical thinking

1 Introduction

The questions that animated this project were inspired by a research-based model proposed by Annemaree Lloyd [1] that combines the conceptualization of information literacy derived from research on information behavior with the guidelines created by practitioners for IL instruction to form a model that places both perspectives within contextual information landscapes. As students move through schooling levels, their information landscape changes, and they must employ a different set of literacies and modalities to navigate the new situations. In Lloyd's model, library practitioners enact their teaching model from the circle of "literacies of information" including all of the many forms that have been investigated such as information, visual, media, digital, and health. Researchers have a different vantage point; they have focused on the central "information environment" – the part of the landscape where people find themselves confronting a particular information problem. The focus of information behavior research is on the individual's own decisions within the landscape, applying the resources and literacies to solve the contextualized problem.

A vast literature on information literacy has been produced since the concept was first described by Paul Zurkowski in 1974 [2]. In the beginning, the concept was primarily in

the context of helping professional people attain a level of competency with information gathering and use in order to make good decisions. Over time it became clear that information was needed in every facet of life and information literate people would need to expand their skills throughout their lifetimes. This study tried to shed light on the guidelines promulgated by practitioners and aimed at college students while interrogating whether the relatively new addition of “dispositions” to those guidelines might lead to a more holistic view of lifelong learning. In order to understand the questions, it is first necessary to understand the guidelines and standards, the dispositions, and the measurements used.

1.1 Information Literacy Guidelines and Standards

Starting in 2011, members of the Association of College and Research Libraries (ACRL) realized that instructional guidelines issued by the Association [3] were inadequate to address the multimodal literacies and the variations in disciplinary information environments that were now part of the higher education information landscape. As the *Framework for Information Literacy for Higher Education* document notes, “the rapidly changing higher education environment, along with the dynamic and often uncertain information ecosystem in which all of us work and live, require new attention to be focused on foundational ideas about that ecosystem.” [4] Adopted in 2015, The *Framework* strives to instill a lifelong information literacy that will apply in all contexts, though many of the knowledge practices are useful primarily within academic settings.

The move from a set of standards to the more open and flexible frames model has been welcomed by most practicing information literacy instructors across higher education. One notable dissent from within the ranks of ACRL was from the two-year college community who felt that the move away from standards were difficult to implement in curricula that emphasize speed and general education [5]; for a rebuttal see work by Swanson [6]. The researcher community was also not convinced, as Tefko Saracevic outlined at this conference in 2014 [7],

- threshold concepts were under-researched and “agent relative”, or tied to the individual
- knowledge practices were undefined and appeared to be holdovers from the standards.

Saracevic did not discuss the dispositions at that time.

Each of the six frames are considered threshold concepts that are foundational to information literacy and were derived from a single Delphi Study with library practitioners that was unpublished at the time of the adoption of the *Framework* but can now be found in the article by Townsend, Brunetti, and Hofer [8]. The frames have been adapted to fit numerous disciplines and contexts, see for example case studies in [9], and most articles have focused on how to instruct students to build their understanding and application of these concepts to their information problems within secondary level education.

Each frame is described by a set of “knowledge practices” and a set of dispositions. Knowledge practices are defined in the document as the “proficiencies or abilities that learners develop as a result of their comprehending a threshold concept” [4] while dispositions are defined using a reference to a 1994 conference paper as “a tendency to act or

think in a particular way.” [4] More specifically, a disposition is a cluster of preferences, attitudes, and intentions, as well as a set of capabilities that allow the preferences to become realized in a particular way”. The concept of personal characteristics, or dispositions, comes from education theory where it has been studied by researchers interested in teaching critical thinking skills at all levels of education [10, 11]. The *Framework* document lists between 5 and 8 dispositions that are purported to be related to each of the six frames that can be used to view information literacy, but these connections are not based on empirical data.

It should be noted that at the same time the *Framework* was being enacted, the American Association of School Librarians (AASL) was at work on guidelines that were released in 2018 [12]. Because there was little cooperation between the groups, the language used to describe some of the desired outcomes were quite different. Especially interesting is that the desired dispositions that students should develop are differently described in that document. However, the two documents were reconcilable as shown through a crosswalking process done by Elizabeth Burns, Melissa Gross, and Don Latham [13]. There has been some work done in the United States to show the transition from two-year community and technical colleges to four-year baccalaureate institutions, see for example [14]. There is much work to be done, however, since truly understanding the progression of information literacy across a lifespan would require studies that examine students as they progress from primary to secondary to tertiary education.

1.2 Dispositions

Information literacy requires critical thinking about the sources people use to create their own knowledge. Though it is not specifically mentioned in the *Framework*, the document does talk about the concept of IL as a metaliteracy that includes references to the critical thinking processes required for using information [15, 16]. A later article by Fulkerson, Ariew, and Jacobson describes the move away from the use of metaliteracy as a founding concept in the *Framework* because it diluted the focus on critical thinking [17].

In one of the major texts on cultivating strong thinking through education, Diane F. Halpern discusses dispositions as attitudes that are necessary antecedents to good critical thinking [11]. In Table 1, Halpern’s language is placed in the first column and compared to the two frames from the *Framework* that were used in this study by the TATIL tests and employed in this study. The constructs are considered equivalent across each line of the table but these relationships reflect the author’s own sensemaking and paraphrasing and have not been tested. It can be seen, however, that the language changes considerably between the columns.

The connections between critical thinking and dispositions are still being investigated in education [10]. Certainly, they have been used rarely in information literacy practitioner studies.

Table 1. Halpern's critical thinking attributes compared to two ACRL frameworks.

Halpern	Authority is constructed frame	Information has value frame
Willingness to plan		
Flexibility	Question how authority is granted	Value the effort needed to produce knowledge
Persistence	Motivation to find authoritative sources	See themselves as contributors to knowledge
Willingness to self-correct and change your mind	Maintaining these attitudes and actions requires frequent self-evaluation	Are inclined to examine their own information privilege
Being mindful	Open mind to conflicting perspectives	
Consensus seeking	Skeptical assessment of content	Respect the original ideas of others

1.3 Information Literacy Assessments

A number of tests to measure levels of information literacy were developed under the original ACRL Standards [3], including one called Project SAILS: Standardized Assessment of Information Literacy Skills by Carrick Enterprises [18]. At the time of this study, Spring 2019, the company had developed four modular tests based on the Framework called the Threshold Achievement Test for Information Literacy (TATIL). These modules included questions that were scored to show what they termed “knowledge outcomes” that are comparable to ACRL’s knowledge practices. It also measured dispositions for each of the TATIL tests. The scores reported by the company are criterion-referenced and based on standards set by a panel of instructional librarians [18]. In order to measure dispositions, the TATIL test questions looked for behaviors by posing scenario based questions that required students to answer what they would do in those circumstance [18]. Table 2 lists those behaviors. Further information about the tests will be provided in Sect. 2.2.

1.4 Research Questions

The questions I asked were:

- R1. Do dispositions measured using the TATIL test vary significantly across demographic characteristics including racial/ethnic identity, gender, generation, or class rank?
- R2. Did prior exposure to information literacy instruction affect student performance on the TATIL information literacy scores or on the type of dispositions exhibited?
- R3. Do dispositions predict information literacy?

Table 2. Behaviors tested in two TATIL tests (EPA and VOI).

TATIL test behaviors	EPA	VOI
Mindful self-reflection	<ul style="list-style-type: none"> • Challenge source of trustworthiness • Question the reliability of traditional scholarly authority • Recognize good reasons to change position on an issue 	<ul style="list-style-type: none"> • Use existing intellectual property to inspire new work without violating the creator's rights • Participate in informal networks of dissemination • Recognize ways to reduce the negative effects of the unequal information distribution
Toleration of ambiguity	<ul style="list-style-type: none"> • Decide what to if/when authorities disagree • Use traditional and non-traditional information sources • Treat authority as a flexible concept 	
Responsibility to community	<ul style="list-style-type: none"> • Be responsible to the discourse community by using sources properly • Recognize that the discourse community determines authority and propriety • Take responsibility for critical evaluation and explaining authority to a work's audience 	<ul style="list-style-type: none"> • Access scholarly sources through formal channels • Avoid plagiarism in their own work and discourage others • Recognize the value of their own original contributions to discourse

2 Methodology

2.1 Research Design

I used two TATIL tests, based on two ACRL frames from the Framework, in this research: *Value of Information* and *Evaluating Process and Authority* both of which are described on the Carrick Enterprises website [18, 19]. I administered the tests in January/February 2019 and repeated the tests in April/May 2019. Participants were students in sections of a semester-long general education course for undergraduates from a variety of disciplines entitled *Information Use in a Digital World*, offered in a mid-sized public university in the southeast United States. This course had recently been designed and implemented and the tests were primarily intended to be used to evaluate the effectiveness of instruction. Students were provided with extra credit if they participated in any way, including simply signing into the online tests.

Although not only about information literacy, many of the concepts involved in the ACRL Framework are included in the class. The author did not teach any of the

classes. Course faculty asked students to take two online tests at their own convenience; each participant controlled the time, place, and setting. The tests were open for a set period of time. Each participant logged into the test with their email and was given an identification number. The number was used to match demographic and information literacy preparation question responses with overall information literacy and disposition scores at the two time periods and between the two tests.

2.2 The Tests

The TATIL that I administered were Module 1: Evaluating Process & Authority (EPA) and Module 4: Value of Information (VOI). The tests provide an overall score for all of the performance indicators and measures of either 2 (VOI) or 3 (EPA) Dispositions (see Table 2). The scores provided are composite scores that include responses to a number of questions. The scores are reported as comparisons to composite scores from students who took the tests at comparable institutions.

One of the original purposes of using the TATIL was to assess the quality of instruction in the LIS 200 undergraduate course, so I gathered a pre-test and post-test score. However, the underlying questions about the dispositions were more about the personal characteristics prior to arriving in that classroom, so only pre-test results were used. The precise measures were Pre-EPA Overall Information Literacy Score, Mindful self-reflection, Toleration of ambiguity, and Responsibility to community, and Pre-VOI Mindful self-reflection and Responsibility to community.

It was also important to compare scores on the Pre-EPA and Pre-VOI tests. The behaviors looked for across the dispositions on these tests are similar.

2.3 Demographic and Information Literacy Prior Preparation Questions

The tests provided a space for me to add questions. These were:

- Generation membership
- Racial/ethnic background
- Gender identity
- Class standing
- Prior IL Instruction
- Prior IL Instructor
- Use of libraries

2.4 Participants and Prior Schooling

Out of 250 students enrolled in the course, 144 participated in some way. I asked the participants about their class standing and found that 11.1% were Freshmen; 28.4% Sophomores; 29.2% Juniors; and 32.6% Seniors. Demographics reveal a diverse set of participants with 13.0% Latino or Hispanic, 25.7% Asian, 25.7% Black, 45% White, and 8% with more than one race/ethnicity; 3% did not disclose their ethnic or racial identity. Rather than ask for age range of the participants, I asked a question about the generational

descriptor that best described each participant. In this way, 91.7% identified as being a member of the iGen (born between 1996-present); 6.9% were Millennials (born 1980 to 1995); 1% were GenX (born 1965 to 1980). Gender identity choices in the survey were broad but the results were binary, 56.9% identified as female while 41.7% identified as male; only 1 participant chose “other gender identity”. A question about the language spoken in their homes revealed that 28.6% used a language other than English there.

In order to ascertain prior information literacy preparation, I asked questions about their prior schooling, general library use, and how they might have been taught the basics of using library information. A library was available for 94% of the participants in the school that they attended before coming to the university. A librarian did not necessarily teach library and information skills; 53% were taught by a librarian, 32.6% said that teachers had provided IL instruction, 2.8% were taught information literacy skills by a public librarian, and 10.4% said that they had received no instruction at all. Other library use was also revealing: 11.8% of the participants reported that they never use a library of any kind while 74% said that they use a public library and 11% had used a community college library.

3 Results

3.1 Demographics

In research question 1 I asked whether demographic characteristics correlated with particular disposition scores or overall information literacy. My analysis revealed that there was no correlation between racial identity, generation marker, gender, or class standing with either the dispositions or the overall score on the Pre-EPA test. There was a weak and negative correlation between gender and the VOI Community measure ($r = -.220$, $p = .05$) but none with the EPA Community.

3.2 Dispositions and Information Literacy Instruction

I analyzed correlations between prior information literacy instruction and either overall information literacy scores or types of dispositions exhibited in order to answer the second research question. I found a weak but positive correlation between the participants' reported use of other libraries and both Pre-EPA Ambiguity and Community at the .05 level. The majority of participants (75%) said that they used a public library, while 11.8% said that they “never use a library”. The concept of library use was ill-defined in the survey; how the libraries were used was not clarified in the question.

More interesting is the measured dispositions effect on the overall scores and on each other. Significant results can be summarized as:

- Pre-EPA and pre-VOI overall scores were related ($r = .498$, $p = .01$)
- Mindful reflection correlated with the overall score on both pre-EPA ($r = .285$, $p = .01$) and pre-VOI ($r = .433$, $p = .01$) tests.
- Community was strongly and positively correlated with the overall score on the pre-VOI ($r = .535$, $p = .01$).

- Community and mindful reflection were correlated with each other on the pre-VOI ($r = .470, p = .01$)
- Community on the pre-EPA and on the pre-VOI were significantly related ($r = .324, p = .01$)
- Pre-VOI Reflection and the pre-EPA overall score was ($r = .350, p = .01$)
- Pre-VOI Community and Pre-EPA overall score ($r = .511, p = .01$)

Therefore, Research Question 3 can be answered in the affirmative. Dispositions do affect the overall information literacy of this population. In addition, the dispositions are related to each other.

4 Discussion

None of the standard demographic descriptives correlated with overall information literacy scores on either of the TATIL tests taken. In other words, it did not matter what age group, class standing, ethnic group, or gender the student was there was not a strong affect on their general information literacy. It makes the job of information literacy practitioners more difficult to not be able to pinpoint that Freshmen need more information literacy or that a particular ethnic group may need more instruction. As Saracevic pointed out, attaining the level of information literacy that is transformative is an agent-relative exercise. Each student must be treated as an individual with a multiplicity of starting points.

There were three participant characteristics that did relate to the dispositions, prior schooling impacted the Community score on pre-EPA while general library use, and gender was negatively related to the measures of community in the VOI context. The effects were not strong but they do show that instruction impacts the dispositions.

Very few participants came from a school that had no library and the number of students who admitted never using a library was low. But just the presence of a librarian does not correlate with information literacy in this particular study unlike the conclusions reached by school library researchers [20]. In fact, instruction by a librarian or the presence of a library in the participant's prior education was not effective either as there were no differences between participants who were taught about information literacy by a librarian and those taught by a teacher. However, this does not answer whether a librarian can impact the quality of instruction provided by teachers.

The strong relationship between community, reflection, and overall information literacy shows that dispositions can be cultivated and will impact information literacy. Does the community disposition remain constant across different domains? If health literacy or science literacy measures were used instead of information literacy would the disposition scores be the same? That cannot be ascertained from this data.

5 Conclusion

Dispositions are important to overall information literacy in some way. But the diversity of language used by the TATIL test, the critical thinking literature, and the *Framework* does not create a clear path forward. Work in critical thinking by Dwyer [10] and others

needs to be used more productively by practioners and researchers in the information literacy field.

As Annemarie Lloyd wrote in her grand unifying theory of information literacy, “Unless those who engage in IL research can come towards [a] more holistic understanding of the field, it will remain trapped in an agenda of disjuncture and divergence that fails to evolve.” I propose that the philosophically rich and important area of dispositions and correspondingly, critical thinking, are two areas that need to be constructed more holistically with research driven results.

5.1 Limitations

The TATIL test questions are proprietary and the results on the measures of Mindful Reflection, Tolerance of Ambiguity, and Responsibility to Community are based on composite scores. This limits the generalizability of the results outside of the testing situation. I gathered the data in a hybrid in-person/online class and the tests were administered entirely online. Therefore, the testing conditions were not ideal and may have invalidated the results. Finally, I acknowledge that the post-COVID world is quite different from that in 2019, however, there has not been an opportunity to gather more recent data.

5.2 Implications

Whether information literacy is a multiliteracy or not a literacy at all is still in question. If there are no differences in either pre-test or post-test scores based on social demographics, and even the effect of instruction is in question then it may be that there is nothing there. An intriguing recent paper by Griesbaum, Cetta, Mandl and Montanari reviewed the position papers of 19 experts in the field [21]. Their conclusion was that research skills are predominant and are domain or discipline specific. They also noted that critical thinking and ethical use of information are inextricably linked to the cultivation of these skills.

Critical thinking and ethical use are embedded in the dispositions. But a better frame for them must be created and Lloyd’s model is a good start [1]. It is unclear at present whether these results fit in the model. But it would be helpful if we, the researchers from both theoretical and practical perspectives, could agree to adopt parts of it as we move forward. We must agree on the definitions of these concepts so that they can be measured successfully. And those must be applied across areas of schooling.

Three of the areas of development identified by the experts in the work by Griesbaum, Cetta, Mandl, and Montanari were the evaluation of information as the central subcompetence, improved integration of learning provision across levels, and fostering motivation. [21] Mindful self-reflection, toleration of ambiguity, are related to these concepts. Understanding them, agreeing what they are, and that they operate in multiple frames and domains is a necessity.

5.3 Further Research

I plan deeper statistical analysis of this data set. The use of TATIL as a measure needs to be further verified in other studies. Real lifelong learning and its relationship to information

literacy is elusive but it starts with using a common set of understandings across levels of schooling in the United States and internationally.

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Assessment and Evaluation of Information Literacy



Assessing Media and Information Literacy: Teenagers' Practices and Competence in Information Search and Multimedia Creation

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Abstract. This article introduces the theoretical framework, method and first results of an international study on the assessment of teenagers' Media and Information Literacy (MIL) in online information search and multimedia creation in four French-speaking countries. The results presented focus on the levels of general MIL competence self-reported by Belgian and Swiss adolescents, the relationship between their competence and their media and information practices, and the influence of gender on their self-reported competence and practices.

Keywords: Media and information literacy · Competence assessment · Media and information practices · Information search · Multimedia creation · Gender gap

1 Introduction

Media and Information Literacy (MIL) is an integrative concept promoted by UNESCO [1], situated at the convergence of two intellectual traditions, media literacy (ML) and information literacy (IL). In this article, we present the theoretical framework, methodological design and first results of *Littératie médiatique des adolescents (LM-ados, The Media Literacy of Teenagers)*, an international collaborative research program involving four French-speaking universities¹. This project seeks to develop and validate tools for assessing the media and information literacy competence levels of lower secondary school students in information search and multimedia creation, and to assess these levels in schools in the four participating regions: French-speaking Belgium, Quebec (Canada), Normandy (France), and the Canton of Geneva (Switzerland). While our work is grounded in the media literacy tradition, we recognize the convergence of ML and IL into MIL as largely relevant to the project presented in this paper.

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2 Theoretical Framework and Research Objectives

ML and IL traditions propose extensions of the concept of literacy and share an historical emphasis on analytical and critical abilities [2]. Both are also home to diverging views on literacy: from cognitive approaches focused on the standardized measurement of the knowledge and skills individuals must master independently of the context in which they are exercised, to critical-cultural approaches that question the very relevance of these assessments and favor qualitative thick descriptions of culturally and socially situated literacy practices. Accordingly, Martens [3] frames the field of ML as the coexistence of an information processing approach centered on the individual's cognitive abilities and a critical-cultural approach centered on the contextual nature of media practices. Similarly, the field of IL has been historically crowded with processual models of information use centered on cognitive skills that position information as a commodity; see [4] for a comparison of four such models. Alternative approaches include qualitative analyses of information practices focusing on how information is experienced by individuals [5], as well as work centered on “information cultures” [6].

2.1 Media and Information Literacy (MIL) as Competence

Taking a middle path between the cognitive and the cultural approaches to literacies, we consider MIL as the expression of *competence*, manifest in one's *competent situated action* [7]. Competence exceeds the mere mastery of knowledge and skills and involves selecting and combining relevant knowledge and skills (considered as internal resources) “to adapt oneself to novel situations in new and non-stereotypical ways” (our translation) [8]. Defining MIL as competence implies considering it both as situated and assessable. MIL competence assessment emphasizes the importance of designing meaningful situations for students to engage and act in. In our research program, online information search and multimodal digital content creation were chosen as meaningful activities (1) that may potentially be part of most adolescents' habitual media practices, (2) could be combined into a single activity (creating a blog post based on the results of an extensive online search—see below), and (3) could be used to design novel complex tasks as part of an assessment instrument. Our work pursues four general research objectives related to MIL competence assessment (see [9] for details):

- **Objective 1: Explore the varying complexity of MIL through its assessment in motive-oriented activities and in their constitutive actions.** Assessing competence calls for the observation of performances in tasks that represent contextualized activities with a meaningful motive. Tasks need to be novel (in other words, to require the student to determine their relevant features) and complex (in other words, to require the selection and combination of multiple internal and/or external resources) [10]. We assess MIL through a *complex* task corresponding to a motive-oriented activity, creating a multimodal blog article detailing the results of an extensive web search. This task is decomposed into *simplified* tasks corresponding to its constitutive actions [11] (for example, assessing the relevance of a web resource for one's search), calling upon a subset of the knowledge and skills it requires.

- **Objective 2: Elucidate the relationship between perceived MIL competence and measured MIL competence.** We seek to collect both performance-based measures of MIL as well as self-reported measures to gauge the validity of self-assessment at the two levels of activities and actions (see Objective 1).
- **Objective 3: Explore the link between media and information (MI) practices and MIL competence at home and at school.** We examine how home and school uses of media and information may be associated with students' MIL competence.
- **Objective 4: Examine factors affecting students' ability to engage in the assessment tasks and, hence, the exercise of their MIL competence.** These factors include the student's gender, the type of education they are enrolled in, the socio-economic index of their school and urbanization degree of its neighborhood, their learning readiness, or the classes they attended in media, information, or digital literacy.

Within the general framework of our research program, the focus of this article is on objectives 3 and 4: exploring the relationship between perceived levels of competence and practices, and the influence of gender on perceived competence and on practices.

2.2 MIL Competence and MI Practices

A host of studies has highlighted how digital skills affect the breadth and depth of online engagement [12, 13]. These studies also address how much content internet users produce [14] and share [13] in a context where only a minority engage in production activities [15]. Conversely, studies that examined whether online practices support the development of MIL skills or competence have yielded mixed results. The use of digital technology does not guarantee the development of skills beyond basic operational abilities [16, 17] nor does internet use guarantee the quality and quantity of personal digital content production (such as websites and blogs) [15]. However, the versatility of technology use seems to support the development of information skills [18] and media literacy competence seems to be supported by more varied media reception practices and more specialized production practices [17]. Finally, young people's digital skills have a complicated relationship to school: their communicative and playful digital practices help them develop relational skills connected to identity construction that are not prescribed or recognized by the school institution [16]. Indeed, as young people use digital technologies more frequently at home than in educational settings [19], youth digital culture develops outside of school as a means to stay connected to one's peer group.

2.3 Gender Differences in MIL Competence and MI Practices

Several studies have looked at the relationship between gender and MIL competence or MI practices. Some showed no difference between boys and girls in perceived [20] or assessed competence [21], both in relation to information search and digital content production. Other research found that girls were more competent than boys in all competence domains [22], while still others found men to be significantly more competent than women [12]. In some studies, boys reported having a better command of the technical side of digital creation (for example, website creation) [23] while girls reported being more skilled in evaluating search results [18]. However, some of these gender gaps may

have less to do with actual competence than with perceived competence as women tend to rate themselves lower than men [24].

Gender differences in MI practices are also the subject of diverging results. Young men have been reported to have more diverse online information search practices [12, 18]. Men have also been shown to engage in digital creation practices more often: for example, American men were one and a half times more likely to produce a website than women [25]. While a decade ago, women were shown to search for information online less often than men [12], a more recent study found that young women used the internet more than young men to share or search for information, consult news and tutorials, create content, and create videos, images and photos [23].

3 Method

3.1 Assessment Instruments

Consistent with the objectives of our project, the general protocol of our research articulates several types of assessment instruments [9]. These include a complex task and a series of simplified tasks (see Sect. 2.1: Objective 1). Each simplified task corresponds to one aspect of the complex task, yielding performance-based assessment data. Additionally, a survey questionnaire includes items corresponding to our complex task and to our simplified tasks, yielding self-assessed competence levels, and to their associated media and information practices. The results presented in this article cover self-assessed competence and self-reported practices, based on data from our survey questionnaire.

Table 1 lists the survey items covered in this article. Competence (CIS and CWC codes) and practice (TSP and TWP codes) items pertain to information search and web creation activities included in our complex task. Items focused on their constitutive actions are not included in this article. Also shown are practices pertaining to more general information search and digital creation activities (GSP and GCP codes). Our analyses also include a count of the technical skills associated with online search or web creation that participants reported mastering. Respondents answered a yes/no question to report on twelve skills including bookmarking a website, downloading content, organizing a file collection, installing software, or inserting content in a webpage.

3.2 Data Collection Phases and Participant Samples

Our protocol included two data collection phases. In the first phase, a large non-probabilistic, stratified convenience sample of lower secondary education students (13–15-year-olds) in each participating country completed a questionnaire on their self-assessed competence and self-reported practices related to information search and multimedia creation. French-speaking schools (excluding special-needs education schools) in the four regions are used as primary sampling units. Different socio-demographic variables are used to determine the samples' strata in the four regions, depending on their respective national contexts.

Data collection for the first phase was completed in May 2019 in French-speaking Belgium, with students from 27 schools participating (N = 1923; age: mean = 14.99;

Table 1. List of survey items presented in the results (translated from French; original items comprised examples not included here for brevity).

Competence items - “To what degree do you feel able to...”		
<i>(1 = Not at all capable, 2 = Not really capable, 3 = Somewhat capable, 4 = Fully capable)</i>		
Information search	CIS1	Find on the internet the answer to a simple question for yourself
	CIS2	Find on the Internet the answer to a simple question for school
	CIS3	Perform a search on the Internet for yourself, for which you must gather information from several sites
	CIS4	Perform a search on the Internet for school, for which you must gather information from several sites
Web creation	CWC1	Creating an informative website for yourself
	CWC2	Creating an informative website for school
Information search practice items - “How often do you...”		
<i>(1 = Less than once a year or never, 2 = At least once a year, 3 = At least once a month, 4 = At least once a week, 5 = Every day or almost every day)</i>		
Task-related practices	TSP1	Search the Internet for the answer to a simple question for yourself
	TSP2	Search the Internet for the answer to a simple question for school
	TSP3	Perform an Internet search for yourself, for which you must gather information from several sites
	TSP4	Perform an Internet search for school, for which you must gather information from several sites
General practices	GSP1	Search for information on social networks
	GSP2	Follow the news
	GSP3	Consult discussion forums
	GSP4	Watch explanatory videos or tutorials
Digital creation practices - “Have you ever done the following?”		
<i>(1 = No, never, 2 = Yes, only once, 3 = Yes, several times)</i>		
Task-related practices	TWP1	Creating a website
	TWP2	Creating an informative website for yourself (sub-question of TWP1)
	TWP3	Creating an informative website for school (sub-question of TWP1)
General practices	GCP1	Keeping your own blog
	GCP2	Creating and publishing digital texts of fiction or personal expression
	GCP3	Producing and publishing instructional videos or tutorials
	GCP4	Participating in the production of a web radio or a podcast

std = 1.068; 51.8% of girls), and in February 2020 in the Canton of Geneva (Switzerland), with students from 7 schools participating (N = 600; age: mean = 14.33; std = 0,567; 52.7% of girls). Data collection in Quebec and France was postponed to 2021 due to the covid-19 pandemic. In the second data collection phase (not covered in this article), a smaller sample of the same age range completes all our instruments (survey questionnaire, complex and simplified tasks).

4 Results

This section presents partial results from the first phase of our project, based on our Belgian and Swiss samples. First, we examined students' different levels of perceived competence between information search and web creation activities, in the school context and outside the school context. Second, we analyzed whether students reported practicing information searching more or less than web creation activities and more or less frequently at school or outside of school. Third, we looked at how students' levels of perceived MIL competence related to the frequency of their MI practices. Finally, we examined gender differences in students' levels of perceived MIL competence and frequency of MI practices, both in online searching and web creation activities.

4.1 Self-assessed MIL Competence

Relative Levels of Perceived Competence Between Activities. Friedman's analysis of variance revealed statistically significant differences between competence items (CIS1-4, CWC1-2) for Belgium ($\chi^2_5 = 4612,537$; $p < 0.001$) and Switzerland ($\chi^2_5 = 2324,563$; $p < .001$). Post-hoc tests revealed that Belgian students reported higher levels of competence for simple search activities than for complex searches, and higher levels for all searches than for web creation activities. The same tests revealed that Swiss students reported higher levels for all search activities than for web creation activities. In both samples, students did not differentiate between items pointing to the same activity (for example simple search) in the personal or school context.

Correlations Between Competence Items.² In both our samples, we observed either non-significant or very weak correlations between the two web creation competence items (CWC1-2) on the one hand and all (simple and complex) search competence items (CIS1-4) on the other hand (all τ_b between these items were $< .25$ ³).

Both in Belgium and in Switzerland, the number of technical skills mastered by participants was only weakly correlated to all search competence items (CIS1-4) but was moderately correlated with both web creation items (CWC1-2): $\tau_b = .36$ for both items in Belgium; $\tau_b = .37$ for personal web creation (CWC1), and $.35$ for school web creation (CWC2) in Switzerland.

² All correlations analyses presented in this article used Kendall's tau-b correlation coefficient for non-parametric data. For all correlation coefficients reported, $p < .05$.

³ Due to the large number of possible correlations between the 22 variables covered in this section, only coefficients equal to or greater than $.25$ will be detailed.

4.2 Self-declared Media and Information Practices

Relative Frequency of Practices Between Activities. The percentage of participants who reported performing online searches at least once a week ranged from 49.4% to 80.4% in Belgium and from 53.5% to 87.3% in Switzerland, depending on the type and context of search. By comparison, the percentage of participants who reported creating a website at least once ranged from 9.0% to 20.9% in Belgium and from 6.7% to 18.0% in Switzerland, depending on whether they reported creating a website in general, for themselves, or for school. Search and web creation practices could be ranked in the following frequency order⁴: simple personal search (most frequent), simple school search, complex personal search, complex school search, personal web creation, and school web creation (least frequent).

Correlations Between Practice Items. In both our samples, general information search practices (GSP1-4) were correlated with task-related information search practices (TSP1-4), as shown in Table 2. In Belgium, those correlations were weak ($\tau_b < .25$), except between complex search for oneself (TSP3) and *searching for information on social networks* (GSP1) ($\tau_b = .25$). In Switzerland, simple search for school (TSP2) as well as complex search for school practices (TSP4) were all moderately correlated with all general information search practice items (GSP1-4) with coefficients ranging from $\tau_b = 0.27$ to $\tau_b = .39$. *Searching for information on social networks* (GSP1) was moderately correlated to all four task-related search practice items (TSP1-4) and most strongly with simple search for school ($\tau_b = .39$). *Watching videos or tutorials* (GSP4) was correlated to simple search for oneself (TSP1) but only moderately ($\tau_b = .25$).

General creation practices (GCP1-4) were moderately to strongly correlated with web creation practices (TWP1-3), as shown in the lower half of Table 2. Overall, correlations in Switzerland were slightly stronger than in Belgium. In Switzerland, *keeping a blog* (GCP1) was strongly correlated with all web creation practices (TWP1-3) ($\tau_b > .46$), as was *contributing to a web radio or podcast* (GCP4) ($\tau_b > .49$). Similarly, *producing tutorial videos* (GCP3) was correlated with general (TWP1) and school (TWP3) web creation practices (respectively $\tau_b = .45$ and $\tau_b = .52$). In Belgium, correlations were the strongest for *keeping a blog* (GCP1) with *creating a website* (in general (TWP1), $\tau_b = .51$, or for oneself (TWP2), $\tau_b = .46$) as well as for *contributing to a web radio or podcast* (GCP4) with *creating a website* (TWP1) ($\tau_b = .48$).

By contrast, all general (GSP) and task-related (TSP) information search practice items were either not correlated or weakly correlated ($\tau_b < .25$) to all general (GCP) and task-related (TWP) web creation practice items.

⁴ In both our samples, confidence intervals computed at a 95% confidence level for each proportion showed no overlap. Hence, all proportions were significantly different.

Table 2. Kendall’s tau-b correlation coefficients between general and task-related practices ($p < .001$ for all coefficients)

		General search practices							
		GSP1 (SN)		GSP2 (news)		GSP3 (forums)		GSP4 (tutorial)	
		BE	CH	BE	CH	BE	CH	BE	CH
Task-related search practices	TSP1	.243	.276	.236	.196	.113	.143	.179	.252
	TSP2	.144	.389	.169	.312	.119	.328	.145	.320
	TSP3	.251	.284	.215	.238	.228	.188	.230	.232
	TSP4	.202	.309	.191	.273	.192	.292	.194	.296
		General creation practices							
		GCP1 (blogs)		GCP2 (fiction)		GCP3 (tutorial)		GCP4 (podcast)	
		BE	CH	BE	CH	BE	CH	BE	CH
Task-related creation practices	TWP1	.506	.482	.335	.393	.383	.446	.473	.558
	TWP2	.458	.474	.352	.379	.355	.395	.416	.487
	TWP3	.306	.461	.244	.389	.286	.452	.406	.580

4.3 Relationship Between MIL Competence and MI Practices

The number of technical skills mastered by students was only weakly correlated with all search and creation practices with *creating a personal website* (TWP2), corresponding to the strongest correlation ($\tau_b = .22$ in Belgium, $\tau_b = .22$ in Switzerland).

Information search competence items were either not correlated or weakly correlated with general information practice items ($\tau_b < .11$), either not correlated or weakly correlated with task-related information search practice items ($\tau_b < .17$), and either not correlated or weakly *negatively* correlated with all creation practice items ($\tau_b > -0.1$).

Web creation competence items (CWC1-2) were either not correlated or weakly correlated with all information practice items (TSP1-4 and GSP1-4) in the Belgian sample. The same was true in the Swiss sample, albeit with slightly stronger (but inferior to 0.25) coefficients; the only exception was the personal web creation competence item with the *consulting online forums* practice item ($\tau_b = .26$ in Switzerland). Similarly, web creation competence items (CWC1-2) were only weakly correlated with general creation practice items (GCP1-4). Only the personal web creation competence item was correlated with two other items above the .25 threshold ($\tau_b = .27$ for *keeping your own blog* in Belgium and $\tau_b = .26$ for *producing video tutorials* in Switzerland).

Comparatively, web creation competence items (CWC1-2) showed higher, moderate to strong correlations with web production practice items (TWP1-3) in both samples, as shown in Table 3. Having created a website, in general (TWP1) or for oneself (TWP2), had the strongest correlation with competence in personal website creation (CWC1), whereas having created a website for school (TWP3) had lower correlations with both web creation competence items (CWC1-2).

Table 3. Kendall's tau-b correlation coefficients between web creation competence and practices ($p < .001$ for all coefficients).

		Task-related web creation practices					
		TWP1		TWP2		TWP3	
		BE	CH	BE	CH	BE	CH
Web creation competence	CW1	.406	.349	.392	.350	.216	.215
	CW2	.336	.348	.337	.342	.206	.252

4.4 Gender Differences in MIL Competence and MI Practices

Competence. Mann-Whitney tests⁵ indicated that boys reported mastering more technical skills than girls and reported significantly higher levels of perceived competence for web creation than girls, both in Belgium and in Switzerland. There was no significant difference between boys and girls regarding levels of perceived competence in information search (simple or complex, for oneself or for school) in either sample.

Practices. Mann-Whitney tests revealed significant differences between girls and boys in the frequency of several practices, which are listed in Table 4. In both samples, girls reported performing simple searches for themselves and for school more frequently than boys did. Conversely, Belgian boys reported performing complex searches for themselves more frequently than girls. No such difference appeared in the Swiss sample. Belgian boys reported following the news more than girls, while the same difference was not significant in Switzerland. In both samples, boys reported consulting online forums more frequently than girls. Similarly, Belgian and Swiss boys reported creating websites (in general, for themselves and for school⁶) more frequently than girls. They also reported keeping a blog, creating video tutorials, and contributing to a web radio or podcast more than girls. No statistically significant difference was observed between boys and girls for all other search and creation practices.

5 Discussion and Conclusion

The results presented in this article describe the MIL competence and MI practices reported by Belgian and Swiss adolescents, the relationship between them, and the influence of gender on both. These results need to be interpreted with care, considering the limited validity of quantitative survey measures of new literacies [13]. The task-based measures included in the next phase of our project will allow us to confirm (or refute) our findings and ground them in qualitative analyses of how participants exert their MIL competence. We now discuss the most salient of these results below.

⁵ Due to the large number of tests, we will not report U statistics. All gender differences cited in this section were statistically significant at $p < .001$ unless otherwise specified.

⁶ All $p < .001$ except for school websites in Switzerland: $p = .013$.

Table 4. Gender differences in information search and digital creation practices

		Belgium		Switzerland	
		Boys	Girls	Boys	Girls
<i>Proportions of participants who have engaged in listed practices at least once a week</i>					
TSP1	simple search for oneself	81%	< 85%	85%	< 93%
TSP2	simple search for school	68%	< 75%	69%	< 84%
TSP3	complex search for oneself	64%	> 60%		ns
GSP2	following the news	72%	> 65%		ns
GSP3	consulting forums	43%	> 24%	37%	> 23%
<i>Proportions of participants who have engaged in listed practices at least once</i>					
TWP1	creating a website (in general)	28%	> 14%	23%	> 11%
TWP2	creating a website for oneself	22%	> 10%	20%	> 8%
TWP3	creating a website for school	14%	> 6%	10%	> 4%
GCP1	keeping a blog	23%	> 15%	21%	> 13%
GCP3	producing tutorials	35%	> 19%	31%	> 16%
GCP4	contributing to a web radio or podcast	25%	> 10%	22%	> 7%

In Belgium as in Switzerland, students reported higher levels of information search competence than of web creation. Similarly, in both samples, and as in other major surveys (for example, [19]), participants reported more frequent search practices than creation practices (simple searches were the most frequent). Overall, a stark difference appears between the pervasive search practices that most students feel they master, and the creation practices that seem more arduous to them. This may be due to the complexity of mastering certain media formats for which school curricula provide no training. Moreover, creation competence in a school context may appear more complex and less spontaneously mobilizable, which would reduce production practices at school.

More generally, our results attest to varying degrees of connection between the competence and practices declared by the participants. First, information search competence and practices on the one hand, and digital creation practices on the other, appear relatively unrelated: they are only weakly (or not at all) correlated with each other. Next, information search competence and general information practices are either not or weakly correlated with one another, as are web creation competence and general creation practice items. However, a stronger correlation exists between web creation competence and web creation practices. Web creation competence comes with very specific practices and expertise that is not always transferable: having created a website seems to influence the perceived competence to create one, while engaging in other digital practices, less so. These results echo findings from other studies (for example, [16, 17]) that the use of media does not guarantee the development of media competence. Additionally, the number of technical skills that students master is only weakly correlated with all competence items, except for personal web creation competence. Young people's technical skills are often associated with specific software or platforms that do not ensure the development of general technical competence across multiple creation practices, which may explain their low self-assessment of web creation competence.

On another note, we found several gender differences in young people's practices and competence levels. Boys reported both creating websites more frequently than girls,

a finding in line with other studies [25], and feeling more competent at it. Consistent with the literature, girls in our samples seem to be more prone to consume online content while boys produce it more often. Since web creation competence was correlated with general creation and web creation practices, and boys reported more creation practices than girls, it is possible that the frequency of boys' practices influenced their self-assessment of their creation competence. Girls, on the other hand, reported performing simple searches more often, both for themselves and for school, and complex information searches for school as often as boys. By contrast, there was no statistically significant difference between boys and girls for simple and complex search competence. Since gender seems to play a role in how one perceives one's own competence –with girls tending to rate themselves lower than boys [24]– the second phase of our research project will allow us to test whether assessing MIL competence in information search with tasks results in gender differences in favor of girls. An alternative explanation, consistent with existing research [18, 20], may be that there is indeed no difference: as information search has become pervasive in teenagers' lives, marginal differences in practices may not translate in difference in competence anymore, as the weak correlations between search practices and search competence seem to show.

Finally, although Belgium and Switzerland have different school systems, results from our two samples converge to a very large extent, and do not seem to depend on the specificities of local education systems. Although our participants do not distinguish between their personal and school MIL competence, their school MI practices are less frequent than their personal practices. Despite recurring calls for school reforms that would better integrate digital technology, our participants seem to tell us that school has not played a decisive role in developing their MIL competence. It appears premature to formulate recommendations on how school systems may foster the development of MIL competence based on the limited results presented in this article. However, we expect the combination of declarative questions, task-based MIL assessment and qualitative interviews included in the later phase of our project [9] to yield results that may be appropriated by educators and policy makers to inform the design of evidence-based curricula, including insights into how students invest and find meaning in MI practices. These results should help understand how school can capitalize on the youths' out-of-school practices and expertise, and conversely support a diversification of MI practices that could spread outside of its walls and foster MIL development beyond its own horizon. Specifically, school may also help reduce the gender gap in digital creation competence. If women are to participate actively in society and make their voices heard [25], they must develop their MIL competence so as to not only have access to digital content, but also to substantially contribute to its production.

Acknowledgements. The work reported in this article is funded in part by the Belgian Fund for Scientific Research - FNRS, under contract T.0082.18. Pierre Fastrez is a Senior Research Associate from the Belgian Fund for Scientific Research - FNRS.

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Peer Assessment, Self-assessment and Teacher Scoring Within an Information Literacy Course

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Abstract. Peer review and self-review were introduced in an information literacy course. For students to make a review, they need to be self-reflective and develop critical-thinking and problem-solving skills. This research looked at correlations and/or differences between review and teacher scoring. Data were collected within the first-year curricula in Health Sciences. Students conducted a self-review and two peer reviews of search reports according to predefined criteria. The teacher also scored every search report. Pearson's r and paired-sample t -tests were conducted. Results: Overall, strong correlations were found. Moderate correlations were found between peer review and self-review, which does not hold for the different curricula. Between self-review and teacher score, there is a moderate correlation that does hold for the separate curricula. Teacher scores are significantly lower than peer review and self-review, self-review scores are significantly higher than peer review scores. This study confirms the importance of the teacher as an evaluator.

Keywords: Information literacy · Peer review · Activated learning · Higher education · Self-evaluation · Peer assessment · Self-assessment · Teacher scoring

1 Introduction

The Faculty of Medicine and Health Sciences of Ghent University has been providing integrated education on information literacy for 10 years. Research from Buysse et al. at this faculty demonstrated that these skills must be taught at the most appropriate time and that this should be done in a constructive way [1]. Teaching students information literacy skills, also means that they must be able to think critically and to be responsible for their own learning. The ability to self-assess is essential for the development of students' self-directed learning; they need to be able to identify what they know or do not know [2]. Self-directed learners evaluate and facilitate their own learning process. Integrating self-directed learning methods into information literacy courses stimulates lifelong learning [3]. Research within a clinical environment has demonstrated that peer teaching and learning provides effective educational support [4]. According to Patterson et al. [5], there are six competencies of self-directed learning:

- self-assessment of learning gaps;
- evaluation of self and others;
- reflection;
- information management;
- critical thinking; and
- critical appraisal.

The characteristics of self-directed learners reflect these competencies:

- to demonstrate curiosity/openness/motivation;
- to be flexible;
- to be persistent/responsible;
- to be venturesome/creative;
- to show confidence/have a positive self-concept; and
- to be independent/self-sufficient [6].

Integrating peer evaluation and self-evaluation within the health sciences' information literacy course can further develop students' self-directed learning.

Self-assessment and peer assessment, where students must evaluate themselves or a colleague, are educational methods that stimulate learning and reflection. The reflective process will develop critical thinking, problem-solving and self-directed learning skills [7]. The student learns to take responsibility of evaluating oneself and for receiving feedback [8]. Self-assessment and peer assessment give the students more ownership, students are active and involved in the process, and they can share experiences about the process. This will lead them to become more independent [9]. Using their peers' feedback and combining this with self-assessment, is considered to be most effective to optimise clinical performance [7].

Reflective practice needs formal training as it does not come naturally to most of the students [10]. According to Burgess et al. [11], formal training in giving qualitative feedback is unusual in medical curricula, but is a general requirement. Medical students pay extra attention to self-evaluation, as this is an important skill to support their further professional life [2]. Training in providing feedback is not limited to students. Teachers also need to know how to provide qualitative feedback to ensure that students can evaluate their peers in an appropriate way or may guide them to make adjusted changes [12]. When people receive negative feedback, they need to understand why and have the ability to revise [13].

When applying these assessment methods, several aspects need to be considered. Personal knowledge and expertise are important aspects in self-evaluation. Studies have shown that people who do not score high often estimate themselves to be at a higher level compared to those who, in reality, had better marks [2]. It is difficult for someone who does not have the necessary metacognitive skills to make a correct assessment. Students who do have the necessary expertise, tend to hesitate to rate themselves higher because they believe their peers could have achieved the same result. They will only increase their own estimated score when they realise that this is not the case [13].

Peer evaluation is used as an evaluation method for teachers to stimulate the learning process [14, 15]. Teachers often use it to save time [16]. However, our experience and

other research [17] confirmed that establishing a qualitative peer assessment is a very time-consuming method, especially if students need to learn something from the peer-evaluation process. The complete assessment process needs to be organised, trained and monitored well [17]. Topping published a typology of peer assessment in higher education in which 17 variables need to be considered when setting up a peer assessment. Some examples of variables are: objectives, focus, product/output, official weight, constellation assessors and assessed, time, requirement... [16]. For each type of evaluation, it is of utmost importance to frame the expectations correctly: what does the teacher expect from the assignment? It is suggested to identify clear criteria and ideally, to give an example of the expectations [16]. Students must follow set criteria to be able to evaluate themselves or their peers. It is recommended to explain and prepare these criteria with the students before starting the exercise [9, 16, 18]. An open and clear way of communicating the criteria is to work with a structured form [9]. Some researchers provide students with the possibility of adding personal and open feedback at the end of the form [19]. In addition to the structured form, another aspect that may or may not act as a barrier for students, is the social (anonymous) aspect of the exercise [20]. Students will give their friends a higher score than to their peers they do not know. The anonymous work ensures that the student have no prejudice and will evaluate the exercise as correctly as possible. Additionally, it is important that in returning the feedback, the reviewer's anonymity is guaranteed.

The student may have to assign scores during the evaluation process, but above all, will have to write supporting feedback. To do this, the student will have to reflect and develop critical thinking and problem-solving skills [7]. Research has shown that this can also improve the students' writing skills [9, 21]. By evaluating their peers, they also see their fellow students' approach and can start comparing their own working method. Did they do or approach it differently or are they learning from their peers' methodology? The peer assessment activates a process of active learning, learning how to give and receive criticism and to identify their own position. Social and assertion skills are developed [16]. By acting as an evaluator and an assessed, the students are learning to be active and self-directed learners, which consists of interactive and reciprocal teaching [19].

This paper focuses on the role of the teacher, peers and oneself as an evaluator. Is there a difference or correlation between the scores that the different evaluators give?

2 Methods

Approval of the Ethics Committee of Ghent University was obtained and students signed an informed consent form. All data collected was anonymised by a trusted third party.

2.1 Participants

Participants of the study were first-year Health Sciences students of the Faculty of Medicine and Health Sciences of Ghent University during the academic year 2018–2019. The cohort of students just entered university with no prior knowledge of searching for health literature. They were all attending the same mandatory information literacy course in the first semester of the academic year. Data was collected for 651 students: 317

medical (MED) students, 54 dentistry (DENT) students, and 280 biomedical (BIOM) students. As students could work in groups of two or three students on the search report, scores were available for 321 search reports (MED (n = 153), DENT (n = 25) and BIOM (n = 143)). Heidi Buysse, co-author of this paper, was the teacher of this information literacy course.

2.2 Intervention

In the information literacy course, students learned and practiced how to search for scientific health papers [22]. They performed a search for scientific health papers on a self-chosen topic to show their understanding of the course content. Based on predefined criteria, they had to note the complete search process in a search report.

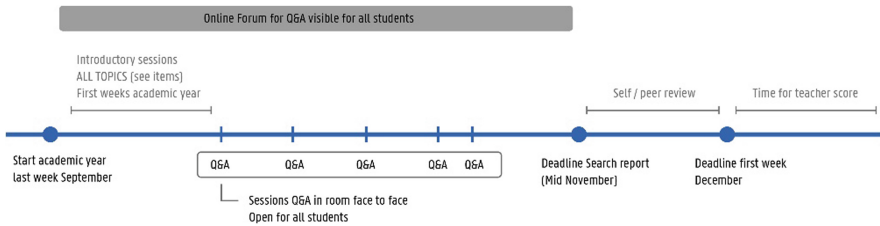


Fig. 1. Timeframe information literacy course with search report deadline

Students received their search report assignment in the first week of the academic year. Within these first weeks, they also had introductory sessions. At different moments, specific question and answer (Q&A) sessions were organised. Other questions could be posted on the discussion forum of the university's learning platform. The deadline to hand in their search report was mid-November. The deadline for the peer review and self-review was three weeks later (Fig. 1). Along with the assignment, predefined rating criteria were available. These criteria¹ concerned:

- general lay-out (automatic table, page number, for example);
- PubMed: free text search with critical view of automatic term mapping;
- Medical Subject Headings (MeSH) search, critical view of MeSH definitions subheadings used);
- search with MeSH Major);
- Embase: quick search, advanced search, PICO-search and critical use of limits);
- Google Scholar: general search and citation search;
- use of Google Scholar for critical view of used controlled vocabulary terms MeSH and Emtree in respectively PubMed and Embase);
- critical interaction between results found in Google Scholar and PubMed/Embase);
- use of other literature databases, for example. Sport Discus for sport related topics;
- PRISMA flow diagram [23] and search methods for the final search question;

¹ The form with predefined criteria can be requested from the corresponding author.

- selection of 6 potentially interesting articles for writing a narrative review with correct reference insertion by using a reference managing software (EndNote).

Peer review and self-review were introduced to evaluate self-assessment [22]. According to the predefined rating criteria, students conducted a self-review and two peer reviews of randomly assigned search reports. The `rand()`-function in Microsoft Excel 2016 was used to set up the randomisation table. The randomisation was performed twice: a first time within their own curriculum and a second time in other curricula; for example: a MED-student received one paper to review from another MED and one from BIOM or DENT. A check was performed so that students did not receive their own paper in the randomisation process. The peer review was blinded in a way that students did not know who reviewed their paper. The university's learning platform was used to perform the reviews. The teacher also scored and commented on every search report. This score was part of the exam scores and was not influenced by peer-review or self-review scores; this was explicitly mentioned at the start of the course. Self-review and peer-review scores (with open comments) were seen as part of the learning process.

Each criterion had to be scored by selecting a predefined numerical score. This numerical score was briefly clarified, for example, 5 points: all elements were present; 2.5 points: some elements were lacking or it was not clear why they used this MeSH; 0 points: this criterion was lacking or a wrong MeSH was used. If students did not give the maximum score, they had to comment on each criterion. At the end of the review, students were asked to list some positive elements and elements to improve.

For the analysis, 1,264 peer reviews were available along with 625 self-reviews and 321 teacher scores.

As different peer-review scores for each search report were available, a two-way mixed method with consistency score was performed to calculate the Intraclass Correlation Coefficient (ICC). According to Cicchetti and Sparrow [24], there was an excellent Cronbach's alpha (ICC = 0.783). Based on that result, average peer-review scores were calculated for each search report.

Once exam results were published, students received feedback on their own search report. Every student had the possibility to search for the review scores and comments by searching their unique student-identification number in a password-protected spreadsheet on the learning platform. Furthermore, they had the possibility to receive oral feedback on predetermined days after making an appointment. Every student who failed the course, had the possibility to improve their search report; the deadline for doing so was mid-May. First, they were obligated to propose what they would change in their search report. If their proposal was good, then they could tackle their shortcomings. If they lacked certain elements, then there was an oral discussion between the teacher and student to improve the search report.

2.3 Statistical Analysis

To look for correlations, Pearson's r was calculated between the scores of peer review and self-review; peer review and teacher scores; and self-review and teacher scores. These analyses were performed with IBM Statistical Package for the Social Sciences (SPSS) v.26 for the overall student group as well as for the separate student groups

(MED, DENT and BIOM). To look for differences between scores, paired-sample t-tests were conducted. Normality was checked by using Shapiro's Wilk-test and the quantile-quantile (Q-Q) plot. Significance level was set at 0.05 and two-sided tests were performed.

3 Results

All correlations were positive as can be seen in Fig. 2. Strong statistically significant ($p < .001$) correlations were found between peer review and teacher score ($r = 0.738$) and also for the individual curricula (MED: $r = 0.726$; DENT: $r = 0.731$; BIOM: $r = 0.751$). A moderate correlation was found between peer review and self-review ($r = 0.531$; $p < .001$), which does not hold for the individual curricula (MED: $r = 0.730$ ($p < .001$); DENT: $r = 0.104$ ($p = .600$); BIOM: $r = 0.421$ ($p < .001$)). Medical students showed a rather high positive correlation. Between the self-review and the teacher score there was a moderate correlation ($r = 0.439$; $p < .001$) that also held for the separate groups (MED: $r = 0.539$ ($p < .001$); DENT: $r = 0.443$ ($p = .027$); BIOM: $r = 0.309$ ($p < .001$)). Looking at the differences between the scores (Fig. 3) for all curricula, teacher scores were significantly lower than peer review and self-review ($p < .001$). Self-review scores were significantly higher than peer-review scores ($p < .001$). Although there were positive correlations between the different scores, teachers gave lower scores (Fig. 2).

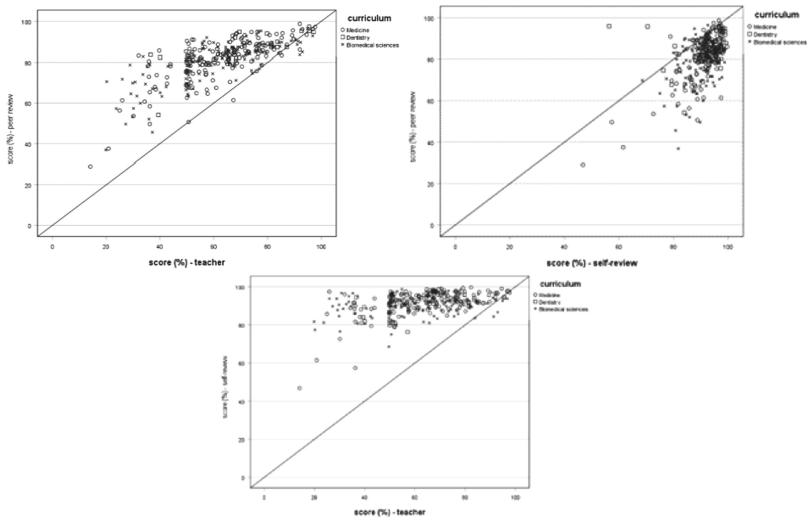


Fig. 2. Correlations with an identity line between teacher, peer-review and self-review scores (%) for first year medical ($n = 153$), dentistry ($n = 25$) and biomedical ($n = 143$) students

A post-hoc analysis was performed by dividing the search reports into three groups based on the teacher score: bad (score beneath 50%), moderate (score between 50 to 70%) and good (score above 70%) search reports.

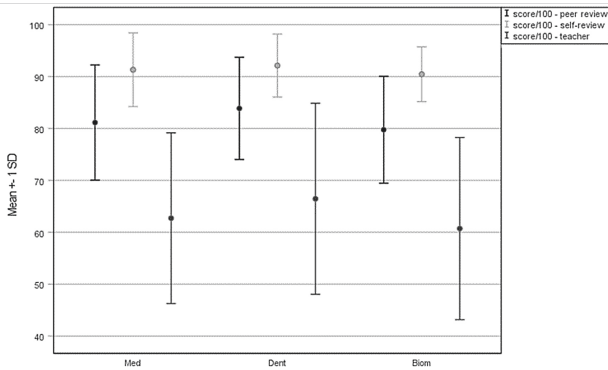


Fig. 3. Mean score with 1 standard deviation (SD) for peer review, self-review and teacher score (%) for first year medical (Med) (n = 153), dentistry (Dent) (n = 25) and biomedical (Biom) (n = 143) students

Table 1. Correlations (r) per curriculum (medical (MED), dentistry (DENT), biomedical (BIOM)) per teacher-score group between self-review (Self), peer-review (Peer) and teacher (Teacher) score; *significant at 0.05-level; **significant at 0.01-level.

	MED			DENT			BIOM		
	n	Self	Teacher	n	Self	Teacher	n	Self	Teacher
Bad search paper (<50%)	n=24	r	r	n=3	r	r	n=32	r	r
	Peer	.832**	.749**		.393	-.379		.371*	.429*
	Self		.539**			-1.000**			-.131
Moderate search paper (50%-70%)	n=78			n=13			n=66		
	Peer	.496**	.285*		.636*	.583*		.276*	.471**
	Self		.343**			.407			.227
Good search paper (>70%)	n=54			n=12			n=46		
	Peer	.293*	.534**		-.019	.419		.050	0.342*
	Self		.229			.605*			-.047

Looking at the correlations (Table 1) between self-review, peer-review, and teacher scores within the different curricula, we noted the highest positive correlations for MED students within the group with bad search papers. Within the group of good search papers, MED-students found it rather difficult to give themselves high scores (r = .229); peers approached the high teacher scores (r = .534). We found, generally speaking, higher positive correlations for all curricula between peers and teachers rather than between self-scores and teacher scores.

4 Discussion

The results of this study showed that self-review scores were significantly higher than peer-review scores and that the teacher gave lower scores. Therefore, self-evaluation scores should be avoided as an evaluation tool. Although peer-evaluation scores are

lower than self-review scores, this study still found a fair difference between those scores and teacher scores. Research from Iglesias Pérez et al. presented similar results. First, students were able to be good peer reviewers. Furthermore, a difference between the self-assessment scores and the teachers' scores was found. These elements suggest that self-evaluation scores are not suitable for a summative evaluation. Other research demonstrated different results and found self-assessment [17, 18] or peer assessment more reliable [16]. Evans et al. did not find statistically significant differences for surgical skills between peer-assessed and trainer-assessed scores [25]. In our study, self-assessment and peer-assessment scores were systematically lower than teacher scores. It is, therefore, of utmost importance to have a teacher as a third evaluator to guarantee a neutral evaluation.

How students evaluate themselves can be influenced. Low-achieving students often need more guidance from the teacher as they do not always have the skills to accurately assess themselves and to point out their own weaknesses [2]. Highly competent students show a systematic bias when evaluating themselves as they presume their peers must have performed in the same way [13, 17]. This study confirmed these results especially for highly competent medical students. These students found it rather difficult to give themselves high scores. Overall, peer scores were more similar to teacher scores compared to self-review scores. There were only three dentistry students, not enough to draw a conclusion for that group. We concluded that the group of biomedical students did not have the necessary skills to neither evaluate themselves nor even their peers. Within the group of medical students, differences occurred depending on their own capacity. Future research should look at the scoring in more detail: how do low achieving students score good search reports and do they really learn from it?; is a high achieving student stricter in scoring other search reports?; what is the impact of the different curricula?

Availability of and monitoring by the teacher is important during the complete process. It reassures the students that they can contact the teacher if they have any doubts or questions, especially when they are unexperienced [16]. The final feedback from the teacher on the exercise, self-evaluation, and peer evaluation are added values for the students' learning process [7, 26]. In a study by Gonzales de Sande et al. [18], students indicate that they trust the evaluation of their teacher more than they trust their peers' evaluation. The teacher will decide neutrally if the students have properly handled their practice and evaluation of their peers and themselves. This can guide them for future assignments and will teach them to apply and handle criticism in a correct way. The assessment results are an extra source of information for the teacher, providing answers to such questions as: How do students tackle the assignment?; Where are the deficiencies?; Do adjustments need to be made?, and Which aspects will students pay particular attention to during evaluation? [21].

Within the follow up, feedback should be given in an appropriate way depending on the determined learning approach. Deep learning needs detailed comments on ideas, evidence, and techniques that have been used [9]. Encouragement will make students more self-confident in developing their skills [27]. To make students feedback literate, feedback needs to be tailored to the students' needs [28]. Training on how to give feedback should not be limited to the beginning of the assignment but should be monitored throughout the process and at different stages of the peer review. Teachers also need

to consider that students can respond in different ways. Students need to be willing to receive feedback, understand it, and use it to improve their learning [28]. In this research, students received feedback at different moments. Students encountering problems with their paper were monitored closely and had the possibility to rework on their assignment based on the teacher's feedback. Throughout the whole process, students were guided and could ask questions directly to the teacher. These results and reviews showed that students were generally well-informed about the criteria. Major elements were missing for only a few students. The focus of the assignment was on learning and activating the information literacy skills of students. As mentioned above, students failing could remediate by using the teacher's feedback and help. They had to write a brief proposal of what aspects they would remediate, based on the written feedback in the spreadsheet, forcing them to reflect on their work.

At the end of the review, students were asked to provide some positive elements and elements to improve. Every student also had to write down a personal critical review about the lessons, the search report, and the peer review. In the open comments, students mentioned they really liked the peer review as they could learn from it. They reflect on their own work by viewing others' work. Other research using self-assessment, peer and teacher assessment to evaluate class participation that was not anonymised showed that students did not like to be forced to grade their peers. They reported that evaluating their peers was difficult and that they wanted to give higher scores, but did not, and did not want to give a lower score [29]. The anonymous character of peer assessment is decisive and it reduces peer pressure [20]. In this research we opted to randomise the selection of the peers and kept it anonymous to exclude the social pressure and bias. The written feedback was given directly to the individual student using a unique identifier; an example can be seen in Fig. 4. Students could ask for individual follow up with the teacher based on this feedback.

Using these assessment tools to gain time is unthinkable. The practical arrangements of the assignment and the review form as well as the monitoring and the follow up of the students from the end of September till mid-November took a lot of time. Time is necessary to guide students in a proper way. After submission, the teacher had to evaluate 1,264 peer reviews, 625 self-reviews, and 321 search reports. The evaluation consisted of scoring and processing feedback given to the students. Students who failed had to be followed-up. Both students and teacher were convinced that it was worth continuing giving an assignment combined with self-evaluations and peer evaluations, as it activates different skills that offer a good basis to become health professionals. This is in line with other research [14]: students learn from assessments when they use this knowledge to develop new learning goals and strategies. And, even if the self-evaluation generally gives higher scores than peer and teacher scores, students can reflect on the scores [20, 28].

The results and open feedback are an added value for the teacher [21]. The problems that often occur and mistakes that students encounter, will be focused on more in the next academic year. The teacher will also take into account the personal comments on the workload and impact on students' time-management and will make sure that there is a good balance. This helps the teacher focus on the students' learning purposes and learning development.

<p>Self-review (BIOM): I think our work looks very beautiful and is therefore very attractive to read. I also think everything is clearly described. Some parts could be explained in more detail, but I think everything is understandable. So one point for improvement would be that we should explain certain parts in more detail. We adjusted our research question at the end and then added that we use the same method for this adjustment as before. I think everyone gets this and this is clear too, but we might have done this better during the search process.</p>
<p>Reviewer 2 (MED): It is a well-organized work that has been written in a good and scientific way. It was easy to follow the way of thinking and method. Sometimes some mistakes were made, such as using a wrong screenshot or certain things are not sufficiently motivated (PICO, Entree, search terms ...). I also found the motivation of the articles to be quite short and general.</p>
<p>Reviewer 3 (DENT):The search for the initially appropriate keywords in PubMed was done very critically. Personally, I think that this has given them a good start to their work. Afterwards, however, it goes downhill. It is rarely described which keywords were used and how many results it has yielded. If the results are nevertheless stated, this concerns thousands of articles. When searching via MeSH, Majr, NoExp and subheadings it would have been better to combine the terms and thus perform more specific searches, which would limit the number of articles. This strategy could also be applied at Embase. In addition, it was also possible to indicate how many interesting articles were selected after each search. Finally, it was also possible to explain why certain articles were included and not others. This way it would be easier to follow the search process. In general, I think that the search strategy has not been described in sufficient detail. In other words, I can't figure out how they got to the 6 final articles.</p>
<p>Reviewer 4 (BIOM): I thought the initial research question was narrowed down very well to the final research question. There are clear screenshots in the document and there is a good structure. Sometimes I found that the methods or motivations were described a bit too short and concise.</p>
<p>Reviewer 5 (BIOM): Everything is in order and placed under different subtitles.</p>
<p>Reviewer 6 (BIOM): The delivered workpiece was certainly not bad, but it could possibly be described even better and more extensively how you worked. For example, no reference to an article was found anywhere in your work (this was explicitly requested for the impact factor). The explanation for some parts is very limited and not clear. The research question seemed very interesting to me, but it may have been incorrectly formulated from the start, in my opinion alcohol has no influence on 'cancer' but on 'the development of cancer'. The report looks nice and clear, it was scientifically written and the text reads smoothly.</p>
<p>Teacher review: Especially agree with R3 and R6</p>

Fig. 4. Example (free translation from Dutch) from different reviews on one specific search report

Limitations: A sound assessment should evaluate the same outcomes on several occasions and should be systematic [9]. Although the number of students was very high, the study was limited to one academic year. This sample of students did not get any formal training in providing qualitative feedback. This study did not focus on the qualitative analysis of the feedback that was collected. Feedback was mainly used to guide students in their learning and to evaluate the assessment methodology. For future research, a clear methodology about collecting and analysing feedback should be elaborated.

5 Conclusion

This study demonstrated the importance of the teacher's score and feedback. Students in this study were positive about this method, although they indicated that it was quite time consuming. Activating self-directed learning through self-assessment and peer assessment for large groups of students, needs organisation skills and time-management on the part of the teacher. The teacher needs to monitor the process and provide feedback in a consistent and systematic way, making sure that students learn from the process. For

this study, the teacher evaluated and scored the search reports, the self-evaluations, and the peer evaluations. What cannot be ignored is the fact that, by working in an activating manner through the use of self-evaluation and peer evaluation, students will clearly reflect on their own methods, those of their peers, but also on the way they grade and write constructive criticism. The knowledge and skills they acquire, form a sound basis for their future self-directed learning process and professional lives in health care.

Acknowledgment. The authors want to thank their colleagues Marijke Salden, Jürgen Goetgeluk and Muguet Koobasi for their support with this research.

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User-Based Evaluation of the Slovenian Version of *Information Literacy Online* – A Multilingual MOOC for Information Literacy: Methodology and Preliminary Results

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Abstract. We present a qualitative evaluation of *Information Literacy Online* (ILO) – a multilingual MOOC for Information Literacy (IL). We evaluated the Slovene version using diary and interview methods. Evaluation was aimed at the user perceptions and user-perceived usefulness of content. The convenience sample consisted of 12 experienced LIS masters students, who completed all modules in 6 weeks in November/December, 2019. Students kept a diary, following the pre-defined evaluation framework, marking each element as present/absent and commenting on its realization from the point of view of user perceptions and usefulness of content. After completing each module they answered three open-ended questions on perceived success and emotions during the course, perceived usefulness of acquired knowledge, and positive and negative experiences. The results indicate some positive impressions and some areas to be improved. Findings are valuable guidelines for further ILO development and a boost to its use to promote IL within formal education.

Keywords: MOOCs · Information Literacy · Information Literacy Online · Evaluation · Qualitative studies

1 Introduction and Literature Review

MOOCs (Massive Open Online Courses) are freely available online courses without entry limitations and aiming at unlimited participation [1]. They are becoming a valuable teaching tool [2, 3]. As the study was prepared for the (later cancelled) 2020 ECIL conference, which was prior to the outbreak of COVID-19 pandemic, we did not include any COVID-related topics regarding distance learning.

Our goal was to present a qualitative evaluation of *Information Literacy Online* (ILO) – a MOOC for Information Literacy (IL) (<https://informationliteracy.eu/>). It resulted from a 3-year (2016–19) EU-funded project and was aimed at improving students' IL. It consists of 6 modules spanning the entire information cycle: 1 – Orienting in information landscape; 2 – Research is a journey of inquiries; 3 – The power of search; 4 – Critical information appraisal; 5 – Information use; 6 – Let's create something new

and share it. We use the phrase, information cycle, as is used by, for example, [4] and [5].

The primary target group are beginner students and the competences acquired with this MOOC should help them enhance their study skills. The content of the MOOC was first developed in English and then translated to Spanish, Catalan, German, Croatian, and Slovenian. Technically, it was implemented into the open source platform *OpenEdX*; more details are given by [6–8].

As noted by Dreisiebner et al. [7], Nowrin et al. [9], and Dreisiebner et al. [8], there has not been much evaluation work of MOOCs on IL. As for ILO, a partial evaluation took place during final development stage. It was mainly quantitative evaluation and included only the German version [7]. It targeted two areas, the user interface and progress of students' knowledge of IL, and found a relatively high satisfaction with the interface, while the progress of student knowledge of IL was inconclusive. Another, more thorough evaluation of the entire MOOC in all language versions was performed with emphasis on its learning capability [8] that showed promising results: the students' knowledge of IL had improved.

In terms of methodology, most MOOC evaluations to date used questionnaires; for example, see [10–12] and [7]. We complemented the overall evaluation of ILO with an interview [8].

This paper has been prepared with a one-year delay due to the COVID-19 pandemic – the MOOC itself has, in the meantime, already been corrected, based on evaluation results.

2 Research Problem and Methodology

User experience is a significant factor of continuous intention to use MOOCs that can facilitate the users' concentration on online courses [13]. As noted by Liu et al. [14], current investigation of user experience in MOOC mainly concentrates on the comprehensive experience encompassing usability, aesthetics, and emotions, or analyses individual design elements, such as videos. With our small-scale study we wanted to evaluate the Slovenian version of ILO MOOC through investigation of user perceptions. Our evaluation, therefore, was entirely learner-based and no expert opinions were included. Contrary to the already mentioned previous evaluations of ILO, we did not measure progress in students' knowledge. Our approach was only aimed at the MOOC itself, evaluating two areas: user experience and user-perceived usefulness of content in terms of learnability, defined as what had they learned and how. The results, although not pertaining to the entire MOOC, could be used to encourage further development of ILO and boost its use to promote IL and its application within the study process. As such, both the developers and university teachers could benefit from this study. We used an evaluation framework that followed recommendations of Robinson and Bawden [15] and Arnes [16], with some additions by Johansson and Frolov [17]. We divided each of our two research topics into two questions:

1. Which positive and negative experiences regarding the interface and their experiences do participants report on the MOOC as a whole? Are there any particular experiences regarding individual modules?

2. How useful is the content of the MOOC as a whole from the learning point of view as perceived by the participants? Are there any particular perceptions regarding individual modules?

We used a qualitative approach in our evaluation of the Slovene version of ILO: methods of diary and interviews. The purposive sample consisted of 12 experienced LIS students at the end of their masters studies (2nd year), who completed all 6 modules in a period of 6 weeks in November and December, 2019, while keeping a diary following the pre-defined evaluation framework. After completing each module, the participants also answered the interview questions.

Diary

For the diary method we used a pre-defined evaluation framework that followed recommendations of Robinson and Bawden [15] and Arnes [16] and consisted of the elements presented below in each of the three segments. The participants marked each element on a 3-point scale (present; partially present; absent), and commented from the point of view of user experience and usefulness of content:

- (1) MOOC as a whole:
 - Interface features, instructions, language and grammar, logical sequencing, use of video, tools for synchronous/asynchronous communication, tools for preparation and handing-in the assignments, overview, evaluation, feedback, collaborative work etc.
- (2) Concluding page of the MOOC:
 - user feedback options, follow-up options, certificate of participation etc.
- (3) Use of videos
 - quality of picture and sound, quality and sensibleness of content, appropriateness of length, subtitles etc.

Interview

The interview consisted of three open-ended questions answered by the participants after each module. Similarly to Nishchyk et al. [18] and Liu et al. [14], the questions tackled various aspects of user experience (cognitive, affective); in our case we were asking for emotional responses along with perceived success and perceptions on the usefulness of acquired knowledge:

- (1) How well did it go and what emotions did you feel during the work with the MOOC?
- (2) What have you learned, how/where do you expect to be able to use this knowledge?
- (3) Which particular positive and/or negative experience(s) can you describe?

We analysed the data in both parts of the study using content analysis, adapted from what is recommended by [19].

3 Results

In the presentation of results, we firstly focus on the results of the diary, followed by interview results. Interestingly, in spite of our aim to capture the participants' emotions via interview, some emotional responses were already recorded through diaries.

3.1 Diary Results

Table 1 presents the diary results for the entire MOOC, Table 2 covers the results for the final page of the MOOC, and Table 3 provides the results for use of videos. For each element, it shows how many participants thought it was present or absent and which positive, negative or neutral comments were given – we summarized the comments, so each topic appears only once, and show their frequency in brackets. Numbers and frequencies may seem as a quantitative approach, but are given to demonstrate prevalent opinions or perceptions or absence of such prevalence.

In Table 1 one can see that some features and functions were accepted as positive by most (or all) participants while others were judged mostly negatively, while some received mixed reactions (positive from some participants and negative from others). Looking at the amount of comments, it is obvious that participants gave more negative than positive comments. Also, some features were perceived as present or partly present by certain participants while absent by others, which could also be a sign of (dis)like for them, especially since more participants marked the presence/absence than commented on them. There were also some (very few) neutral comments, where the participants did not give evaluative judgement but merely noticed that something is there, exists, or works. These neutral comments are not shown in textual columns of Table 1.

Participants liked the option that allowed them to repeat tasks and return to the same position within the MOOC, the options for quick access back/forward, and the bookmark function. They found the functionality of the table of contents useful (11 and 12 positive opinions). They judged tools for preparation, handing-in, survey, assessment, feedback mostly negatively (7–11 negative opinions). Accessibility for mobile devices was perceived negatively by one third of participants. Many negative comments were aimed at the lack of help and confusing final quizzes. They found quizzes confusing when they did not offer the option to find out the correct answers and when they experienced, in some cases, that correct answers depended on participant guessing the right form of the word to be typed in. Adding to confusion was lack of interaction options and inconsistency of language and other linguistic features, including grammar. Mixed comments were received on the interface design, length of materials and use of various formats of information (text, pictures, graphics, videos) – while some participants liked those, others did not, and some were neutral. For example, some participants liked the simple interface design and even its inconsistency, while to others it seemed too plain and boring and annoyingly inconsistent. To some participants materials seemed much too long, while others liked their length/amount; some participants liked the instructions and others thought they were too lengthy. MOOC structure was also perceived variably – from participants who thought it has a sensible structure to those who often felt lost, missed important information, or thought it should be more emphasized. While some participants perceived the various formats of information (text, pictures, videos)

as inadequate or not well balanced, others commented on the nice balance of text and other formats.

The final page of the MOOC was not received well by the participants, as can be seen from Table 2. Only two marked feedback options as being present, although they were not clear what they meant by this, while all other feedback and interaction features were perceived negatively and assessed as missing. The comments were also mostly negative: the participants felt frustrated with no feedback options, with the lack of interaction with other MOOC participants, and a very unclear final phase of the MOOC: there is no clear information that the MOOC has been completed, also there is no automatic redirection to final certificate page where the certificate could be printed. The participants also commented that the final certificate should contain more information in addition to the username, such as course title and/or topic, and time completed.

Table 3 contains the perceptions on the use of videos. These results reveal rather polarized with some very positive and other very negative perceptions. Over half of the participants liked the mixed formats and, if videos were not too long, felt that they complemented the content well. In general, the quality of videos was acceptable or even praised. Also, the content was seen as acceptable and some emphasized that videos were understandable.

As videos were mostly in English and not subtitled, most commented that this was annoying. Videos that were too long bothered them. They were frustrated with some technicalities. This included videos not adapted to mobile devices and files that were too large and uploaded too slowly. If videos were not included (such as in Module 6), they expressed dissatisfaction. Interestingly, in some modules they felt that there were too many videos, for example, in Module 4.

3.2 Interview Results

Although their diary results already indicate their emotions during the use of the MOOC, we can complement these findings with the results of the interviews:

- (1) Regarding the first interview question on success and emotions, the participants did not report feeling unsuccessful – on the contrary, most tasks seemed easy to them. Many of the students commented that, as LIS majors at the end of their studies, they felt confident at most tasks, but that freshmen, which are the primary target group, would find the MOOC very useful.

In terms of emotions during the work, both poles emerged: negative and positive emotions, but the first were more frequently reported. Over half of the interviewees reported feeling frustrated at certain points where they did not know how to proceed or find help, and at tasks and materials of varying lengths, especially where there were missing or misleading instructions. They were not happy with the interface not being adapted for mobile devices. A lot of dissatisfaction was felt due to inconsistent language, grammar, and fonts. They noticed the places where the interface was not fully translated to Slovenian and that disturbed them. They missed the descriptions of learning goals such as target competences or felt that the descriptions were inaccurate, too vague, or even too optimistic. They felt that there should be more information on the required timeframe such as deadlines. They missed interaction

Table 1. Diary results – entire MOOC

Participant comments on content and user experience				
	+	–	Positive	Negative
Interface adaptability (text, contrast, colour), consistency	3	6	Interf. simple, clear, attractive (3) Nice contrast (1) Nice visual elements (2) Inconsistency is attractive (1)	Should be adaptable, not adaptable (5) Annoyingly inconsistent (5) Ugly, unattractive, too plain (3) Static (1)
Access. from various devices/browsers	8 (2p)	4	/	Interface does not adapt to mobile phone (2)
Links work	12		/	Almost no links (2)
Back/Forward buttons	12		/	Not translated (7) Poorly designed (5)
Autosave function	12		Position stays after return (5)	/
Consistent language (only one)	8		/	English and Slovene (9) Some German words (5) Should be translated (10)
Grammar	4	7	Correct (1) No major typos (3)	Many mistakes, typos and grammatical errors (6)
Appropriate terminology for target user group	10	1	Appropriate, clear (6)	
Instructions for work	8 (2p)	1	Short, simple, clear (5)	Too long (2)
Synchr. & asynchr. distance commun. Tools	6 (1p)	4	/	Only help button, does not work (3)
Interact. collabor. work tools	5 (2p)	1	/	Unfortunately none (1) Poorly designed (1)
Help (contextual, FAQ, ...)	1p	8	/	No useful help available (3) Only some help in English (3)
Options to skip & search for modules/tasks	8		Possible anytime, bck&fwd (5) I like I can skip modules (3)	Alas no search option (3) Transition option not visible (2)
Table of contents	12		Nicely designed, clear, works (8)	Too scarce, could be richer (2)

(continued)

Table 1. (continued)

Participant comments on content and user experience				
	+	–	Positive	Negative
Appr. length (text, screen, module, chapters...), consistent amount of material	7 (2p)	3	Length ok, balanced amount of material in different chapters (2) Sensible (2)	Texts much too long (2) Not balanced amount of material in different chapters (7) Confusing (5)
Option to repeat tasks (questions, modules...)	11		Repeating of tasks or modules available at any time (5) Nice quick access back/fwd (3) Nice function Bookmark (3)	/
Assessment criteria	1	7	/	Criteria only visible after a task (6) No feedback, one feels lost (5)
Quizzes at end of modules (option to repeat questions, feedback on points...)	10 (2p)		/	Corr. answers visible after corr. answer - confusing (7) Quizzes cannot be re-taken (4) Quizzes do not enable saving (1) Comm. only with a system, not live teacher unpleasant (9) No instr. how to take quiz (6)
Connecting to other participants, like forum		11	/	No interaction at all, alas (9) Should be there (5)
Sensible structure (steps, sequences...)	8 (2p)		Mostly sensible (4)	Not clear where user is (5) Import. inf. not stressed (2) Many introductions confusing (5)

(continued)

Table 1. (continued)

Participant comments on content and user experience				
	+	–	Positive	Negative
Use of var. formats of content presentation	8 (1p)		Text and video contents, nicely balanced (4)	Too few formats, just video & text (3) Text/video not balanced (5)

Key: + present. – absent, p partly

Table 2. Diary results – final page of the MOOC

Participant comments on content and user experience				
	+	–	Positive	Negative
Feedback options/User survey	2 (1p)	7	/	No feedback possible (5) Simple survey would be good (1)
Forum (or other option) for user interaction on content, course...		9	/	Forum should exist to enable interaction and comparison with other users (5) Not there (1)
Certificate of participation		9	/	Cannot be found (3) Not automatic after completion (2) Should contain more data (4) Not there (2)

Key: + present. – absent, p partly

options and felt that it was not good that the MOOC is not moderated that prevented feedback from the instructors on quizzes and exercises etc. They were frustrated with many introductions and with the unclear final text of the first module. They would like to have links between the exercises that were related to each other and instructions on how the exercises were related. Photos should be smaller and better described.

Participants liked the number of modules and distribution of content within the MOOC. They were pleased to have several options to move within the MOOC but many commented that it would be better to have more graphical and less textual elements. They liked to have descriptions and explanations of the tasks and a combination of various teaching methods and formats.

- (2) The second question, what have they learned and how usable is the knowledge, was partly answered already within the context of the first interview question. The

Table 3. Diary results – use of videos

Participant comments on content and user experience				
	+	–	Positive	Negative
Quality (picture, sound)	/	/	Good picture and sound (4)	Some video files too big and upload too slowly (2) Videos not adapted to screen size (2) Some videos too long (1)
Quality of content, sensibleness in terms of content	/	/	Sensibly complementing chapter content (3) Understandable (2) Appropriate (2) As enhancement (4)	Some videos too boring (1) Additional material not needed (1) Some videos partly not understandable (2) Videos should have explanations (1)
Appropriate length (3–5 min)	5 (4 p)	5	Length acceptable (4) When interesting, can be longer (1)	Additional videos too long Length should be stated Videos should be in all modules (4)
Subtitles	2	7	/	Missing subtitles (6)
Videos work	6 (2 p)	2	All videos worked	Not adapted to screen

Key: + present. – absent, p partly

participants generally did not feel that they learned much, as they are experienced students at the end of their studies, but were also aware that the MOOC is primarily aimed at beginner students. Therefore, most comments regarding the usefulness of the knowledge were positive – they felt that such learning opportunity would be valuable when entering the study.

The participants were rather in agreement in their comments on individual modules, with only a few opinions that stood out: the first module (Orienting in information landscape) seemed rather theoretical and too long. One participant commented that it looked like an introduction and the users might only take a quick look, not taking it seriously. The second module (Research is a journey of inquiries) was accepted well, both from the side of form and content: participants liked the clear structure, shortness of instructions, and exercises. One participant commented that Module 2 offers good opportunities to use and solidify the knowledge. The third module (The power of search) has less clear structure and content, according to participants' comments. They missed more pictures, clearer instructions, and even found some mistakes. To two participants, Module 3 seemed too difficult for a beginner. This module and Module 6 received the least positive comments regarding usefulness of knowledge. They were also not very happy with Module 4 (Critical information appraisal) and its mix of videos and written exercises; they

missed more interactive exercises but liked the podcast as a new format. In the fifth Module (Information use) the participants liked the content and felt it was valuable, but commented that duplicating the information in text and graphics and/or videos was unnecessary. Participants' comments on the content of the sixth module (Let's create something new and share it) were again not very positive, as they felt that they did not build up their knowledge. They also missed videos that are not included in Module 6.

- (3) The third interview question on particularly positive and negative experience(s) revealed that participants felt happy to receive the knowledge that they thought would be useful both for school and everyday life. Two commented that it was good that the MOOC is not too demanding, while another two liked the content in mixed formats.

Three participants had problems with the registration to the MOOC. The most frequent negative comment, besides linguistic inconsistencies, was that it is disturbing not to get feedback or to be able to check whether you gave a correct or incorrect answer, and that correct answers depended on guessing the right form of the word. One participant commented that there was too much reading required for an online interactive way of teaching and another was bothered with the inconsistent structure of the MOOC. Several participants commented on the scarcity of text in the final certificate of participation – they would like to see more data on this certificate besides the username as it influences the usefulness of such certificate.

4 Discussion

First, we show and discuss the “big picture” of participants' perceptions, concentrating on the results concerning the entire MOOC, to shape the answers to the research topics and questions. Second, we discuss some implications and propose some points to be improved.

1. The first research question tackled positive and negative experiences regarding the interface and user experiences on the MOOC as a whole. Both were present, and addressed technical and content-related features, although it seems there are more negative than positive experiences. This can also be attributed to the instruction that participants pay particular attention to areas they felt need improvement. Some features received mixed comments,

Many participants noticed that the modules are of very different lengths and difficulties, have inconsistent structure, employ interaction inconsistently, and video use of video is inconsistent in terms of length, placement, linguistic and grammatical errors, and illogical sequencing. Some content was perceived as illogical, confusing (instructions, exercises) or wrongly designed. Students reported this for example in terms of final quizzes where the user has to type in an exact form of each word and where correct answers are not visible. Individual students felt that some exercises were too easy and felt they underestimated the abilities of the user. Students generally wished for more practical exercises and more feedback options as well as interactivity, both with the system and with other MOOC participants, and better accessibility from mobile devices. They also missed tools for preparation and

submitting assignments. Features perceived as positive were easiness of navigation, resume function, bookmark option, and interactive table of contents. The mixed comments on the interface design, length of materials, and use of various formats of information could be to some extent also attributed to the differences between the participants.

The second part of RQ1 dealt with specific participant experiences regarding individual modules. Here, too, some differences were noticed, especially regarding the structure, length, balance of text and videos, interactivity (and lack of it) and overall sense of direction.

2. The content of the second research question were participants' perceptions of the usefulness of the MOOC content from the learning point of view and particular perceptions regarding individual modules. As this was an entirely learner-based evaluation and no expert opinions were included, these answers are, of course, not complete. Topics like appropriateness of content, teaching methods, and material and instruction design can only be fully answered with the help of experts in pedagogy. Overall impressions were that participants judged ILO very useful, especially for beginner students, which are indeed the intended target group. Participants felt that for a beginner student such a tool would be valuable, as it enables acquiring and developing basic study competences. Some participants regretted not having such a tool themselves when entering their studies.

There were some differences in perceptions of the modules: three were accepted relatively well, while the other three were not. The first one was perceived as very theoretical and also very long. The most useful in terms of form and content was Module 2, followed by Module 5. Modules 4 and 6 were not perceived as very useful and, according to participant opinions, also lacked interactivity and variety of formats. Similarly, the perception of Module 3 was negative, this time due to its difficulty and lack of varied formats.

These findings indicate some technical and content-related points of the MOOC to be improved:

- (1) Technicalities: While it is not possible to change the overall interface design (the simplicity of which was perceived positively by some participants and negatively by others), the MOOC should contain more links between certain parts since the main navigation approach was offered through the table of content. Because of this, many participants reported often feeling lost or not knowing how to proceed. Interface consistency should be levelled throughout all six modules. Tools for preparation and submission of assignments, assessment, feedback, and surveying should be improved and/or added where missing. While the technical side of the MOOC was generally not found as very problematic, there still exists the linguistic side. The platform *OpenEdX*, used for implementing ILO MOOC, is clearly not prepared to host multilingual content as most students noticed the areas of the interface that were not translated into their mother tongue. We need to note that, for most Slovenians, it is not a problem to communicate in English and the participants were able to understand the MOOC, however, as the MOOC was supposed to be offered in their mother tongue, this issue should be resolved.

- (2) **Content:** Many comments tackled inconsistency (of MOOC structure, length, difficulty, and use of formats); illogical, confusing or inappropriate content (such as final quizzes where participants were unable to find the right answer or where the right form of the word had to be guessed); linguistic and grammatical flaws; and varied length. All of these issues can be attributed to the fact that each module was prepared by a different subteam within the project and without joint agreement on the common elements and approaches. Therefore, this MOOC would need a thorough overall postproduction to ensure its consistency, proper sequencing, and all necessary basic elements and features. As participants often missed help, this is certainly a feature to be improved. But, we need to comment that, while some issues are relatively easy to resolve, others are not. This includes features that would ensure more feedback and help options, which was also one of the most common complaints. This is due to the fact that this MOOC is non-moderated. Also, we would need to obtain professional opinions from experts for a wholistic evaluation of the content, pedagogical approaches, and instruction design.

5 Conclusion

On the whole, both the diaries and the interviews revealed more negative comments and experiences than positive examples. We can explain this with the fact that the study participants were asked to look for areas that, in their opinion, needed improvement. When asked for their general opinion on the MOOC, all participants, except one, expressed pleasure over its existence and the possibility for beginner students to take the course at the onset of their studies. They were even happy for their younger colleagues to have the opportunity that they did not have to develop necessary study skills more timely and in a more structured, guided and systematic way. Participants also emphasized their belief that ILO MOOC should be continually developed in the future.

We can also say that our chosen methodology that combined two not so common methods of diaries and interviews were good approaches in MOOC evaluation and could be used in the future. As this was a small-scale study and only tackled some aspects of the MOOC, a more thorough analysis and inclusion of more aspects and topics would be needed for a full evaluation. The study should be done on a larger scale and include expert participants. In such as future study we could also include measurement of student progress in knowledge of IL. The target population of this MOOC are beginner students of fields other than LIS; this audience should be included in order to investigate changes in their knowledge.

Our study is too small to meet the ambitious goal of drawing global recommendations for the creation of MOOCs in general. It could, however, be used as a starting point in evaluation procedures, especially in the methodological sense. It could be enhanced with other approaches and participant groups, including beginner students and experts. It provides, nevertheless, valuable information for the developers in further development of the ILO MOOC, as well as its six linguistic versions and for university teachers in its use during the study process. As mentioned in the beginning, the COVID-19 pandemic has had its influence in the preparation of this paper, as in the meantime ILO MOOC has already been corrected in some areas. That, means that certain findings are no longer

relevant and an evaluation should be repeated on its improved version. It would be interesting to see how users would evaluate the MOOC after the improvements.





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How to Measure Information Literacy? An Evaluation Based on Expert Interviews

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Abstract. While the importance of Information Literacy (IL) in today's digital age is acknowledged, the question of its measurement remains rather unresolved and challenging. This paper reviews the literature and outlines a representative overview of approaches to IL assessment. Building on that, the work provides a detailed evaluation of existing approaches by gathering the perspectives of 15 experts. Semi-structured interviews were conducted with German, US-American and Canadian experts from information and library science. The results largely confirm the state of research, including the challenge of finding a consensus on how to approach the measurement. By deducing an estimation of the available standard instruments, achievement and performance assessment approaches are compared in particular. Additionally, the development of IL assessment in the future is a major focus. In this regard, aspects, such as cognitive heuristics in the context of measuring IL are addressed.

Keywords: Information Literacy · Measuring instruments · Qualitative research · Expert interviews · Cognitive heuristics

1 Introduction

In view of the constantly growing amount and complexity of available information in today's digital age, the ability to search, find and use information effectively is becoming increasingly important [1]. These competences are summarized as Information Literacy (IL) [2]. Proficient information behaviour is crucial in various areas of life, including scientific research, professional contexts or personal decision-making [3]. Due to widespread disinformation, the main challenge of today's information seeking is no longer to gain access to information, but to evaluate it with regard to its credibility and validity [4]. For example, the IL Competency Standards of the American Library Association [2] or the Standards of Information Competency of the German Library Association [5] can be seen as attempts to compile and summarize necessary IL skills in a uniform manner [6]. While such standards are able to outline important competencies, they do not answer the question of how to measure IL. This leads to the main focus of the present study: The challenge of measuring IL. While the importance of this

issue is acknowledged in the literature, the question of the measurement itself remains rather unresolved [3]. The development of meaningful and reliable evaluation methods is particularly challenging considering the constant advancement of internet and communication technologies [7]. Nevertheless, various approaches to IL assessment can already be found in the literature, including quantitative approaches, such as multiple-choice tests or qualitative self-assessments [8]. These different approaches have their individual strengths and weaknesses [7–9].

2 Objectives

The aim of this study is to develop a detailed evaluation of existing instruments and approaches for IL assessment. Therefore, at first, a short inventory of instruments that try to measure IL is provided, as similar investigations are not very current. Following that, the perspectives of experts in the field are considered. For this, 15 experts from Germany, the United States and Canada were interviewed. The interviews provide insights into which instruments are widely established or less used, reasons for their usage and into the question how experts envisage the measurement in the future. The study is based on the following research questions: (RQ1) Which instruments and approaches exist to measure IL skills and how do these differ from each other? (RQ2) How do experts evaluate the various approaches and instruments in terms of their informative value and usefulness in practice? And (RQ3) how are the measurement methods assessed in terms of their capability to measure advanced aspects, such as cognitive heuristics?

3 Background

3.1 The Necessity of Measuring Information Literacy

The demand for measuring IL initially grew in American academia landscape in the late 1980s [10]. The benefits of it are briefly summarized below.

Basically, IL assessments are used to determine the competence level of learners [11]. They simultaneously test the theories and models of IL in practice [11]. In library and university contexts, the measurement is usually carried out to assess the effectiveness of related trainings and instruction [11]. The results can then be used to optimize these trainings so that they are tailored to the needs of the respective group. To be concrete, it can be determined whether the relevant concepts have been learned and skills have been acquired [10]. This becomes particularly measurable if students' assessments are, for example, taken both before and after a specific IL course or at the beginning as well as at the end of the students' studies at university [7]. Going into further detail, test results can also give additional information about individual needs of specific student groups or programs, for example by identifying topic areas where the results are weaker than in others. According to Leibiger and Schweinle [12] testing undergraduate students' IL skills is particularly relevant in order to enable closing of possible knowledge gaps as well as to plan suitable interventions within the course of studies. It should be noted that there are further stakeholders, such as legislators, trustees or even parents having an interest in measurable results regarding students' IL skills [10]. In the same way, employers want to know whether the university's education produces information literate graduates who can cope with today's information age [9].

3.2 Similar Investigations

There are few publications that group the various assessment methods and characterize them as well. Examples include the works of Oakleaf [9], Walsh [13] or Covello [14]. They examine and compare various approaches based on existing research. In doing so, they do not claim to draw an exhaustive list of existing methods, but rather serve as starting points for introducing IL assessment [13]. In his representative sample, Walsh presents a total of 10 different approaches to IL assessments including exemplary case studies [13]. Thereby, he merely focusses on the question of whether any of these methods have proven to be reliable and valid. In contrast, Oakleaf presents three different IL assessment approaches: Fixed-choice tests, performance assessments and rubrics [9]. Covello in turn is less concerned with general approaches, but presents concrete instruments that have already been implemented, such as the SAILS project [1]. Due to the fact that these works were conducted in 2008, 2009 and 2010, they can no longer be considered up-to-date. A targeted literature search on the actual status of the various test approaches was accordingly unavoidable and is therefore presented in the following chapter.

4 Overview of Instruments to Measure Information Literacy

4.1 Research Procedure

Due to the relevance of the topic, there is a multitude of literature dealing with approaches to IL assessment [13]. The research procedure for developing a representative overview had the following criteria: The possible sources to be included were published studies as well as articles in journals or conference proceedings. In addition, the selected literature should refer to assessments in Higher Education. Furthermore, approaches and instruments were only included when there was sufficient information – allowing full understanding of the measuring instrument – available free of charge. In order to find the most recent attempts at measuring IL, the search was limited to articles published after 2005. For the scope of the review, it was important to have a comprehensive, but not necessarily exhaustive overview of existing methods to measure IL. Representative coverage was accordingly suitable for this purpose, as it does not examine the entire literature, but instead gives examples from the literature intended to represent larger groups of topics. The literature research process itself is illustrated in Fig. 1. It went from keyword search in Google Scholar and library folders (1) to reverse searching based on these sources (2) to a detailed documentation of their main characteristics and clustering to categories (3).

The result of the abovementioned process was a categorization of IL assessments into “Achievement Tests”, “Simulated Tasks”, “Information Search Tasks”, “Self-Assessments” and “Further Approaches”.

4.2 Instruments to Measure Information Literacy

In this chapter, the approaches resulted from the literature research will be described briefly before coming to a first estimation.

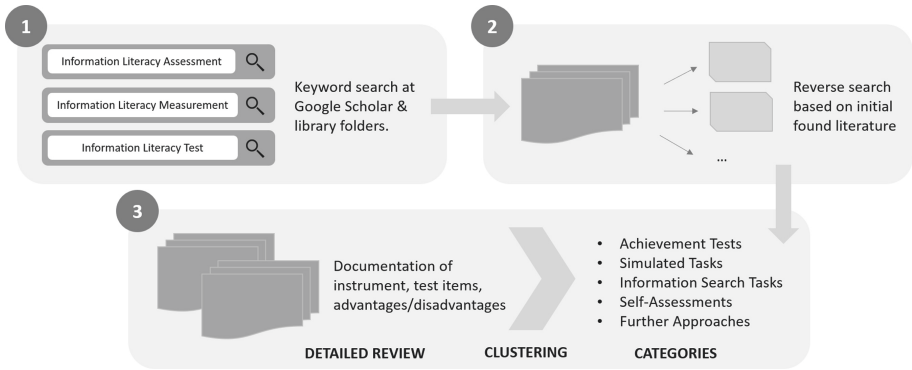


Fig. 1. Illustration of the procedure for the literature search (Source: Own Illustration)

Achievement tests to measure IL skills are particularly characterized by differentiating between correct and wrong answers in multiple-choice questionnaires [15]. The central motivation for the development of these test types lies primarily in the aspiration for a standardized test instrument to capture IL-related skills of students [16]. Such tests are therefore aimed at institutions, teachers or librarians who use them and are thus supported in the assessment of their students [7].

Simulation Tasks focus on assessing the performance of individuals while they are completing a certain task [9]. The setting is simulated as the tasks are based on recreated databases and software [17]. Thereby, the interaction should be as realistic as possible. In addition to the standard metrics, such as correct and incorrect answers, simulated environments allow further observations like an inspection of the reaction time [17].

Information Search Tasks are used in IL assessment by letting examinees solve a certain task in a real-world setting with common search tools. That means that the students have access to a computer where they can perform tasks by using library databases or search engines [8]. Similar to simulated tasks, information search tasks involve students' performance observation [9].

Self-Assessment approaches to measure IL essentially refer to questionnaires that consist of a large number of items carrying out attitudes and behaviour of students [18]. More specifically, these surveys do not focus on correct and incorrect answers, but rather on a documentation of the respondents' opinions and beliefs regarding IL related topics [15].

Further Approaches that cannot be sorted into the above categories should also be mentioned. For example, the analysis of bibliographies produced by students for specific projects or assignments is an additional approach to measure IL skills. These authentic materials are used to assess certain key competencies connected to IL. Assessing students' written portfolios is another attempt to measure IL. Apart from that, hybrid test methods exist as well. The PIKE-P test by Rosman et al. [17], for example, combines descriptions of certain scenarios (inspired by simulated tasks) with an assessment on a Likert scale where one approach is the best (variation of correct-/incorrect answers).

4.3 Estimation of Instruments

Table 1. Overview – IL assessment approaches.

	Achievement tests	Simulation tasks	Information search tasks	Self-assessment
Factors measured	Declarative knowledge	Procedural knowledge	Searching behavior	Self-estimation
Method of measurement	Multiple-Choice Questionnaire	Performance Observation	Performance Observation	Rating scale Questionnaire
Costs for measurement	1 = <i>lowest effort</i>	3	4 = <i>highest effort</i>	2
Explanatory power	2	3	4 = <i>highest significance</i>	1 = <i>lowest significance</i>
Examples	Project SAILS [19]; ILT by Swain et al. [20]	ICT by Katz and Macklin-Smith [21]; Evaluating Information by Wineburg et al. [22]	Assessing IL using information search task by Leichner et al. [23]	PILS by Doyle et al. [24]; IL-HUMASS by Pinto [5]

Table 1 provides an overview of the measurement approaches presented in the previous chapter and derives an initial assessment. It becomes apparent that achievement tests require the least effort to perform compared to the other three approaches [25]. Once the questionnaires have been developed, they allow many people to be tested in a short time [25]. Evaluating the questionnaires is also comparatively simple, as there is always only one correct answer [25]. Compared to this, information search tasks have the highest effort with regard to their development and implementation. For this reason, fewer test items can be queried, which in turn has a negative effect on the reliability of the assessment test [23]. Apart from the effort, however, the ranking of significance in the table shows that information search tasks are the instrument with the highest explanatory power to measure the holistic comprehension of IL [17]. In addition, the results of these assessments are attributed to actually expressing the IL related competencies of students as they are very similar to search tasks in real world [23]. With regard to the meaningfulness of the approaches, self-assessments have the least significance since they have little informative value about students' IL skills [12]. Rosmann et al. [8] question their validity because self-assessment is an individual ability just like IL competencies. Consequently, students with lower self-assessment abilities may overestimate their competency level and the responses may not correspond to their true skills. Similar criticism is also raised about the achievement tests as such limited knowledge inquiries which only check whether students can remember learned IL knowledge. Therefore, it rather takes their declarative knowledge into account [26]. These tests do not allow statements on whether students apply this knowledge in practice [13].

With regard to the first research question (Which instruments and approaches exist to measure IL skills and how do these differ from each other?) the previous chapters created a representative overview of existing approaches to measure IL. There is clearly a range of different instruments available.

5 Expert Views

5.1 Interview Guideline

The present investigation is based on qualitative expert interviews. The interview guideline for this purpose was structured into four phases: The information phase, the warm-up and entry phase, the main phase and the final phase [27]. The central element of the interview were the questions asked in the main phase. Table 2 shows the questions used to capture expert opinions on the measurement and evaluation of IL assessment approaches.

The first section dealt with the question of how experts evaluate the existing instruments for assessing IL. These five test items can be assigned to the second research question (How do experts evaluate the various approaches and instruments in terms of their informative value and usefulness in practice?). The second section of the main part contained questions related to the third research subject about cognitive heuristics in combination with IL (How are the measurement methods assessed in terms of their capability to measure advanced aspects such as cognitive heuristics?). Three different questions were developed for this purpose.

5.2 Expert Recruiting

For the present study, a total of 15 experts were interviewed. It seemed important to include US-American experts in the sample as some of the analysed evaluation instruments were created in the US. The selection of these experts was a deliberate choice. Experts were defined as persons who, in their professional activities, deal with the topic of IL and its measurement. As a starting point for selection, the position papers on “Information Literacy and Information Literacy Teaching: Current Status and Perspectives”, which were published in October 2019 by Çetta et al. were used. They contain statements on the topic of IL and IL training from various authors dealing with this topic in their professional activities. A well-founded research with regard to their working area, their position or their (thematic) background could additionally guarantee that the experts had the required knowledge before getting in contact with them [28]. Building on this, other experts who have published on the subject of IL and its evaluation over the last 15 years were considered as well. To contact them, an e-mail template in German and English was prepared. The template contained a personal introduction, information about the present research topic as well as information about the organizational background, such as the time required and the technical implementation. In the further course, if the experts’ response was positive, the second step was to set a date, to determine the preferred tool for conducting the interview (Skype or Zoom) as well as to send the declaration of consent.

Table 2. Relevant interview questions.

Section I – Evaluation of instruments for measuring IL	
I.I	Which instruments for measuring IL do you know? Have you already used any of them? Possible inquiries: Why did you choose this instrument? If not: Which instrument would you choose to measure IL?
I.II	Do you see limitations and weaknesses in the existing testing instruments? If so, please describe them, if not, why not?
I.III	What do you see as the most effective test design to assess the actual IL competency of an individual?
I.IV	Which form of presentation to the subjects do you consider useful and why?
I.V	How should future IL measurement instruments be designed?
Section II – Use of cognitive heuristics related to IL	
II.I	Which cognitive heuristics do you know that can influence information search and evaluation?
II.II	Whether and under what circumstances does the use of heuristics lead to good or bad credibility decisions referring an information source? Possible inquiries: Do you think that the use of cognitive heuristics that lead to bad credibility decisions is a sign of lacking IL?
II.III	How would you improve instruments for IL assessment, for example to reflect aspects such as cognitive bias or to better reflect motivational factors?

5.3 Pre-test

Before the actual interviews were carried out, the designed questionnaire was first subject to a pre-test to eliminate potential weaknesses and incomprehensibilities. In accordance with Kaiser [28], the pre-test participants were recruited from among potential experts. By asking the test persons about their interest in the questions and the comprehensibility, the pre-test resulted in minor adjustments to the guidelines by adding further descriptions. Adjustments of the questions itself were not necessary as the test persons confirmed their comprehensibility in general.

5.4 Execution

The interviews were conducted over a period of three weeks. As in the pre-test, the guide was employed in a flexible manner [28]. This means that the sequence of questions could vary for the different interviewees and is thus thematically adapted to the individual course of the interview. The interview duration varied between 20 and 55 min. The interviews (n = 15) were conducted with 11 female and four male participants from Germany (n = 6), the United States (n = 7) and Canada (n = 2). The participants are employed in different positions in academic libraries (n = 10) and information science institutes (n = 4) at universities or in other educational institutions dealing with IL (n = 1). They have either a master's (n = 9) or doctoral degree (n = 6).

5.5 Analytical Procedure

To evaluate the transcribed material, the method of qualitative content analysis as proposed by Mayring [29, 30] was used. This method is mainly characterized by the development of a category scheme, which is either theory-led (deductive) in advance or, as in this case, inductively developed directly from the material. The analysis was conducted by the first author of this paper. According to Mayring's [30] suggestions, the inductive category building was implemented as follows:

1. *Specification and theoretical justification of the research question:* This step was covered by the previous explanations in the paper.
2. *Selection and characterization of the material:* The interview material for this investigation consists of 15 transcribed expert interviews whereby the persons involved were made anonymous.
3. *Classification of the material in the communication model:* The experts for the interviews were specifically selected and informed directly about the interest and research topic.
4. *Definition of the units of analysis:* The smallest material component to be evaluated in a category – the coding unit – was understood to be several words, a word sequence. The largest text component – context unit – falling into one category was defined as an entire answer text to a question asked in the interview.
5. *Determination of the category definition:* After an initial review of the material, the following category criteria were defined: Category system I should include all evaluations and assessments on existing approaches to measure IL. Category system II should cover any described approaches for modifications of existing approaches.
6. *Determination of the level of abstraction:* The selection criteria were formulated in very general terms and thus exhibited a high level of abstraction. The classification was chosen in such a general way so that the following category formation was not strongly restricted by the category criteria, but rather offered the possibility to develop inductive, concrete subcategories to the topics.
7. *Start of the inductive category creation:* Categories were carried out with the help of a prepared Excel sheet. The sheet contained three columns: “Original text”, “Paraphrase”, and “Generalization”. They were used to capture the material with regard to the abovementioned category criteria. After one third of the interview material was included in the table, similar content could be combined and reduced to create summary categories in the fourth column.
8. *Revision of the category system, intracode check:* The structure as well as the wording of the categories were revised several times, as the necessary back-checks on the material revealed some categories to be inappropriate, which were then adapted or reworded. In this way, the main and corresponding sub-categories were developed.
9. *Final pass of material:* In the final material run, all transcribed interviews were coded using the inductively developed category system. For the assignment of the text passages to the respective categories, an Excel sheet was used again. In this file, all main categories and subcategories were listed in table form.

6 Results

The following analysis is structured according to the research questions.

RQ2: How do experts evaluate the various approaches and instruments in terms of their informative value and usefulness in practice?

Regarding the basic approaches and instruments we see the following: To find a consensus on how to approach IL assessment by highlighting “one” perfect instrument is difficult or almost impossible, even after taking expert opinions into account. In principle, the expert opinions can be interpreted to the effect that an IL assessment is more appropriate the closer it is tested to real-life scenarios and contexts (“I think the most important thing with measuring information literacy is that it needs to be done in real life environment of the individuals.” – Participant XI). Nevertheless, it should not go unmentioned that the experts reported on several other factors that influence IL assessment and the instrument choice in institutional contexts. This mainly includes monetary and time resources. Experts reported, for example, on their experiences in American institutions of higher education and academic libraries, which conduct IL assessments regularly and with a large number of students. These assessments are then primarily used for the adaptation of the IL instruction. Using performance assessments seems almost impossible in these contexts due to the high effort required for evaluation and scoring. Hence, a large-scale implementation with these assessments would require significantly more resources than in the case of achievement tests.

To sum up, the expert interviews suggest that the more precisely one wants to get at the actual information competence of test persons, the greater the effort required. The conflict between costs and benefits must therefore be resolved according to the assessment context.

The level of test approaches or individual instruments and the experts’ experiences with them, can be summarized thus: With regard to information search tasks, the consideration of students’ assignments, artefacts or essays was named several times. By including an authentic context, it is possible to find out how students actually deal with information in reality and to get deeper than it is possible with standardized assessment. In addition to these artefacts themselves, students’ reflections on the process of doing an assignment are also used for IL assessment as they are giving “[...] so much good insight into students’ IL practices [...]” (Participant I). Other positive evaluations to these reflections include words like “most valuable” or “the best method”. In the course of authentic assessment, the approach of formative testing was also positively mentioned. This can be implemented, for example, as a continuous assessment during a course (“I find formative testing is much more useful because formative testing allows us both to determine what students are learning and to make changes in a program that will immediately affect those students.” – Participant IV). Coming back to students’ artefacts, it has to be said, that although the reflections show that students have learned about the concepts taught, what they have learned is hard to quantify. The experts named the so-called rubrics here to evaluate assessments like these. Another limiting point mentioned with regard to authentic assessment is the time necessary for reading the artefacts and creating suitable scoring guidelines such as the rubrics.

Compared to this, the strengths of objective standardized assessments are mainly related to the acceptance of these instruments. The tests are quick and easy to use, as neither the implementation itself nor the evaluation takes much time. In addition, it was mentioned that the possibilities to measure IL quantitatively are beneficial due to the variety of different existing instruments. Nevertheless, descriptions such as “limited in their scope”, “constructed for general organization” or “stem from library environment” address further difficulties described by different experts. The fact that achievement tests for IL assessments nevertheless play a role, especially in the United States, shows that the abovementioned disadvantages and limitations of this approach are accepted because of the few resources that are needed for their implementation (“[...] I use them for a good reason [...] you can measure a lot of individuals. And it’s not very time-consuming for the study team or the participants.” – Participant XI).

With regard to self-assessments, the experts described the problem that students often wrongly assess their IL as high. Thus, instruments such as the self-efficacy scale are subjective and cannot be used to assess whether students can evaluate information.

To conclude the second research question, it can be said that IL measurement is characterized by a conflict between the significance or explanatory power of the measurement and the effort required: A compromise for this conflict must be found in the individual usage contexts. It should be clear that not all test approaches are suitable for a deeper analysis of real understanding of user behaviour. According to experts, achievement tests can fulfil this only to a limited extent and serve more as a benchmarking or a survey regarding IL related knowledge.

At this point, a short outlook should also be given to possible future developments or adaptations of instruments. Here, particularly the improvement of qualitative measurement in real-life scenarios instruments was mentioned – which is coherent with the evaluation of these approaches (“It is good when the individuals are tested in their real-life situations. I think this would be the most important thing for as such an instrument.” – Participant XI). It is interesting to note that the achievement tests described above play a subordinate role in this context, although they seem to be playing a big role right now, especially in North America. In order to examine students’ written works with regard to IL, the experts mentioned the further development of the so-called rubrics. Although the rubric development and rating process is initially time-consuming, developed and validated rubrics can be then used again and again for the assessment [31]. Then, rubrics enable the assessment of IL skills on the basis of authentic texts. Although it is limited to written works, it offers a way of quantifying the results of performance assessments in terms of IL and reporting back to the students.

RQ3: How are the measurement methods assessed in terms of their capability to measure advanced aspects such as cognitive heuristics?

The inclusion of cognitive heuristics and other motivational factors in the assessment was described by attributes such as “hard to capture”, “difficult to take into account” or a “complex and complicated thing”. Nonetheless, the experts named various approaches that are, according to them, conceivable in this context. In general, qualitative assessment was considered more suitable here. In addition, a pre- and post-test design and formative assessment were considered as well. As concrete ideas for its methodological

implementation behaviour, observations in combination with the method of thinking aloud were named. Another possible test design mentioned was a scenario-based test in which contrasting and partly biased studies or sources are presented for which questions must be answered or which are to be compared with regard to certain factors. In addition, a combination of a quantitative assessment and a qualitative interview, which includes in-depth questions referring motivational issues, was proposed (“[...] Maybe pairing a quantitative assessment with some type of qualitative expanded interview on that idea of the different heuristics.” – Participant V). The assessment approaches for the inclusion of heuristics proposed by the experts all focus on the user and aim to extract motivational aspects from them, which should ultimately enable conclusions to be drawn about the use of cognitive heuristics in information processing of individuals.

In terms of the abovementioned research question, capturing motivational aspects and cognitive heuristics in the context of IL assessment is difficult and complex, but holds a high potential for valuable insights. As study results on the use of heuristics from other disciplines show, it can lead to meaningful results: A recent study by van den Broek and Walker from 2019 [32] examines, for example, the people’s use of heuristics in relation to their perception of their appliances’ energy consumption. With the help of three sub-studies, it was found that the participants use a variety of different heuristics in judging energy consumption that even go beyond those already known in literature [32]. Additionally, following the results of the study, the use of these heuristics can be influenced and changed in the way that unhelpful heuristics are counteracted, which in turn leads to an improvement in energy literacy [32]. This example once again supports the potential of including heuristics in the measurement for IL research to obtain deeper information about the motivational factors when humans deal with information. Particularly, as experts reported that heuristics or mental shortcuts can often be observed in students and that in some cases, they are even deliberately given to them, further underlines the necessity to obtain detailed information about their use.

7 Discussion and Outlook

Answering the research questions, we can state the following core results of this investigation: (RQ1) IL testing instruments range from objective methods, such as multiple-choice tests, performance assessments where students complete certain search tasks as well as create assignments or portfolios, to approaches in which users assess themselves. (RQ2) By interviewing the experts, it became clear that the ability to actually measure IL is attributed to performance assessments, whereby the instrument selection is also strongly dependent on the context of its use. (RQ3) The inclusion of cognitive heuristics and other motivational factors in these assessments is complex, but could be meaningful for IL research.

In general, the holistic assessment of IL requires time and resources. Even though the ability to capture IL holistically is attributed to performance assessments, achievement tests still play a crucial role in this regard. At the same time, a revolutionarily better instrument – standing out through a more balanced relationship between the effort of its implementation and the requirement to capture the entire scope of IL – has not been found yet. In 2015, Rosman et al. found that research on IL has not yet been able to

come to a consensus on how to tackle the measurement of IL in a unified way [8]. The research carried out shows that this statement is still valid six years later. To make a decision on which approach or instrument is dependent on individual contexts, aspects such as the overall assessment goal, the purpose of the results to be generated, the benefit of these results for the institution, class or program, and the available resources in terms of expertise, time and funding should be taken into account [33].

Concerning the methodological aspects of this investigation, some limitations should be mentioned. The number of experts interviewed was limited because of time, and the saturation criterion was not applied. Since the study was conducted from the outset with a fixed number of 15 participants, it cannot be ruled out that the involvement of additional experts would have brought further findings and insights. Also, due to resource limitations, this study did not apply quality criteria in terms of intra-coder and inter-coder conformity in the qualitative content analysis [30]. However, preliminary steps, such as the definition of the content analyst units, coding, context and evaluation unit, which make a review according to the quality criteria possible at all, were fulfilled. The process therefore followed strict guidelines and was well documented to make the research process comprehensible to others [29].

In summary, it can be said that the present work – although certain aspects have remained open – represents an updated view of the relevance of IL and its measurement, and can thus be used as a starting point for various further investigations in the future.

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Academic Integrity, Plagiarism and Digital Piracy



Law Students' Perceptions of Academic Integrity: Pilot-Study

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Abstract. The goal of the study is to investigate law students' perceptions about academic integrity and plagiarism. The study looked into the opinions and attitudes of students at a Law school in Osijek and a Law school in Rijeka. An online survey was conducted in March and April 2021. The sample included students of all five years of study who attended seminar classes in the summer term of academic year 2020/2021. Findings indicate that students are aware that plagiarism is a serious offence, but are not always sure what constitutes plagiarism. Only half of the sample is familiar with the ethical documents of their schools but a majority of respondents are well aware that their university professors use plagiarism detection software. Differences in the sample were spotted for male and female respondents, students with higher and lower Grade Point Average (GPA), students from Osijek and Rijeka, and students of lower and higher level of study. In future, educational activities focusing on issues of academic misconduct should be intensified in order to help students successfully avoid plagiarism and academic dishonesty.

Keywords: Academic integrity · Law students · Croatia · Plagiarism

1 Introduction

Academic dishonesty within the context of higher education has been a focus of various research studies [1–3], which indicates its importance for the academic community. There is a growing concern among academia that, with the advance of information technologies, such sort of behaviour would be impossible to prevent. However, although the new technologies and the Internet make academic dishonesty easier, they also make plagiarism more visible, mainly through the existing plagiarism detection software such as Turnitin or iThenticate [4].

Plagiarism can be a difficult term to define for students because it encompasses a number of errors in academic writing such as: (a) submission of a paper written by somebody else, without the authors' knowledge; (b) submitting a paper somebody else has written for the student; (c) copying a text (complete or fragments) without

acknowledgment; (d) copying material from a source text, acknowledging the source, but omitting the quotation marks; (e) paraphrasing material from a source without crediting it; (f) buying a paper from a research service or a paper mill [5]. Citing without crediting sources and failure to use quotation marks are believed to be the most common errors in academic writing among university students [6].

Academic dishonesty including plagiarism continues to remain a global problem. In 2015, 50,000 students enrolled at British Universities, were found to have plagiarized [7]. Similar observations were made in other countries, as well [8, 9]. The British study found that particular difficulties with plagiarism tend to occur with students from outside the European Union – students from overseas, and particularly China [10]. On the other hand, only a small fraction of students ever face punitive actions for their misconduct [11].

This paper looks into the perceptions and attitudes of law students of two Croatian law schools (in the cities of Osijek and Rijeka) toward academic dishonesty (such as submitting a paper somebody else has written for the student) and plagiarism practices of their peers and themselves as well as their knowledge about citing and referencing sources. The authors hope to stimulate students to start thinking about the topic and be more motivated to take library instruction classes at their law schools that focus on academic integrity.

2 Literature Background

There are various factors connected with academic dishonesty, such as gender, age, discipline or grade point average [9] or [11–13], but also low levels of understanding concerning academic ethical policies, lack of sanctions of academic dishonesty and absence of education and instruction on the topic [14, 15]. It must be pointed out, however, that results from studies of the relation between gender and academic dishonesty are inconsistent – there are those that report higher level of cheating by men [9] or [14], or others that observed no reliable gender differences [16, 17]. Further reasons for students' dishonesty mentioned in the literature are, among other things, grades, procrastination, student workload and the feeling that everyone is doing it and getting away with it [18]. Strongest correlates for academic misconduct are: moderate expectations for success, having cheated in the past, having poor study skills, holding favourable attitudes toward cheating, perceiving that social norms allow cheating, anticipating greater reward for success, social comparisons with peers (seeing others cheat or approve cheating), and the experienced severity of punishment for cheating [13, 19].

Additional problems for academic dishonesty and plagiarism practices are presented by the internet and online environment that make textual theft even easier. Therefore, it is unsurprising that the majority of authors believed that plagiarism increased with the advance of the internet. Especially worrisome are teenagers' attitudes to copying texts – in a 2009 United States (US) survey among students aged 12–18 36% said that downloading a paper from the internet was not a serious cheating offense and 19% said it is not cheating at all [10]. However, the research suggests that the level of internet plagiarism might be similar to the levels of 'conventional' plagiarism. For instance, the study from 2002 [20] found that students who went online to cut and paste without

citation constituted 24.5% of the sample, whereas in a 2009 study [10] on US teenagers 21% have turned in a paper downloaded from the internet and 38% copied text from a website. Similar results were found in 1963 (30% of students admitted to having plagiarised) and in 1993 (26% have plagiarised) [21].

Law students' plagiarism practices are believed to be similar to those of other students worldwide [11]. Legal research and advocacy rely heavily on proper citation. Law schools all over the world (including Croatia) include courses on legal research and writing in which they are taught about the concept of legal authority and proper citing of documents [3]. However, authors complain [3] that new students that come to law schools rely on their previous (high-school) experience which very often lacks proper citation instruction and therefore resent the rigor of law professors who ask them to provide the complete citation of the sources used. Legal research and proper document citing are crucial skills for law students' future employment. The data say that 56% of law firm associates indicated that their employers expected them to have strong legal research skills but did not provide any legal training. Associates in practice less than two years spent 35% of their time doing legal research [22]. Consequently, lack of legal research skills combined with absence of document citing may lead to serious consequences for law students – during their studies, but also later when they start their employment. Although the punishment for academic dishonesty may be as severe as expulsion from the university [3, 11] the majority of authors plead for universities to undertake actions to help students avoid plagiarism – this may include academic ethics policy documents, teachers who emphasise the importance of academic integrity and are not lenient when it comes to plagiarism, or workshops (which might be part of library instruction or information literacy classes) on plagiarism and how to avoid it [3, 5, 11, 18]. Although it is true that some students intentionally plagiarise, it is also true that students need help in understanding how to avoid plagiarism and how to attribute sources properly. The authors believe that, in the setting of Croatian law schools, the best direction would be to include topics on academic dishonesty and plagiarism in library instruction courses at those institutions.

In Croatia, the topic of academic dishonesty and plagiarism of students was often not a topic of research papers. The majority of papers identified on the topic in Croatia came from the discipline of medicine [9, 23–25] and this is the first study that looks into the attitudes and perceptions of law students on these topics.

3 Study

3.1 Goals and Research Questions

From 2015 Croatian higher education institutions are legally bound to deposit students' graduation papers in the national repository Dabar. Before deposition, every student paper must undergo the plagiarism check by one of the plagiarism detection software and be marked as an original paper. Therefore the issue of plagiarism, either intentional or unintentional, is of particular importance for all actors of higher education. This paper, for the first time in Croatia, looks into the perceptions and attitudes of law students to academic honesty and plagiarism. The study was guided by following research questions:

RQ1: What are the perceptions of Croatian law students toward plagiarism and academic honesty?

RQ2: Are there any differences in attitudes and perceptions of academic integrity and plagiarism in relation to demographic data?

RQ3: Do students possess enough knowledge about plagiarism in order to successfully avoid it?

Given the described and the limited scope of this study, this paper brings the selected findings from the study.

3.2 Methodology, Instrument, and Sample

A survey was carried out at two law schools of similar size – the Law School of Osijek (LSOs) and the Law School in Rijeka (LSRi). The online survey was completed by 169 respondents ($n = 90$ from Osijek and $n = 79$ from Rijeka). The study was conducted in March and April 2021 on the population of 230 students yielding a response rate of 73.5%. The sample included students of all five years of study who attended seminar classes in the summer term of academic year 2020/2021. Table 1 gives demographic data about the sample. The sample consisted of more female than male students, but this is consistent with the gender structure at both law schools. From LSOs more respondents had higher GPAs (3.5 or higher) (59.6%), whereas more respondents from LSRi were with lower GPAs (3.4 or lower) (63.6%). At both schools more junior students (attending the first three years of study) filled out the questionnaire, which again is consistent with the number of students in lower and higher years of study.

Table 1. Demographic data

	Male N (%)	Female N (%)	Lower GPA ($\leq 3,4$) N (%)	Higher GPA ($\geq 3,5$) N (%)	Junior (1st–3rd) N (%)	Senior (4th–5th) N (%)
LSOs	21 (23.3%)	67 (74.4%)	36 (40.4%)	53 (59.6%)	64 (71.1%)	26 (28.9%)
LSRi	22 (27.8%)	57 (72.2%)	49 (63.6%)	28 (36.4%)	66 (84.6%)	12 (15.4%)
Total	43 (25.4%)	124 (73.4%)	85 (51.2%)	81 (48.8%)	130 (77.4%)	38 (22.6%)
Missing	1	1	3			1

The questionnaire consisted of 37 multiple-choice and open-ended questions on students' views on and experience with plagiarism and academic integrity. The survey was found to be acceptable since the internal consistency of the questionnaire measured by Cronbach's alpha was 0.74 (values from 0.70 and above are considered to be acceptable) [26]. The questionnaire also included several citing examples where students were asked to choose the correct way of citing and referencing.

The majority of students did not participate in information literacy programmes organized by the library, as many as 160 respondents, or 94.1%, and only 9 respondents stated that they participated, or 5.9%. From the content they listened to as part of the trainings they list the search, use and evaluation of academic databases and other information sources, as well as guidelines for writing student papers.

4 Results

4.1 Student Attitudes Towards Plagiarism

Table 2 gives an overview of students' attitudes about ethically questionable behaviour. We noticed the highest level of agreement for the claims that plagiarism is even copying small parts of the text (3.40), and that such a behaviour should be severely penalized (3.01). A lower level of agreement was observed for claims that plagiarism can be forgiven among 1st and 2nd year students but not for senior students (2.81), and that if students knew about such a behaviour, they would not report their peers (2.07). The lowest level of agreement was observed for the claim that it is normal for students to plagiarise because that is how they learn to write correctly (1.99).

Table 2. Students' attitudes about the ethically questionable behaviour of other students

Causes	N	Mean	Std. deviation
Even if only small segments of text are copied, it is still plagiarism	168	3.40	1.234
Such a behaviour should be penalized without exception	167	3.01	1.184
1st and 2nd year students can be excused for such a behaviour, but not older students	167	2.81	1.217
If I knew about such a behaviour of my peers, I would report it	167	2.07	1.106
Normal for students to plagiarise because it is the only way to learn properly how to cite and reference	168	1.99	1.092

Table 3 provides an overview of views on claims related to ethically questionable behaviour. We noticed the highest level of agreement for the following claims: the theft of an entire work of a person with the intention of presenting it as one's own (89.4%), the use of translation of a text in another language for presentation as one's own work (75.2%) and the purchase of the entire work of one person with the intention of presenting it as own (73.9%). The lowest level of agreement was observed for using the same written assignment for several different courses during one's studies (24.9%) and using someone else's ideas without giving them credit (45.5%). Statistically significant differences were noticed between male and female respondents using the same assignment for several different courses during one's studies, where more female respondents (63.4%) consider this to be an unethical procedure than the male respondents (34.9%). Also, a statistically significant difference was spotted for students in Osijek and Rijeka

in relation to purchasing somebody else's work and presenting it as one's own – students from Osijek (82.2%) are more convinced that this is unethical behaviour than is the case with students from Rijeka (63.3%).

Table 3. Views on ethically questionable behaviour

Causes	Sample N (%)	LSOs N (%)	LSRi N (%)	Male N (%)	Female N (%)
Copying somebody else's work in entirety	151 (89.4%)	82 (91.1%)	68 (86.1%)	37 (86.0%)	111 (89.5%)
Translating a text into Croatian and presenting as own	127 (75.2%)	65 (72.2%)	62 (77.2%)	30 (69.8%)	94 (75.8%)
Purchasing somebody else's work	125 (73.9%)	74 (82.2%)*	51 (63.3%)*	29 (67.4%)	93 (7.0%)
Copying parts of chapters without crediting sources	124 (73.4%)	66 (73.3%)	56 (70.9%)	30 (69.8%)	90 (72.6%)
Using the structure of an analysis, without crediting sources	113 (66.9%)	64 (71.1%)	47 (45.9%)	26 (60.5%)	83 (66.9%)
Copying parts of sentences	95 (56.2%)	54 (20.0%)	41 (19%)	29 (67.4%)	63 (50.8%)
Paraphrasing without crediting sources	81 (47.9%)	43 (47.8%)	37 (46.8%)	22 (51.2%)	56 (45.2%)
Using other people's ideas without attributing them (e.g., in oral communication)	77 (45.5%)	45 (50.0%)	31 (39.2%)	19 (44.2%)	55 (44.45%)
Submitting the same written assignment in several courses	42 (24.9%)	25 (27.8%)	16 (20.3%)	15 (34.9%)*	26 (63.4%)*

*Statistically significant at 0,05

Table 4 provides an overview of students' views on the reasons why students plagiarise. We observed the highest level of agreement for the following statements about reasons for students' plagiarism: the habit of doing things at the last minute (3.87), the lack of time (3.69) and the lack of knowledge on how to write student papers correctly (3.67). We observed the lowest level of agreement for the following statements: that students plagiarise because the assignment has little effect on the final grade (2.73), because everything on the internet is in the public domain and can be freely downloaded

without citing sources (2.78), because when they copy somebody else's work, they get a higher grade (2.54) or because the teacher is an inexperienced internet user and will never detect the fraud (2.27). By comparing the obtained results, we noticed small differences between students with regard to their GPA or lower and higher year of study. Students in Osijek believe more often that teachers do not read students' assignments (3.10) than students in Rijeka (2.64). Students with higher GPAs and senior students are more prone to plagiarism if they believe the assignment has little effect on final grade. In addition, students with higher GPAs believe more often that it is easier to copy than to write on your own than is the case with students with lower GPAs. Finally, senior students are more often convinced that students plagiarise because they do not know how to cite and reference properly than is the case with their junior colleagues.

Table 4. Reasons for student plagiarism

Reasons	Mean	LSOs	LSRi	Lower GPA (≤ 3.4)	Higher GPA (≥ 3.5)	Junior (1st–3rd)	Senior (4th–5th)
Students always do things 'at the last minute'	3.87	3.91	3.83	3.78	3.98	3.88	3.84
It is easy to manipulate text on the internet	3.69	3.58	3.82	3.72	3.67	3.64	3.82
Lack of time	3.69	3.69	3.68	3.58	3.78	3.67	3.71
Students do not know how to cite and reference properly	3.67	3.58	3.79	3.56	3.78	3.55*	4.08*
It is easier to copy than to write on your own	3.56	3.54	3.58	3.26*	3.85*	3.48	3.84
Too many assignments	3.50	3.45	3.56	3.40	3.59	3.48	3.58
Assignment is extremely difficult and complex	3.23	3.16	3.32	3.13	3.32	3.20	3.32
Assignment is of an abstract and theoretical nature	3.08	3.02	3.16	3.10	3.05	3.02	3.24

(continued)

Table 4. (continued)

Reasons	Mean	LSOs	LSRi	Lower GPA (≤ 3.4)	Higher GPA (≥ 3.5)	Junior (1st–3rd)	Senior (4th–5th)
‘Everybody does it’	3.02	2.89	3.18	3.06	3.01	3.01	3.08
‘Teachers will not notice’	3.00	2.98	3.03	2.93	3.11	3.05	2.84
‘Teacher does not really read students’ assignments’	2.89	3.10*	2.64*	2.52	3.31	2.83	3.11
Students feel they are learning nothing from the assignment	2.84	2.70	3.01	.68	2.99	2.84	2.84
‘Everything on the internet is in the public domain and can be used freely’	2.78	2.74	2.81	2.68	2.89	2.75	2.87
Some teachers do not regard this as such a ‘major’ offense	2.75	2.69	2.82	2.64	2.89	2.70	2.92
The assignment has little effect on the final grade	2.73	2.5	2.91	2.62*	2.86*	2.62*	3.11*
When you copy somebody else’s work, you get a higher grade	2.54	2.56	2.51	2.37	2.71	2.59	2.35
The teacher is an inexperienced internet user and will never detect the fraud	2.27	2.31	2.21	2.18	2.37	2.34	2.00

*Statistically significant at 0,05

4.2 Students' Own Experiences with Plagiarism

Regarding their own experiences related to plagiarism, only two respondents (one from Osijek and one from Rijeka) (1.2%) answered that they once paid someone to write a paper for them, and one respondent (from Osijek) (0.6%) stated that she did it several times. All three students are female and have a higher GPA. Only 19 students (11.2%) indicated that they resorted to plagiarism when writing a student paper during their studies. In addition, only two (1.2%) respondents (both from Osijek) stated that they were wrongly accused of plagiarism during their studies. Most of the respondents are not aware of any cases where one of their colleagues was accused of plagiarism during their studies ($n = 148$, 89.2%). Students with a higher GPA ($n = 14$, 17.3%) were more likely to hear about situations where their colleagues were accused of plagiarism than students with a lower GPA ($n = 3$, 3.5%).

Only slightly more than half of the respondents ($n = 87$, 51.5%) are familiar with their school's Codes of Ethical Student Conduct. The majority of respondents ($n = 93$, 55%) are aware that university teachers use plagiarism detection software when correcting student papers (e.g., Turnitin). Students with a higher GPA ($n = 51$, 63.0%) are more familiar with this than their colleagues with a lower GPA ($n = 39$, 45.9%), as is the case with students from LSOs ($n = 60$, 66.7%) compared to students from LSRi ($n = 31$, 39.2%).

4.3 Student Information Skills - Practical Tasks Related to Citation

Table 5 gives an overview of students' success in solving practical tasks related to the rules of citation and referencing. By comparing the obtained results, we noticed that students were most successful in examples of quoting someone else's idea ($n = 148$, 87.6%), citing all sources in examples where they were omitted ($n = 144$, 85.2%) and citing direct quotations ($n = 136$, 80.5%). In solving examples of omitted citations, female students ($n = 112$, 90.3%) were more successful than male students ($n = 32$, 74.4%), as were students from LSOs ($n = 80$, 88.9%) compared to students from LSRi ($n = 64$, 81.1%). Female students were also more successful in solving examples of citing direct quotations and paraphrasing in relation to male students, as were senior students in relation to junior ones. Students were less successful in citing book chapters, legislation and case law, internet sources, and scientific articles. Comparing the results, we noticed that when quoting Croatian laws, instead of citing the database of the official gazette of the Republic of Croatia, which is the primary source in quoting Croatian laws, 30 respondents (17.8%) cited the commercial legal base Ius-Info. When quoting the case law of Croatian courts, senior students ($n = 37$, 97.4%) were more successful than their junior colleagues ($n = 106$, 81.5%), students from LSRi ($n = 56$, 70.9%) were more successful than students from LSOs ($n = 62$, 68.9%), and female students ($n = 97$, 78.2%) were more successful than male students ($n = 21$, 48.8%). When quoting scientific papers and journals and quoting book chapters, female students were again more successful than male students. Senior students ($n = 28$, 73.3%) were also more successful in quoting chapters in books compared to junior students ($n = 82$, 63.1%), as were students with a higher GPA ($n = 65$, 80.2%) compared to students with a lower GPA ($n = 55$, 64.7%).

Table 5. Information literacy skills of law students – examples of citations

Examples of citations	Quoting someone else's idea N (%)	Omitted citation N (%)	Direct quotations N (%)	Para-phrasing N (%)	Book chapter N (%)	Legislation and case law N (%)	Books N (%)	Internet sources N (%)	Articles N (%)
Correct	148 (87.6%)	144 (85.2%)	136 (80.5%)	129 (76.3%)	122 (72.2%)	118 (69.8)	110 (65.1%)	99 (58.6%)	66 (39.1%)

4.4 Student's Concluding Opinions

Almost half of the respondents ($n = 79$, 46.8%) thought that this survey changed their attitudes about plagiarism and that they would have a negative view of any form of plagiarism in the future. This is truer for students from Osijek ($n = 43$, 47.8%) than from Rijeka ($n = 36$, 38.0%). The vast majority of respondents ($n = 140$, 82.8%) believe that the offered practical examples will help them to cite sources correctly in the future. Female respondents ($n = 106$, 85.5%), students with a lower GPA ($n = 69$, 81.2%) and senior students ($n = 37$, 97.45%) are more likely to consider the practical examples as useful than the rest of the sample. The results have shown that the majority of students ($n = 128$, 75.7%) were aware that, according to legal obligations, their graduate theses would be publicly available in the National Repository of Undergraduate and Graduate Theses. However, students from Osijek ($n = 55$, 61.1%) were more familiar with this than students from Rijeka ($n = 41$, 51.9%).

5 Discussion and Conclusions

This paper presents findings of a pilot-study on law students' (from Osijek and Rijeka) attitudes toward academic integrity and plagiarism.

The majority of students agree that academic integrity and plagiarism practices should be avoided and punished, but they are also not always sure what plagiarism really is – for example, “(...) it was only a part of two or three sentences, I wouldn't call it plagiarism” (S51), or “He [the teacher] explained that it is not allowed even in cases of Power Point presentations” (S90). Students condemn various types of unethical behaviour and plagiarism practices, but they are not likely to report it. Also, they are not really sure that using parts of sentences or submitting the same written assignment for several different courses should be seen as unethical. Although the vast majority of students seem to behave with integrity, 11.2% admitted to having plagiarised, whereas two (female) students even bought a written assignment once, and one additional (female) student did it several times. They all had a higher GPA. (RQ1)

We spotted differences in regard to gender, law school, level of study and GPA, which is consistent with other studies on this topic [9, 11–13]. Female students tended to have a higher developed sense of ethics and were more successful in solving practical citing exercises - as were senior students, and students with higher GPAs. Students from Rijeka are more likely to cite correctly than students from Osijek, but Osijek students seem to be more familiar with institutional ethical guidelines, usage of plagiarism-detection

software by their teachers and the existence of a National Repository of Graduate Papers. (RQ2)

Although the majority of students frowned upon academic dishonesty and plagiarism, there were still those who did not behave in a completely ethical way. However, sometimes plagiarism was the result of a lack of knowledge, and not intent. The study clearly showed that students need clear guidelines and instruction on all the topics included in our survey (the sample found exercises for citing books, articles, internet sources, laws and case laws especially useful). (RQ3)

More junior students (1st–3rd year of study) filled out the questionnaire which also explains their unfamiliarity or lack of knowledge with institutional ethical documents, plagiarism-detection software or the National Registry of Graduate Papers.

Only 5.9% of students took part in library instruction programs where they received instruction about writing an academic paper (which included guidelines on plagiarism and referencing), but this small percentage indicates that academic libraries at each library school must increase their efforts (which is extremely challenging today in the time of the COVID-19 pandemic) to include as many students in their workshops as possible. Since respondents claimed that the practical citing assignments from the questionnaire were extremely useful and will help them in writing future academic papers, it is our intention to embed topic on plagiarism and academic integrity in seminar courses at all study years at those two library schools and thus ensure reaching higher numbers of students than through library instruction classes that are optional.

The authors devised the questionnaire also with the intention to raise awareness among students about academic dishonesty and plagiarism, and practical citing assignments were included to help those who plagiarise unintentionally to learn about citing different types of sources. The study results confirmed that we succeeded in our intentions.

Considering the lack of research on this topic in the area of law studies in Croatia, this paper presents a contribution in understanding the problem and paves the way for future research in this area. Also, a particularly interesting topic for future research is unintentional plagiarism, which is often the explanation for plagiarised student assignments [14, 15].

On the practical level, this research may serve as a framework for the creation of formal programs of library information literacy instruction at all law schools in the country, but, with minor adjustments, also at academic libraries at other institutions of higher education in Croatia.


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Learning How to Avoid Plagiarism: A New Approach in Information Literacy Sessions for Computer Science and Engineering Students

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Abstract. Plagiarism is one of the main issues information literacy had to address in higher education in the last two decades. In addition to deterrent practices, there is a need to develop instructional concepts that address the problem of poor skills in the correct use of sources that often lead to unintentional plagiarism. In this paper we describe a new approach we implemented in information literacy sessions for computer science and engineering students in order to provide them with a better understanding of the different functions sources can have in scholarly literature. As a novelty in the courses for technical studies we adapted Joseph Bizup’s rhetorical framework for research-based writing in the humanities to a German-speaking setting. According to a literature review and our experience we argue that a broader understanding of the sources as rhetorical components of scientific argumentation strongly improves technical degrees students’ ability to avoid unintentional plagiarism.

Keywords: Information literacy instruction · Higher education · Computer science education · Engineering education · Plagiarism awareness · Unintentional plagiarism · BEAM-framework

1 Introduction

In the last twenty years plagiarism has increasingly become one of the more urgent issues of higher education. Easy access to digital information [1, 2] combined with the “ease of information transfer” [3], the ‘googleization’ of search habits [4, 5] and the undifferentiated perception of digital sources in their validity [6]: these and other factors strongly influence the way students of all fields of studies operate in the process of gathering and implementing information in their assignments. The problem should be considered under two different point of views: on one side we have the issue of academic dishonesty that encompasses cheating in individual courses with a final assessment of some kind and contract cheating. Among the possible triggering factors for academic dishonesty may be work overload and a sense of inadequacy [7] or “family expectations, job market competitiveness and the financial cost of education” [8, pp. 396–397]. Both factors,

academic inadequacy and financial issues, also play a decisive role among Russian engineering students as showed by a recent study on the causes of plagiarism. Seventy six percent of the students attribute their recourse to plagiarism to the fact that “there are hard-to-understand disciplines, and it is impossible to cope with the required workload” [9, p. 341]. In addition, 56% hinted at the lack of time of working students. On the other side, plagiarism is often unintentional and can arise from poor reading comprehension and paraphrasing skills. Roig’s famous “Plagiarism Knowledge Survey” showed that the more complex the source text, the poorer and closer to plagiarism will be the paraphrase [10], thus suggesting that enhancing reading skills through knowledge of the writing conventions and specific terminology of the discipline is essential for the prevention of unintentional plagiarism [11]. The occurrences of academic dishonesty and unintentional plagiarism in both undergraduate and advanced courses make it necessary to apply prevention concepts early in the curricula.

There are different aspects of plagiarism issues in computer science and engineering education. Computer science students are mostly concerned with originality in source coding and may have therefore a different perception of the concept of plagiarism [12], more interdisciplinary fields like user experience design may be affected by the problem in a conventional way. Also the assessment items in computer science courses may differ largely from the traditional ones, including among other items programming, spreadsheets, and web coding [13]. Engineering students’ insecurity arises from the particular nature of the sources they are supposed to use [14]. The “Information Literacy Standards for Science and Engineering/Technology” (ILSSET) [15] highlight specific difficulties for technical fields, like peer reviewed literature which is hard to find and to access, knowledge of special institutions, management of raw data and the great variety of source formats, among others “patents, standards, material/equipment specifications, current rules and regulations, reference material routinely used in industry” [15, 1.3]. Engineering students are also involved with ethical, environmental, and safety issues that are connected with the correct application of standards. Dölling [16] showed that the problem of plagiarism in the perception of German universities teachers is closely associated with deficiencies in information literacy (IL). Dölling interviewed academic teachers of different German universities about three domains of IL competences with regard to their importance. In their opinion, the domain covering “critical evaluation of sources and reporting” turned out to be the most crucial. Gaps in this area would explain the students’ incapacity to productively combine pre-existing knowledge with original ideas. It is interesting that Dölling’s outcomes coincide with the results of a study conducted among full-time professionals in an internationally operating company and engineering students at Purdue University [5]. Phillips’ claim that professionals “take a ‘least effort’ approach to information gathering that prioritizes speed and convenience over authority and comprehensiveness” [5, p. 40] corresponds to German teachers’ assumption that engineering students put convenience above quality, thus displaying a lack of critical awareness regarding the use of sources. This may be related to time pressure and the great number of high-stakes examinations [16].

2 Prevention of Unintentional Plagiarism Through Enhancement of Writing Skills

Many handbooks and publications on how to prevent or mitigate plagiarism have appeared in the last decades, together with innovative didactical methods conceived either to educate academic integrity or to enhance referencing and citation skills [11, 17].

On one side plagiarism prevention implies ethical education, detecting tools, and deterrent practices and is mostly directed against cheating in course assignments. Ethical policies and codes of conduct have long been the cornerstone of preventive strategies in academia all over the world. Plagiarism detection tools are becoming increasingly sophisticated thanks to the growing development of machine learning [18]. Detection software like Turnitin may even be used in teaching context [19], for example, by including announced plagiarism checks and subsequent feedback on detected plagiarism in writing courses for computer science [20] and engineering students [21]. Deterrent practices may involve the assignment of individual tasks [22].

On the other side plagiarism prevention focuses on the enhancement of referencing and citation skills and is generally carried out by academic libraries and writing centers. The project, “Refairenz,” at the university of Konstanz, Germany, emphasises the importance of academic libraries in plagiarism prevention and stands out by offering various practical solutions based primarily on proactive teaching strategies and detection tools support [23]. The library of the Technische Universität München has also developed a set of teaching materials and exercises that covers all formal aspects of referencing, providing a well-functioning example for technical universities [14].

The trend in preventing academic dishonesty goes towards a holistic approach that combines ethical education, deterrent practices, and enhancement of citation skills, thus requiring the collaboration of different units of the same institution [24, 25]. It goes, nevertheless, without saying that deterrent practices and ethical education make less sense in the prevention of unintentional plagiarism deriving from poor reading comprehension and paraphrasing skills. In this field, institutional writing centers can have a great impact on the plagiarism problem in academic contexts. By enhancing the writing skills of the students they not only provide them with essential writing techniques, but also contribute to the development of critical thinking, which is essential for a full comprehension of the concepts of intellectual property. The development of writing skills of engineering and computer science students has long been incorporated in many curricula in universities around the world [26, 27]. Also, writing centers (‘Schreibzentren’) operate to support teaching, counselling and scientific research in many medium-sized and large German technical universities [28]. While courses at these institutions mainly address the needs of undergraduate students who are starting to write a bachelor’s thesis, some offer post-graduate and doctoral degrees as well.

The approach of writing centres in German technical universities is very focused on the didactics of writing: students learn strategies for the integration of sources into their own writing production through exercises on text blocks, wording, and phrasing. These courses are very popular and the outcomes are positive. Students in technical fields who are not accustomed to writing in scientific language benefit from the intensive training and develop a greater awareness for the specific characteristics of scientific and technical

communication that will be essential for their professional future. A good example is the “SchreibLABOR” of the Karlsruhe Institute of Technology (KIT), an interdisciplinary writing centre that hosts various projects promoting scientific writing for bioengineering, chemical engineering, and process technology. Academic libraries are involved in the programs, but generally the topics they cover are limited to research in catalogues and databases, while plagiarism and citation rules are handled by writing instructors. And yet writing skills without in-depth IL are only a partial solution of the plagiarism problem. In the last two decades there has been a growing awareness that IL education should be fully implemented in writing courses; many programs are now based on the close collaboration of teaching librarians with writing instructors or researchers [29]. These projects are, however, generally limited to humanities and social field of studies.

3 A New Approach to the Understanding of Scholarly Sources: The BEAM Framework

Each year the Library of the University of Applied Sciences in Ingolstadt (THI) offers an average of 400 information literacy courses to approximately 6000 students from 30 degree programs. Courses for first-year students of the Business School, the Computer Science Faculty and the three Engineering Faculties are offered as part of the curriculum. In five degree programs, students enroll in an introductory course in scientific work techniques between the third and fourth semester. In seven programs preparatory courses for the bachelor thesis are mandatory between the fifth and seventh semesters. Students apply the IL skills they acquire in eleven advanced courses that include mandatory assessment portfolios, (two of which are graded. This is the most comprehensive and integrated IL program in the landscape of the Bavarian universities of applied sciences, It is the result of many years of intense collaboration with lecturers, professors, deans, and university rectors, and a rigorous conceptual work has underpinned it from the outset [30].

We conduct brief surveys at the beginning and at the end of each advanced course to assess the major information needs of the participants, their expectations, and doubts regarding the writing process of a final thesis. We administer the surveys orally, with the aid of flashcards and flipcharts, or online with PINGO¹). According to these surveys, the students fear most of all to commit unintentional plagiarism. Assessment portfolios always contain a task where citation rules must be applied correctly to sources according to a specific citation style. Regardless of this specific training and graded assessment, the majority of students who attend our private support sessions in the last stages of the bachelor thesis are still greatly concerned with this issue.

The new Framework for Information Literacy for Higher Education (Framework) with its meta-literary and metacognitive approach has confirmed what our intuition has told us over more than fifteen years of IL curricular teaching at THI. That is, in order for students to form life-long IL competences and create a scientific habitus, it is necessary to implement topic- and participant-centered innovative teaching solutions from the very beginning of their studies [30].

¹ <https://pingo.coactum.de>.

For almost two decades, the teaching library team of the THI has already adopted what the Framework now calls a “renewed vision of information literacy as an overarching set of abilities in which students are consumers and creators of information who can participate successfully in collaborative spaces ... extending the arc of learning throughout students’ academic careers” [31]. Three frames in particular, “Authority is constructed and contextual”, “Information Creation as a Process”, and “Scholarship as Conversation”, lead to more flexibility of previous standards by reshaping the vocabulary of IL and shifting the focus to a new critical perception of information. The core message is that information must always be contextualised in a multidirectional and multiperspectival communication network [32]. If appropriately implemented in IL instruction, the new frameworks endorse an expansion of the area of competences the teaching librarian should cover in higher education.

Searching for a new didactic approach that would address the problem of unintentional plagiarism from a perspective that is not exclusively normative, we set the condition that it should combine IL with content usually covered by writing centres. As a technical college without a writing centre and with a small team of teaching librarians charged with managing an ever increasing number of curricular courses, a viable solution had to be found. At the same time, we needed to adopt a student-centred method that would help eliminate the insecurities of computer science and engineering students concerning the use of sources, their functions, and their overall *raison d’être* in scientific works. The innovative framework Joseph Bizup conceived of in 2008 for research-based writing proved to meet our needs best: its strength lies in the new perspective it applies to the analysis of sources, going beyond the traditional categories of primary, secondary and tertiary. Bizup’s rhetorical framework was developed to create an “alternative vocabulary” [33, p. 75] for the didactic of writing, introducing the students to the topic of scientific sources in their rhetorical-argumentative functions, in other words with a “language that focuses their attention ... on what they as writers might *do* with them” [33, p. 75]. This is a two way-process, that works as well for the reader of scientific literature as for the writer. Bizup used four terms to define the function of a source in a scientific text from the ‘passive’ point of view of the reader: “Background”, “Exhibit”, “Argument”, “Method” (the acronym “BEAM” being introduced by his students) and four verbs to describe the same sources from the ‘active’ point of view of the writer, as information to “rely on”, to “interpret or analyze”, “to engage” and to “follow”.

Some writing centres have already adopted a similar approach. KIT considers, for example, the following different uses of sources: as “Adoption of information”, “Presentation of research”, “Critical approach to research”, “Reference to own research” [34, pp. 25–28]. The focus, however, is mostly on the formal integration of the sources in the text flow according to their different functions, a training similar to those aimed at enhancing paraphrasing skills. Such strategies do not cover, among other issues, the problem of what to consider general knowledge or in which section of a text one type of source should be used rather than another. Another advantage of Bizup over traditional methods of enhancing writing skills is that the framework is easily visualized, is equipped with catchy key words, is applicable to both writing and reading exercises, and can be fruitfully combined with IL instruction. Bizup himself developed a concept to integrate his framework with IL elements in a recent handbook [35]. The model has been

positively received and incorporated in courses across different fields of study, mostly in the humanities [36–38] or in interdisciplinary concepts [39]. Nevertheless, Bizup was convinced that the model was applicable also in the context of technical studies:

BEAM also suits disciplines in which researchers do not customarily refer to their materials as *sources*. BEAM is clearly applicable to literary criticism, but it can also be applied to primary work in the sciences [33, p.76].

4 Implementation of the Framework in a Teaching Module for Technical Studies

In order to guarantee the coverage of all courses, the small team of teaching librarians adopted a modular IL structure. The modules cover four main areas: “Systematic analysis of the research topic”, “Research strategy and documentation”, “Scientific argumentation”, “Plagiarism and Citation”. The modules are designed so that each of them can be easily adapted to the specific curricula of the degree programs and, in the advanced courses, to the individual contents of the bachelor theses or projects. A continuous and homogeneous transfer of competences is guaranteed by the sequential structure of the modules. One of the core elements of the program is the interactivity. We have striven to maintain this interactivity also during the coronavirus pandemic, transferring the contents of all four modules to e-learning units designed with the tool, Articulate Storyline 360. Early on in the undergraduates courses the student learn to classify and critically evaluate different formats and different contents by directly examining and discussing various specimens of print and online media. We subsequently focus on how information is produced and published. The scope of the lesson is to raise awareness of three important factors in the publication process: time (current vs. established), coverage (general vs. specific) and localization (surface vs. deep web/library). Hereby it becomes clear that a good research strategy starts from the chronological endpoint of the publication process (Figs. 1, and 3).

In the summer 2019 we started to redesign our module, “Plagiarism and Citation”, implementing the BEAM framework, at first in the original English version, for international master students in the Engineering and Management degree program. The resulting positive feedback encouraged us to move further and try to adapt the framework also for German students. Since Bizup emphasized the importance of key terms in this alternative nomenclature, it was also essential for us to transfer the concepts into German. We took care so that, on the one hand the key terms did not lose their meaning and, on the other hand, so that they could be used through an equally easily memorable acronym.

Background is all material that the writer considers a fact and inserts in his work as an authoritative element “expect[ing] their readers to do the same” [33, p. 75]. The frame “Authority” places the same degree of importance on the contextuality and relativity of information that must always be interpreted against the background of the community that produces it. Different disciplines “have acknowledged authorities in the sense of well-known scholars and publications that are widely considered ‘standard’, and yet, even in those situations, some scholars would challenge the authority of those sources” [13]. This perspective can help the student to “develop and maintain an open mind when encountering varied and sometimes conflicting perspectives” [13]. This would

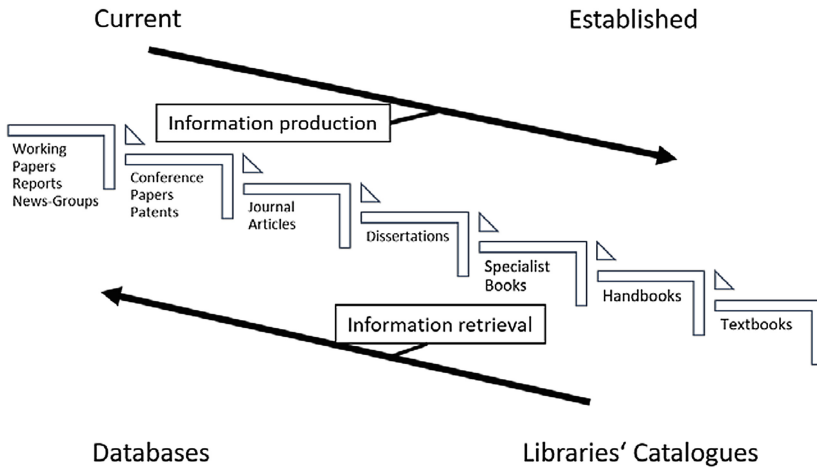


Fig. 1. Timeline: Type of publications, information production and information retrieval

meet, for example, the frustration issues students referred to in Phillips' survey on when their respondents found "inconsistent information (different sources claimed different things)" [5, p. 44]. An example of specific sources that can be used as authoritative background is mentioned within ILSSET's performance indicators of IL: professional associations and their publications [15]. Some of these publications and other similar sources may not meet the citation requirements of other disciplines. For example, in the engineering design process this includes "material produced by and about corporations, such as press releases, product manuals, annual reports, trade publications, and industry blogs ... Marketing collateral such as brochures, sales sheets, and catalogs" [40, p. 126] and also information gathered through direct contact with experts, practitioner and consultants. Nevertheless, engineering and computer science students need to *rely* on them in order to make clear in the context of which authority they are arguing. In the field of engineering studies the choice of an authority as a reference may also involve essential safety issues, like relying on sources that offers potential solutions and criteria in the engineering design process [41]. We chose the term "Hintergrund" (*background*) for the German model and the verb "vertrauen auf" (*to rely on, to trust in*).

Bizup's second key term, "Exhibit", is not equivalent to "evidence", but covers all the materials a research writer is supposed to interpret, analyze, or explain. In most cases this process coincides with the original part of the work. In this respect exhibit information "may need to be constructed with raw data from primary sources or by experimentation" [15, 1.2]. Hereby, notice that "Exhibit" in the BEAM vocabulary overlaps with the conventional term, "primary sources". This materials "may often require manipulation and a working knowledge of specialized software" [15]. Bizup notes that, in the humanities, "rich exhibits may be subjected to multiple and perhaps even conflicting 'readings' ... [one] must do rhetorical work to establish their exhibits' meaning and significance" [33, p. 75]. While, at first sight, this approach may seem unsuitable for the

technical disciplines, it can contribute to sharpen students' sensitivity to the challenges of data interpretation. Interpreting data often requires "specific data management expertise" [15, 1.2] and, in a broader sense, the research writer should not underestimate the challenge of correctly and scientifically extrapolating presentable results from the available raw material. Exhibits in these fields can be in very different formats: interviews, measurements, statistical surveys, standardized test data, mathematical theorems, technical reports, and different forms of gray literature. The German term we chose for it, "Untersuchungsgegenstand" (*research object*), is not the exact translation of "Exhibit" but has a closer correlation to the inherent German verb "analysieren" (*analyze*).

The third term, "Argument", is used for source materials that have to be questioned by the research writer. In the process of highlighting the original part of their own work, an author should use sources as argumentative support or as evidence to be confuted, adapted, or expanded. Such sources may contain a position opposite to the writer's approach, nevertheless they must be included in the text if they are pertinent [15, 3.4]. In this sense, the writer "engages" the source. In his original definition, Bizup saw a "genre gap": while academic writers engage with other peers in their own genre, thus establishing a conversation, students do not normally engage with the production of their peers. The frame, "Scholarship as a Conversation", offers a broader vision of this issue, one we can implement in our application of the BEAM framework: here, "novice learners and experts at all levels can take part in the conversation" [31]. Students should consider themselves members of the scientific community, provided that they are aware of its specific conventions and of their own inexperience. IL can help them to acquire the discursive skills and argumentative competences they need to participate to this conversation. For the German version we chose the term "Argumentationsstütze" (*argumentation support*) and the translation of "engage", "sich auseinandersetzen".

Bizup's last item, "Method", refers to information resources that convey procedural rules, frameworks, models, reference tests, investigation procedures, statistical treatments, in short, ways to approach a problem. Methods implies almost always a specific terminology the research writer has to adhere to. "To follow" is the verb Bizup uses to describe the activity related to these sources. From the point of view of the plagiarisms issue, sources related to "Method", may bear the same challenges of a "Background" source, namely the question of whether they must always be cited. Very popular and established methods can "lose their ties to specific sources" [33, p. 76]. Here, IL teaching must operate at the level of a deeper understanding of one of the main BEAM assumptions that the same source can have different functions depending on the use one makes of it. Isoc [42] examines this feature in technical disciplines and distinguishes between approach and application: if I apply a theorem and the object of my research does not require a demonstration of it, I do not have to cite it. If I am looking for a theoretical approach to the theorem and its proof is essential to my research question, then I must cite it in some form. Again, the chosen term in German is a plain translation ("Methode"), as the related verb "folgen" (*to follow*).

The different information formats ILSSET mentions as characteristic for computer science and engineering studies make it necessary to expand the BEAM nomenclature and items to a fifth function. The particular nature of these sources coincides with the formal denomination of the source itself: "standard" ("Normativer Rahmen" – *normative*

frame). We have chosen *to adopt* (“verwenden”) as the verb to describe what we do with this kind of source. It is a different process from *rely on* and *follow* because adopting a standard means adhering to precise rules, established methods, mandatory criteria, and defined processes. The verb subsumes further meanings that can describe what a research writer does with these documents: *to adjust to*, *to adhere* (“sich ausrichten”, “einhalten”). Unlike the other sources, standards may contain mandatory requirements if incorporated into contracts or regulation. Knowledge of the organizations that produce, revise, and update standards, codes, and patents (ISO, ASME, IEEE, VDE among others) is essential for the technical disciplines. Students need also to know that standards are continuously developed. That involves, on one side, the recourse to special search strategies and retrieving channels, on the other side the awareness that licensing and intellectual property undergo a stricter control than in the case of other sources, thus making it harder to retrieve this kind of document. The research writer must also abide to stricter consultation rules. It is safe to affirm that the employment of standards, codes, and patents presupposes a higher level of IL on the part of the users. Adding this item to the BEAM framework is essential for technical disciplines and fills a gap left open in conventional IL training, whereby IL and writing skills are both required to an equal extent. To work with standards and patents from the point of view of the BEAM framework is also a way to deepen the understanding of research as a communication process that needs a particular language in each different field. “Standard[s] are a vehicle of communication for producers and users. They serve as a common language, defining quality and establishing safety criteria” [43]. We used the new umbrella term, “Normativer Rahmen”, also for codes and patents that have a similar function.

The resulting acronym, HUMAN is just as easy to memorize in the German language as BEAM is for the English-speaking students.

Finally, we allocated in the five frames the different types of media that students have learned to distinguish in the session on the publication process, as visualized in two of the graphics² (Fig. 2) we use to introduce the framework in our courses (Figs. 2 and 3).

The session “Plagiarism and Citation” already contained some introductory reflections on the legal and ethical implications of plagiarism and practical exercises on how to determine whether a text passage may be considered plagiarised or not. With the implementation of the HUMAN framework we also let the students assume one of the two perspectives the model can be applied to, that of the reader. After reviewing precedent didactic implementation of BEAM, we decided that the type of exercise best suited to this purpose and the limited time available for each session (90 min) was a think-pair-share task. This method is particularly suitable for testing the comprehension of a new content. At the same time, peer cooperation makes it easier to immediately verify validity and practicability of the proposed framework. The students are requested to read a short scientific paper related to their field of study and apply the criteria of the framework to the references (Table 1)³:

² We actually employ different versions of the graphic, this one is more suitable for in class discussions with the help of whiteboards/flipcharts and flashcards.

³ The task can also be carried out accessing an online paper as a PDF document and using the program markers. The task and the following claims have been translated from German.

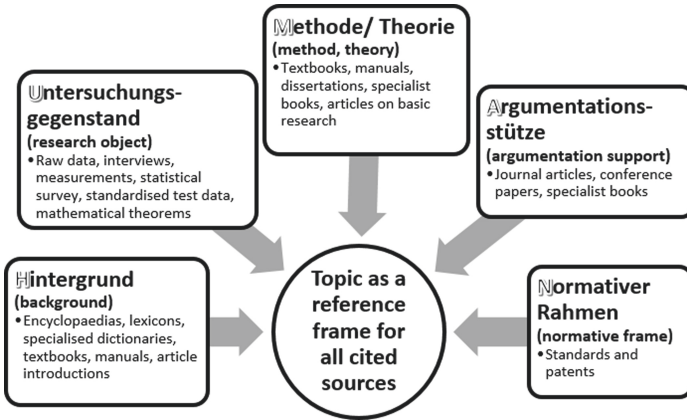


Fig. 2. The HUMAN framework: topic as a reference frame for all cited sources

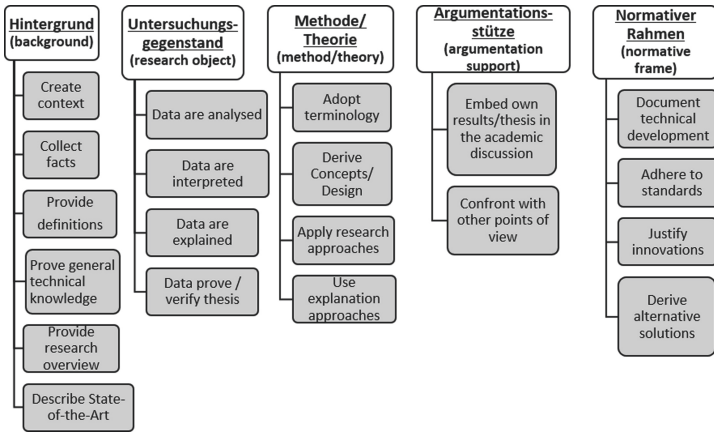


Fig. 3. The HUMAN framework: function of sources

Table 1. Think-Pair-Share Task: Reading and understanding the function of sources

Think-Pair-Share Task: Reading and understanding the function of sources
1. THINK: Read the article individually. Use the single capital letters from the acronym (HUMAN) to mark in the text the different use of the sources. (10 min)
2. PAIR: Discuss your interpretation with your partner. Finally, focus on the aspect you have been assigned and prepare a small presentation (flip chart). (15 min)
3. SHARE: Present your findings and discuss with your classroom. (10 min)

Meyer and Land [44] threshold concepts lay behind the new Framework (“Transformative”, “Integrative”, “Irreversible”) [45] and are also easily applicable to Bizup’s framework. Relying on these concepts, we did not expect predetermined learning outcomes. We wanted “the learner to experience a shift in perspective”, to “bring together separate concepts ... into a unified whole”; we wanted them to transform a concept into a habit that “once grasped, cannot be un-grasped” [44, pp. 4–5]. From this point of view the following claims (Table 2) should not be perceived as rules but as starting points for a discussion following the HUMAN session. Students can also be invited to conceive new claims for each category. This discussion may foster further reflection that will eventually lead to a deeper comprehension of the value of sources in scholarly contexts.

Table 2. Claims to be discussed from the point of view of the HUMAN framework

General observations
A source should only be cited if it is needed and mentioned in one’s own work
Every time a source is needed or used with a function, it should be mentioned
A mentioned source should always have a function or a scope and must be closely related with one’s own research question
<i>“Hintergrund”</i>
A source should be clearly classified according to its information value and contextualised in one’s own field of research
<ul style="list-style-type: none"> • A source that is recognized as an authority in one’s own field of research should be trusted, but can be questioned. If questioning the source highlights the originality of one’s own work, then the source is needed • A source that may contain what in the context of one’s own field of study is perceived as common knowledge, then the source is not needed
<i>“Untersuchungsgegenstand”</i>
A source can be valuable/necessary regardless of its format
A source can require manipulation in order to be usable
<i>“Methode”</i>
A source can deliver a particular terminology. If this terminology is openly recognized as canonical for the field of research, then it can be left uncited
<i>“Argumentationsstütze”</i>
A source must not be mentioned without being explained, analyzed, interpreted, discussed, refuted, or accepted as support
<ul style="list-style-type: none"> • A source must not be directly cited without comment • A valid source that is pertinent to one’s own work must be used, even if it is unfavorable to one’s own thesis
<i>“Normativer Rahmen”</i>
A source that is relevant for safety and/or privacy issues must be used and mentioned

5 Conclusion and Outlook

The principal aim of adopting the HUMAN framework in the “Plagiarism and Citation” module is to provide computer science and engineering students with the theoretical background needed to create a critical and responsible attitude towards information sources and thus avoid unintentional plagiarism. In the first two modules of our program the students get a thorough overview of the different formats in which information can be produced, of the suitable information retrieval systems, and of the possible locations of sources. In a subsequent step they learn, through the lens of the framework categories, to determine the need for specific sources. Finally, they learn that there are functional criteria a source must fulfil in order to be cited in their work. Our approach takes into account the fact that, in smaller universities that do not have a writing centre, the teaching library is the main reference point for most of the scientific writing issues. If the organisational aspect is certainly crucial, so is conveying the idea that working with sources is not only a matter of correctly citing but it also implies a deeper understanding of an essential statement of the Framework: the scientific community is a communication space in which every research-based text fits, even those of beginners. Scientific rigour and academic honesty are as much a prerequisite for a seminar paper as they are for a doctoral thesis. Students need to know that the different publication formats are not just formal labels (monograph, journal article, conference paper), but must be considered in the context of an information production process that goes from the first communications of research outcomes to the consolidated knowledge of textbooks. Understanding this process is a prerequisite for efficient information research, especially regarding the problem of information overload on the Web. But this is not enough: if IL instruction is limited to “library stuff” like research or formal citing rules and continue to be perceived as a separate element from the creative writing process, students of technical subjects will be often confronted with feelings of failure. This frustration will result from being forced by the rules of scholarly writing to find and use sources, to perhaps know everything about borrowing books or searching journal articles in a database, but not understand why and how it is necessary to use them, especially if their task is mainly a practical one. This is where the implementation of the HUMAN framework can make a difference. The THI teaching library concept of consecutive and curricular modules strategically spread over the entire course of study creates the ideal setting for this new approach. The next step will be to implement the HUMAN framework instruction in our e-learning concept. IL courses are currently hosted on the platform, Moodle, so that the student’s activity can be analysed through a multimodal collection of learner data and learning analytics. Our long-term aim is to conduct a study on the effects of the new plagiarism module on the occurring rate of involuntary plagiarism by relating the outcomes of the courses with an analysis of the bachelor’s theses of students who have benefited from this new approach during their studies.

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Do Not Steal This Article! A Study on Digital Piracy Among Students

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Abstract. An information literate individual should use resources ethically and legally. However, studies show that despite the free accessibility of various legal online content digital piracy is increasing. In our study, we were particularly interested in the phenomenon of piracy among students who are a user group that typically uses digital content both when studying and in their leisure time. We conducted an online survey of Slovenian students in March 2020 to investigate why, when, and how they use pirated content. The analysis of the 259 student responses revealed that most of them are involved in digital piracy and are usually aware of the illegality of their actions. However, we found that even when they do not intend to use pirated materials, they prioritize convenience over ensuring the legality of used sources.

Keywords: Digital piracy · Students · Illegal sources · Information literacy · Education

1 Introduction

The Association of College and Research Libraries' Information Literacy Competency Standards for Higher Education [1] stipulates that information literate students understand ethical and legal issues associated with information use. Students must understand aspects of intellectual property, copyright, and fair use. This is a critical matter, given the increased reliance on the digital information environment in which students search, retrieve, produce, and consume information.

Nevertheless, the literature on digital piracy suggests that illicit acquisition behavior is increasing, therefore libraries and educational institutions should put more effort in educating students and other patrons by promoting awareness of this issue. Individuals' attitudes and behaviors towards digital piracy are influenced by various factors, such as cost and availability of the intellectual products, individuals' level of income, moral beliefs, legal awareness, and metaliteracy [2–4]. One of the biggest problem is that even though people usually know that piracy is illegal, they still access, download, and distribute this type of content [2, 4–6]. Even more concerning is the fact that when people access materials and acquire digital products, such as music, movies, books and academic papers, they do not always distinguish between legal and illegal sources and

are not necessarily aware of their unlawful acts [4, 7]. Students represent an interesting and important group that does not only access and download digital content for leisure but are also often obligated to acquire expensive learning materials for their studies. Although Kraweyk et al. [8] found that students have similar ethical concerns about online piracy compared to other population, Czerniewicz [7] claims that they distinguish between illegal acquisition of learning materials and other content.

2 Literature Review

Fisk [9, p. 4] defines the term intellectual piracy as an “act of copying and distributing intellectual property without authorization of the rights holder”. Online piracy is a subcategory that represents any act of piracy that uses computer networks as a mechanism for copying and distributing content. Meanwhile digital piracy includes illegal downloading, copying, and distributing digital media content, such as music, movies, books, and software, but does not necessarily involve a computer network [9].

Since digital piracy does not seem to involve a direct victim, some consumers perceive it as less serious than other crimes and do not feel guilty when engaging in this activity even though they know it is illegal [4, 6]. The strongest motivators for downloading resources from illegal websites is ease, convenience, and price, as some materials are perceived to be too expensive [7]. However, digital piracy causes high costs to producers and creators of music, movies, software, videogames and other creative content. Sahni and Gupta [4] claim that the effect of piracy is not only limited to financial and job losses but also effects creativity.

Although students are believed to be more prone to commit online piracy than the rest of the population, Krawczyk et al. [8] claim that ethical concerns about online piracy do not significantly differ between various subpopulations. What is more, Czerniewicz [7] noticed that students distinguish between pirating learning materials and other content, such as music and movies.

The growing availability and adoption of digital book formats by readers, students, and professionals has also enabled the growth of illicit downloading and accessing to copyrighted material. Due to the high price of college learning material many students have found more affordable ways to obtain textbooks. There are many file-sharing websites that provide illegal access to books, such as ZLibrary, Bookboon, Free-Ebooks, and ManyBooks free of charge. Meanwhile many copyrighted academic books, textbooks, and scholarly articles can be downloaded from Library Genesis (Libgen) and Sci-Hub.

The arguments in favor of digital piracy, such as limited financial resources or educational proposes are evident especially in the case of scholars and students [4]. The results of research conducted by Book Industry Study Group (BISG) [10] showed that although students prefer print textbooks, there is an increase of alternative forms of acquisition behavior, such as photocopying or downloading content from other students, obtaining materials from pirate websites, and acquiring international versions of texts. Most frequent reasons for illicit acquisition behavior are connected to the price, such as high cost of new textbooks, low budget for books and belief, that instructor does not use a book enough to justify the purchase and cost [10]. Additionally, The Guardian reports on other reasons for practicing illegal methods of accessing books, such as ease of access

or to “pre-read” content before the purchase, since many readers had bad experience and were dissatisfied with the book after purchase [11].

Although the idea of websites with freely available educational and academic texts might not seem so controversial as many scholarly publishers are charging libraries and individuals outrageous prices, Sanchez and Russel emphasize that mass infringement is wrong and can cause further increase of subscription costs [12].

On the other hand, consumers might not even care or be aware that they are accessing resources illegally. Czerniewicz [7] found that students access learning resources both legally and illegally without necessarily knowing the difference. McNutt [13] also points out that much traffic to Sci-Hub is from researchers who already have legal access to the articles they are seeking. While ability to understand and respect the copyright law represents an important competence in the context of information literacy, some researchers have observed that finding and using unconventional resources could also be perceived as a form of digital literacy as more literate students usually download pirated content more frequently than less literate students [2, 7].

Piracy Practices in Slovenia

Slovenia is sometimes perceived as a “pirate country” as it does not have strict restrictive measures against piracy [14]. According to the Alexa website traffic statistics, Partis, web portal for (illegal) file sharing, was the 4th most popular webpage in the country in 2020 [15]. However, according to studies and compared to other countries, it is not at the top of piracy leaderboard [5, 16]. The streaming of TV series and movies was the most commonly used piracy service among the Slovenian users in 2016. This was followed by public torrent downloading and a small proportion of those, who downloaded content from private torrent webpages and Youtube. While observing these results Muso [16] underlined that at the time of research Slovenian Netflix, which was the only available streaming service of its type, was lacking content and therefore was not appealing enough to draw people away from online piracy [16].

Also, the latest Slovenian study on the book market revealed that most respondents who read e-books are obtaining them for free. While some of e-books are borrowed through the library services (12%) and read on blogs or social networks (10%), most are downloaded from the web (63%) [17]. Compared to the results of a similar study, that was carried out in 2013 [18], the number of readers who borrow e-books in libraries increased (from 4% in 2013 to 12% in 2018) and the number of people, who acquire free (pirated) books from the internet decreased (from 75% in 2013 to 63% in 2018). Even though the authors argue that well-established library loan can reduce book piracy, this method remained the most frequent form of e-book acquisition in Slovenia [17].

3 Methodology

3.1 Research Questions

In our research we focused on student practices of piracy. We wanted to obtain answers to three main research questions:

- Are there differences in the ways students obtain resources for study and leisure?
- In which circumstances do students use illegal ways to acquire digital content?

- What is the general perception of students towards digital piracy?

3.2 Sample and Procedures

In our study we focused on students, as they are known to be active users of electronic resources for both academic and non-academic purposes [19–21]. We conducted a survey to gather the most extensive data and help us determine how students understand various issues related to information access and the ethical and legal use of various resources. Data for the study was collected from Slovenian students just before the first lockdown of COVID-19 (March 2020). The online survey, which was distributed to students through social media, included nine questions about the use of various resources, computer software and demographic data. The distribution of the survey resulted in a convenience sample of 259 students. Most of the students were younger than 25 years. Various fields of study were represented: social sciences (52%), humanities (30%), natural sciences (16%), and engineering and technologies (9%).

4 Results

Respect for intellectual property is a moral obligation of every individual. It is far from the case that everything on the Internet can be freely used. The main reason why students were willing to buy applications, programs, music, games, movies, and books in the past was to (financially) support the authors or creators (54%). The second reason for purchase was more ethically problematic, since 45% were looking for a free version but did not find it and were therefore forced to buy it. Another interesting and important finding is that only a small number of students (3%) stated that they are afraid of penalties and therefore chose to buy the product over acquiring illegal copy. On the other hand, the strongest motivations for acquiring materials illegally were cost and convenience. Students were accustomed to downloading software and electronic resources because it was free, and the original product was too expensive. What is more, almost half of them stated that they could access the pirate version faster. However, comments such as “everyone does it” indicated that students knew their actions were illegal, indicating an awareness and knowledge that pirating is illicit and socially undesirable. For study purposes students mainly obtained pirated computer software and educational videos. A quarter of the students illegally downloaded scholarly articles several times a month, while 42% of students have never obtained illegal copies of this type of content. The second most frequently downloaded materials were video content (13%) and e-books (9%). It is not so surprising that more than 30% illegally downloaded videos and music for their leisure several times a week. What is more, only 5% of respondents have never illegally downloaded any content.

Pirated software was mainly used for photo editing tools and data compression software (68 students; 27%), text editors (64 students; 25%) and antivirus programs (60 students; 24%). It seems that antivirus programs are very important for the students as they were the most common software for which they were willing to pay if they did not obtain it with the purchase of the computer (Table 1).

Most students are accessing pirate content through P2P (e.g. Torrent, Piratebay, Partis) (21 students; 86%), streaming (105 students; 43%), pirate web sites for e-books

Table 1. Use of pirate sources (n = 244)

	I have used it	I know it, but I do not use it	I do not know it
P2P (Torrent, Piratebay, Partis...)	86%	8%	6%
IPTV (Internet Protocol television)	12%	24%	64%
Streaming content	43%	33%	23%
Websites for downloading pirated e-books (ZLibrary, Bookos...)	21%	28%	50%
Websites for downloading pirated articles (SciHub, LibGen...)	20%	20%	60%

(e.g. ZLibrary) (52 students; 21%) or shadow libraries for scientific articles (SciHub, Libgen) (49; 20%).

The strongest motivations for illegal acquisition of materials were the cost, convenience, and faster retrieval, especially when they needed learning materials and content for their personal use. In the comments, one of the students mentioned that “she has been doing this [pirating] since she was 12 and didn’t know it was illegal”. There are obvious differences in the frequency of piracy depending on the circumstances (if they need content for learning or for personal use) (Fig. 1).

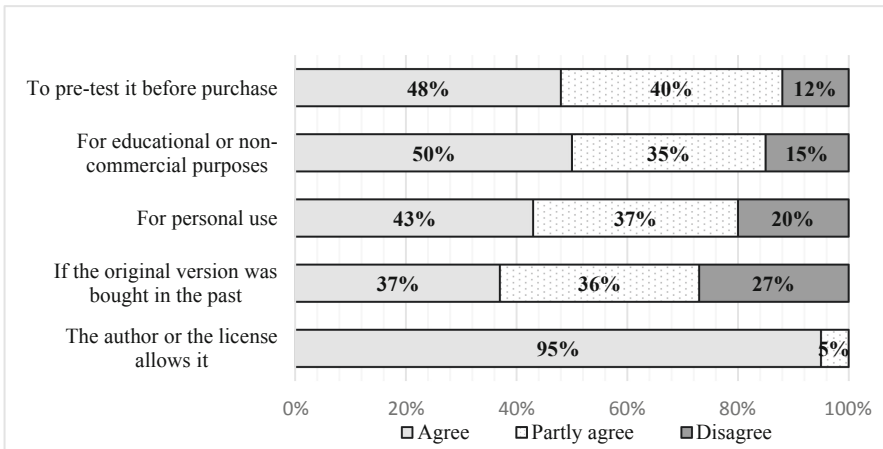


Fig. 1. Acceptability of downloading digital content

Similar to other studies, we found that students usually recognize the illegality of their actions, however, they sometimes perceive the easy accessibility of the material as

more important than the legality of acquisition method. What is more, students do not always realize that they are using materials from illegal sources (Fig. 2).

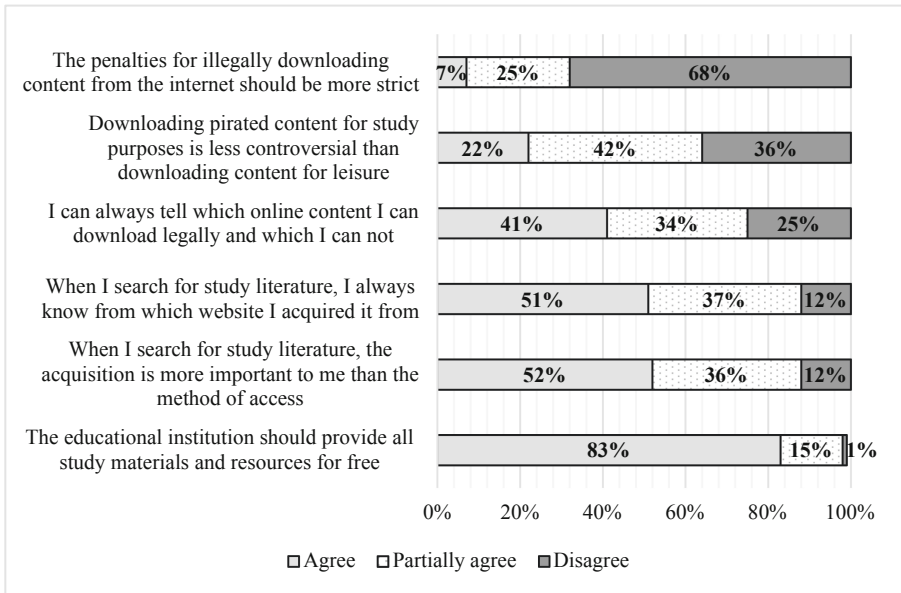


Fig. 2. The level of agreement with some statements

The results show that students are quite indifferent to copyright compliance and expect all resources and software for their studies to be provided by the university.

5 Digital Piracy During COVID-19 Pandemic

It is not surprising that during the COVID-19 pandemic, the need for digital content has increased. Since all the movie theatres were closed, studios have tried to change their strategy and sell newly released movies through streaming services. However, this business model has made it even easier to illegally copy and share this type of content [22]. According to the data collected by Muso [23], global film and TV piracy has increased by over 33% after the lockdown was enforced in March 2020.

Due to their inaccessibility in their physical form, even books have become frequent subjects of digital piracy. During lockdown most universities moved their lectures to online environment. Since many bookstores and libraries were also closed, students were forced to turn to electronic resources, including online articles and e-books. According to UNESCO [24] digital libraries have emerged as vital pathways to high-quality electronic reading content. In March 2020, The Internet Archive launched a project named National Emergency Library where they made 1.4 million books available online. Since many of these books were copyrighted, they were accused of using epidemic as an excuse for

this action by which they were denying authors and bookstores potential income and patrons for libraries, which were still operating e-lending programs [25–27].

However, with increased consumption of pirated content there is also a bigger threat of acquiring computer malware. For example, relocating work to the home computers during pandemic created a good opportunity for hackers to gain access to sensitive information. A research survey commissioned by Digital Citizens Alliance (DCA) found that people that own piracy devices and apps were three times more likely to report an issue with malware, which is especially problematic in times when many were working and studying from home. DCA reported that 50% of those who work in jobs that include sensitive or confidential information reported having an issue with malware in the last year [28].

6 Conclusion

Digital piracy is the main topic of many studies, however we have not come across much research that directly address the differences in using various content for study and leisure. Similar to the findings of Czerniewicz [7], the results of our survey suggest that students distinguish between piracy of digital content used for different purposes. As proposed by other researchers [2, 4, 6], we also found that although students are aware of their illegal behavior, they still access and download this type of content as they are not afraid of the consequences. Their main motivations are cost and ease of access to all types of content. What is more, the vast majority of our respondents believe that all mandatory materials and resources for their study should be provided for free by their educational institution. We were surprised by these results, as most universities in Slovenia have good academic libraries that provide remote access to many licensed information resources and offer some free licenses for various computer programs. As it has been previously argued by McNutt [13], and on the basis of the responses of our study, we can assume that students sometimes do not even know that some resources are provided to them at no additional cost. On the other hand, it is worrying that even if they are aware of an online legal version of the work, it is easier for them to obtain the pirated version. This could indicate that there is a need for a better user experience in bibliographic information systems. In addition, academic libraries should be proactive and raise awareness about legal access to electronic resources, educate patrons about the importance of copyright, and offer information literacy courses. They should also warn their patrons about websites that offer pirated content and the potential risks associated with its use.

Since our research was conducted before the pandemic, we assume that pirating practices have changed significantly. Online resources became more important than ever before, therefore many publishers and other websites have provided free access to their content. Although there has been increase in piracy of video content [23], we cannot be sure to what extent this trend has been observed for study resources. This is an interesting and important topic to explore and could be a great addition to our research. In our future studies, we could also include other people who manage and use this type of digital content, such as librarians, professors, and other researchers.

Although our research brings important findings, it is not without limitations. The main topic is quite sensitive and not everyone is willing to admit that they have been

involved in piracy. Also, we used convenience sampling and the number of participants turned out to be rather low. Although we cannot generalize the results to the broader population, our findings offer important insight into students' practices related to digital piracy and raise new questions about this important topic.





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Academic Integrity of Undergraduates: The CETYS University Case

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Abstract. The aim of this paper is to report the academic integrity (AI) challenges and opportunities facing CETYS University, the leading private higher education institution from Baja California, Mexico; as well as the outcome of an international survey on the subject that included CETYS' participation. The AI study, named Academic Motivation and Integrity Survey-Spanish (AMIS-S), led by Jason M. Stephens [1], included 95 questions to "... assess a wide range of students' perceptions, beliefs, and behaviors related to academic motivation and integrity institutions grouped into nine 'academic behaviors'" during the past year. The questionnaire was sent to all 2,530 students except those who were in their first undergraduate year; 376 responded. AI is a critical learning topic, especially in higher education institutions [2] where students have to demonstrate respect for intellectual property in their writings and in other means of knowledge construction [3, 4]. The survey results showed, for example, that student disapproval for academic dishonesty was low (nearly one third) while 85% were involved in at least one dishonest action of the nine components that ranged from low impact to serious actions. These overall outcomes clearly indicate that CETYS has to create guidelines and further develop procedures to motivate AI among their undergraduates and faculty who supervise reinforcing the value of honesty.

Keywords: Information literacy · Ethical use of information · Academic integrity · Academic honesty · Academic cheating

1 Introduction

Academic integrity (AI) is understood by the International Center for Academic Integrity (ICAI) as "... a series of basic [Honesty] principles which are the foundation for success in any aspect of life and represent essential elements that allow achievement of the necessary learning which enable the future student to face and overcome any personal and professional challenges" Cited by Guerrero-Dib, J. G., Portales, L., & Heredia-Escorza, Y. [5, p. 3]. This concept is the central subject of this paper, taking CETYS University as a case. This private institution with 8,000 students, located in Baja California, is one of the five universities accredited from Mexico in the United States from and one of the 19

among Latin American nations, a description that has been previously included in other ECIL papers. The incentive to write about this topic is because Jason Stephens invited CETYS through the National Association of Private Universities and Institutions (FIM-PES) to take part in the study named Academic Motivation and Integrity Survey-Spanish (AMIS-S) in 2019. The study included four other Mexican universities whose results are excluded here due to paper length limitations. After our conceptual introduction, we provide our analysis of the outcome of the study, along with results from the four academic affairs deans' focus group on current institutional AI status, and the actions CETYS libraries are leading as a follow up to Stephens' AI study results. A limitation of this paper is that there is no attempt to tackle the root cause to explain why there is such high level academic misconduct in Mexico or other Latin American institutions as it would require a full paper to explore such causes. A similar study needs to be done in regard to assessment design to minimize the possibility of academic misconduct.

The challenge of AI at the undergraduate level is not new in Mexico; there are some studies but none at CETYS. The literature review was mainly focused on student practices, leaving aside potential studies on why learners conduct AI misconduct. Only six Mexican studies were identified in a search dated from 2015. Most of these findings are referenced in this paper. The first to explore this subject was the journal, *Integridad Académica*, that seems to be the only AI-focused publication in Mexico and probably in the whole of the Latin American Region. This journal has been sponsored by a group of private universities since 2016 with ten issues to date. A review of journal issues shows that most contributions are of the conceptual type. A book, also of related concepts was published in Mexico by Cortés [6]. The subject has been certainly well assessed at the international level, among these publications is Stephens' [4] work, who developed a research methodology that dates to over a decade ago. The early work by Stephens, Romakin and Yukhymenko [4] focused on a student population from Ukraine and the United States, using an earlier and shorter AMIS version than the one conducted at CETYS and the four Mexican universities that are not reported here.

2 AMIS-S Survey Results

Stephens conducted the Academic Motivation and Integrity Survey-Spanish (AMIS-S) study at CETYS in 2019 [1]. The online instrument consisted of 95 questions that were grouped into nine "behaviors" that covered "students' perceptions, beliefs, and behaviors related to academic motivation and integrity" by asking how often their engagement was in this regard during the past year. We sent the invitation to participate to all 2, 530 students in their second to fourth undergraduate year. Among those who responded, 376 were valid cases and represented 92.4% of those that had completed the questionnaire. A summary of Stephens' most relevant results are cited here:

"The majority of the sample was male, most in their third or fourth third year of study, and typically earning grades between 8 and 9. The average number of cheating behaviors reported for all students was 3.43 (of 9 surveyed) and, based on ANOVA tests, differed significantly by gender (*masculinos* > *femeninos*) and typical grades earned (Entre 7 y 8 > *La mayoría o todas son* 10). These findings concerning gender and grades are not unusual, as it is not uncommon to find higher levels of cheating among males and

lower achieving students. However, in this case, the size of the observed differences were larger than normal (i.e., greater than half of standard deviation)" [1].

Academic and sociomoral climate related to cheating behavior at CETYS was shown to be "... largely positive as students reported perceiving a greater emphasis on 'Mastery Goal Structures (MGS) as opposed to Performance Goal Structures (PGS)' $M's = 1.02$ vs. 0.43 , respectively). As indicated by the size and significance of the correlation coefficients, only students' perceptions of PGS were significantly correlated with self-reported cheating behavior ($r = .13$, $p < .05$). In other words, as students' perceptions of performance goal structures increased, their self-reported engagement in cheating behavior increased. The size of the effect, however, was relatively small. However, students' perceptions of the sociomoral climate were not significantly correlated with self-reported cheating ($r = -.04$, $p = .414$). This finding is atypical, as perceptions of the sociomoral climate are usually significantly (negatively) associated with cheating (even if only modestly so)" [1].

In regard to students' perceptions of AI policies and their learning, the outcome was that among seven different sources, they reported learning more during class discussion with their faculty (62%), followed by the student handbook and syllabus which tied with frequent sources (both 40.7%). Less popular was the Web. "... the overall mean of this variable ($M = 3.15$) was not significantly associated with self-reported cheating behavior ($r = -.06$, $p = .243$)." The component of peer norms perception and their self-reported cheating reflected, on the other hand, that peer disapproval of cheating "... was relatively low ($M = 0.24$). Regardless, the extent to which students felt that their peers disapproved of cheating was negatively correlated with self-reported cheating behavior ($r = -.34$, $p < .01$): the more students believed that their peers disapproved of cheating, the less likely they were to report doing it" [1].

The question, 'how often have you seen your peer cheating', showed that the more a student replied seeing classmates cheat, "... the more likely they were to report doing so themselves; and, while seeing other students cheat was fairly typical, seeing them get caught doing so was quite rare". Student domain and responsibility judgments related to academic dishonesty and self-reported cheating showed that "... the more students believed behaviors to be morally wrong, the less likely they were to report engaging in them ($r = -.27$, $p < .01$)." On the other hand, responsibility judgments related to academic dishonesty were as expected "... the extent to which students endorsed former statements was negatively correlated with self-reported cheating behavior ($r = -.30$, $p < .01$) and the extent to which they endorsed the latter was positively correlated with it ($r = .42$, $p < .01$). Table 1, included at the end of this section, summarizes the low peer Disapproval of Cheating. The frequency of reporting engagement in academic dishonesty was high, only 14.6% reported "Never" to all the nine behaviors assessed in the AMIS-S study "... 85.4% of all students surveyed ($n = 321$ of 376) reported engaging in at least one of the nine types of academic dishonesty assessed on the AMIS-S" [1]. Although this is a high percentage of students, as Stephens (2019) stated, an approximately similar percentage was found in the United States and New Zealand.

Stephens' final analyses was a regression analysis to identify what personal and environmental factors mattered most in explaining variance in students' levels of engagement in academic dishonesty. The results "... suggest that educational efforts should focus

on helping students understand why academic dishonesty is morally wrong and to help them feel personally obligated to not cheat (rather than disengaging that sense of moral responsible by blaming others or the circumstances). Equally important, these findings suggest that efforts are needed to reduce the extent to which students see their peers cheating. Given the social nature of most cheating behavior, it is likely that students in the High Frequency group are members of groups of close friends and not making their academic dishonesty decisions alone or in isolation from peers. Accordingly, a targeted intervention aimed at working with groups of close friends (and not randomly formed ones) would be the most direct approach to ameliorating levels of academic dishonesty. In addition, it would appear that some process of student engagement in current AI policies or their modification could help increase the level of student understanding and support for those policies” [1, p. 15].

Table 1. Peer disapproval of cheating (Stephens, 2019)

Please use the five-point scale to indicate how much you agree do you disagree with each of the following sentences	Disagree or Strongly disagree %	Agree or Totally Agree %
1. My classmates think it is okay to copy other student homework	28.4	39.9
2. My friends wouldn't mind if I plagiarized part of a newspaper	27.7	48.4
3. My classmates think it's okay to cheat on a test	16.2	56.3
4. If I cheated on a test, my friends would be very disappointed in me	31.1	38.5
5. Among my friends, plagiarizing some sentences or paragraphs is NOT a big deal	28.7	41.2
6. If I copied another student's work, my friends would get very angry with me	27.7	37.2

3 Similar AI Challenges at National and International Levels

As stated by Stephens [1], CETYS' AI results are worrying but seem to be in line with the few Mexican studies reported in the literature. For example, Díez-Martínez [7], with a narrower survey approach of 24 questions, reported on 208 high school and undergraduate students from educational institutions in the city of Querétaro. He identified academic-dishonest activities, such as presenting a work found on the Web as their own or sharing exams' answers with classmates in almost 85% of respondents. Another

Mexican publication by Díaz Castellanos et al. [8] focused on 11 serious misconducts, unlike Stephens' 95 items grouped in nine components, found, among 181 students from Tecnológico de Monterrey. They found that 60% of the students reported that they had cheated in their university academic activities. Ayala Enríquez [9, pp. 20–21], on the other hand sampled 75 students from the same higher education institution, identifying 15 behaviors that "... 65 and 52% of the participants stated that they had let a colleague copy them during the exam; and shared their homework to another classmate to copy". While both statistics were lower than those from CETYS, their focus was on fewer causes and did not cover institutional environmental variables.

Other studies in the region include that of Medina Díaz and Verdejo Carrión [10] who analyzed 16 diverse studies in seven countries: Argentina, Brazil, Colombia, Costa Rica, México, Perú and Puerto Rico. They reported that the percentages of academic dishonesty actions reached almost 100% in several cases, a slightly higher percentage than CETYS students. Another recent study conducted in Puerto Rico by the same author and others [11] reported that between 11% and 82% of those 360 cases surveyed admitted having resorted to at least one dishonest behavior of the 46 listed in the instrument among 51 dishonest acts. In particular, some similar practices seem to be increasing, a worrying growth, such as the purchase of homework in a British study [12] that increased from 3.52% in 1978 to 15.7% in 2014. In addition, Burgason, Sefiha and Briggs [3] found in an American meta-analysis that students who performed some type of cheating at the undergraduate and graduate level ranged between 9% and 90%. A similar "... meta-analysis of 107 studies from United States and Canada dealing with academic integrity revealed that the mean prevalence of cheating in a university setting was 70% among all surveyed students" [3]. The COVID pandemic has also apparently contributed to a higher international dishonesty growth among students. Eaton [13] and Lancaster, T. & Cotarlan, C. [14, p. 5] explained that taking as an indicator the posts of questions and answers across five analyzed subjects at <https://www.chegg.com>, there were 3,050,372 questions posted during 2018/2019 and 5,335,770 during 2019/2020, showing an increase of 74.92%" from one period to another (p. 5). In conclusion, CETYS' dismaying results, in general, were middle ground, not the worst but not the best. This is confirmed if compared with results from the other four Mexican universities that were part of the AMIS-S survey. This comparison is certainly a valid one because the same instrument was applied [15].

4 What AI Steps Could Be Taken: CETYS Academic Affairs Focus Group

Following up on Stephens' study, an online focus group was convened to identify what CETYS processes deal with issues of AI. The participants were three academic affairs directors (one per campus), the director general of academic development, and the convenor, who is the head of the social sciences faculty and one of the co-authors of this paper. The starting question delivered to them was: What are the main cases or situations that faculty face in relation to academic dishonesty? Their replies were that students are normally reprimanded when cheating was identified. One of the directors explained that there have been cases where, despite the fact that one of the students in a group is sanctioned, others perform the same dishonest action from the same group,

so it seems that application of the sanctions have limited or no effect on some students. This group behavior was identified by Stephens [1]. When questioned about the main cases or situations that are dealt with in relation to academic dishonesty, they pointed out different cases of plagiarism, where students are reprimanded directly by faculty. Participants reported as not having statistics but did recognize that there was an AI data challenge. In flagrant cases, where professors report the dishonest act, a three-professor council reviews the misconduct allegation. The verdict is usually to give a sanction that includes, in instances of serious misconduct, the dismissal of the student. However, there are also situations when the student does not accept his or her fault. These cases require lengthier processes to get more proof of student wrongdoing. Additionally, they confirmed that student non-ethical situations occurred at all university levels, undergraduate and graduate.

Academic campus affairs directors acknowledged that the ethical work they do with the students is insufficient. They concluded that faculty have to be continuously trained in this subject, because if they are properly trained, there would be a cascading effect on students with professors playing a key role in AI. An example that they gave was that faculty members have to be the first to use citations and references correctly in their teaching materials, as well as using serious academic sources identified in the databases in such a way that the lecturer is an example of what the student should do. In other words, they insisted that the best strategy is that faculty should model AI. They argued also that AI training should be mandatory especially for newly recruited faculty. Another suggestion was to diagnose student perceptions of AI and design classroom AI actions to be carried out [1]. Another subject of discussion was three subject areas taught in classes that deal with academic ethics learning and intellectual property recognition: Information Management (a compulsory eight-credit information literacy course), Research Methodology, and Advanced Communication in Spanish. However, long-term effects on their learning outcomes depend on the professors who teach the rest of the curricula.

All participants agreed that there are opportunities to enhance academic honesty as Stephens' [1] findings point out. The institution has regulations that need to be revised to be more comprehensive and, above all, set up corrective and formative strategies. These strategies would have to include support from student-related departments, such as the Student Development Center (CEDE), as well as the library itself, as participants considered that the problem was also related to study habits and lack of ethical awareness by students. Finally, the focus group recognized that CETYS lacks a clear action plan for how to deal with AI incidents and that the plan must be recognized by the university community.

5 CETYS Library Actions

Institutional libraries have taken actions to contribute to the enhancement of AI among students and faculty. The main actions have been the organization of annual institutional open town hall meetings, a training course for a sample of faculty, and a policy document proposal. AI is seen as an integral part of the institutional information culture where libraries play a key role. The compulsory eight-credit information literacy course that librarians teach to at least one group per semester, is the venue to foster AI and the skills

to use reliable information and respect intellectual property. The AI town hall meetings have been organized twice with the student affairs department, once in 2019 and again in 2020. The meeting goals have been to bring AI to the attention of students and faculty and to explore their thinking on this subject. The 2019 event was organized in each of the three campuses as a roundtable to discuss causes of academic dishonesty and current AI regulations. Participation at the three sites totaled nearly 500 people [16]. The second meeting was organized online because of the pandemic. It was attended by 80 to 100 participants in the three different segments of the program, among them were, again, faculty and students. It was open with no required registration. Students represented different institutional union groups and student associations. There was an exploratory questionnaire with seven open-ended questions, and CETYS study results were delivered, framed in a summary by Stephens [1]. The instrument was sent before the meeting to the student representatives with an affiliation of about 500 members, although it cannot be claimed that their answers represent their membership's opinion, as no consultation was conducted of their student base [17]. There were 23 questionnaire replies received from the three campuses. The answers showed concern and provided suggestions to tackle the problem along with the suggestions and conclusions of the academic affairs deans' focus groups.

Another action led by librarians was the proposal Program of Attention to Academic Integrity. The drafted text included contributions from academic and administrative student support areas including the Student Development Centers (CEDE) from each campus and two Centers of Attention and Psychological Orientation (CAOP), as well as the academic directors of each campus and the deans of the Schools of Humanities and Social Sciences, Engineering, Administration and Business. The core proposal was to create a preventive model, especially aimed for first-time infringement students, so that they would take AI training, including participation by the faculty who detected the problem with referral and support from the CEDE, library, and CAOP, among other units. The project proposal also proposes regulatory modifications to the CETYS bylaws that must be discussed and approved by the corresponding institutional instances. So far, it has been approved by the CETYS provost for academic affairs, and a roll out has been initiated for discussion and approval by participating departments and, hopefully, a gradual implementation in the near future. In addition, a faculty training course was designed in conjunction with staff at the the Center for Academic Integrity of the University of Monterrey (UdeM) who have several years of AI experience. The first training course enrolled 29 faculty members from the three campuses and from all educational levels in two sessions that totaled five hours of training. However, this is just a start, since the participants represented about 3% of the total number of the university faculty. In a few words, libraries have taken an integral approach as Cortés [6] suggests in fostering AI culture.

6 Conclusions

The study conducted at CETYS by Stephens [1] showed the opportunities that CETYS has to develop an institutional AI culture among their students and faculty. Non-ethical behaviors were prevalent in most of the surveyed students in the nine AI components

of the study. The survey showed alarming results, such as low student disapproval for academic dishonesty (nearly one third), and student involvement in at least one dishonest action of the nine components of the study, from low impact to serious actions. The findings call for a red flag but nonetheless apparently are in line with similar trends in other educational institutions in Mexico and from other Western nations. The academic affairs directors of the three campuses and the director general of academic development responded to the survey results in a focus group. The main outcome of the focus group were recognized in, recommendation to create procedures to encounter such student academic infringements and provide training to key stakeholders: faculty. Opportunities for CETYS libraries to deal with the recommendations include calling an annual town hall AI day where students and faculty convene to discuss the subject and potential solutions. In addition, a library-initiated proposal of enhanced regulations and procedures, with collaboration of student affairs-related departments, is under discussion by university departments. Through these means, administrators, faculty, staff, students, and librarians all can contribute to reinforce an AI culture, as well as promote further research to understand student motivations to undertake unethical misconducts. A final action that may be undertaken is to re-focus the eight-credit undergraduate information literacy compulsory course to expand the information ethics component into an academic honesty culture unit, as well as to explore a potential evaluation of the course by student behavior outcome. With its library's leadership, CETYS has taken the first steps to embrace AI challenges and opportunities pinpointed by Stephens [1].

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Information Behaviour



Literally Looking at Links – Mapping Communication and Content on Twitter

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Abstract. Social media offers teachers and other educational professionals the opportunity to engage into discussions about (educational) leadership and acquire social capital. In this context, social media platforms, such as Twitter, are increasingly utilized to share resources and initiate relevant discussions about (educational) policy. Yet, while “tweeting” has been identified as a central new information literacy practice, more research is required to map and better understand the underlying communication patterns within these spaces. The present study focuses on a selection of 15 US-based hashtags and employs a mixed-methods approach, using social network analyses, latent semantic analysis and web-scraping techniques. Our results suggest a large network structure in which different types of resources are being shared, ranging from personal blogs to commercial vendors.

Keywords: Social capital · Social media · Twitter · Social network analysis · Web scraping · Semantic analysis

1 Social Media as an Opportunity Space to (Informally) Network

The continuous professional development of teachers is a pivotal element in the provision of high quality education [1]. Here, teachers and educational professionals do not have to rely solely on formal support roles and institutions. Instead, they can draw on (informal) networks wherein they can share their ideas and collaboratively reflect on their practice [2]. Hofman and Dijkstra [3] propose that informal networks can provide teachers with a platform to engage in collaborative communication processes, exchanging insights and ideas, and thereby contributing to each other’s professional development. Boyle and colleagues [4] were able to show that these theoretical considerations are met by the perceptions of teachers, who consider sharing their practices to be an important element for their longer-term professional development activities. Scholars have postulated that the potential advantage of informal learning networks lies in their possibility to provide teachers with a platform where they can continuously share their practice and collaboratively engage in informal professional learning [5].

In this context, the rise of social networking sites (SNS), also referred to as social media, has led to a panoply of online communication spaces, wherein individuals can informally network and communicate with each other. Moreover, a growing number of studies have shown that teachers use SNS, such as Twitter, to collect the latest news on education and share resources with colleagues [6]. Moreover, these online spaces provide individuals with access to a plurality of (different) opinions and experiences on a shared interest or topic [7]. Yet, despite their potential, when entering such informal learning spaces neither learning nor knowledge creation are guaranteed. They rather constitute *social opportunity spaces*, which provide the meta-context wherein knowledge creation is fostered and learning processes are stimulated by the complex interplay of various underlying relations and factors.

1.1 Social Media and Educational Leadership

Influenced by developments in society, such as the described increase in available SNS, there has been a shift from government to governance in the past few decades [8]. This shift means that the hierarchical government model has increasingly given way to a governance approach, wherein the (horizontal) cooperation between the government and networks of relevant actors (private/public) is central. In particular, the *network governance* approach focuses on the informal, horizontal nature and mutual dependency between the various actors in the development and implementation of policy [9]. This network approach to government control means that the traditional, stable processes change into more dynamic, fluid processes in which possibilities for direct control disappear [10]. In these processes, the government assumes a role in which it does not provide direct steering, but mainly initiates, coordinates and facilitates discussions about topics such as educational leadership [8]. These discussions increasingly take place on social media platforms, such as Facebook and Twitter. This allows teachers and other educational professionals to closely follow developments, make new contacts, critically review news and possibly assert influence on the (national) discourse about educational leadership [11]. These online conversations are by definition no longer tied to a location and are no longer confined to a pre-defined group of individuals [12].

1.2 The Social Dimension of Social Media – The Example of Twitter

The concept of social capital has been increasingly used by a wide variety of disciplines, including health sciences [13], human resources [14] and education [6] to contribute to our understanding of how informal networks develop and evolve over time. Additionally, social capital can help to explain potential benefits from networking [2] and has already been used to better understand professional development [15]. Social capital can further be defined as “*relational resources embedded in the cross-cutting personal ties*” that “*are useful for the personal development of individuals*” [16]. It therefore connects to the concept of metaliteracy [17], which expands the standard conception of information literacy “[...] to include social media, online communities [...] by promoting the creative production and sharing of information through collaborative social media” [17, p. 85]. Moreover, it allows for incorporating considerations that have called for a more constructivist approach of describing information literacy, acknowledging that individuals are not

active on social media in isolation, but rather part of a network of interconnected, self-directed learners [18] Nahapiet and Ghoshal [19] distinguish among three dimensions of social capital, namely a *structural*, a *cognitive* and a *relational dimension*. The *structural dimension* is concerned with the social interactions between individuals within a particular setting, such as a SNS. The *cognitive dimension* deals with the question of whether participating actors share a common understanding and terminology, which improves the potential of exchanging ideas and information. Finally, the *relational dimension* of social capital describes issues such as trust and common values among individuals. In the context of this paper, we will focus on the *structural* and *cognitive* dimensions of social capital.

Twitter is a light-weight tool for easy communication that enables individuals to share information about any topic, in so-called “Tweets” that are limited to 280 characters. It is one of the most frequently used SNS to share information and news [20]. The main modes of communication on Twitter are direct messages (which are private), mentions (e.g., @user), replies (e.g., RT @user), and using hashtags (e.g., #topic). Including hashtags in tweets allows individuals to categorize their contribution and include their Tweet in a larger conversation about a certain topic. Particularly the latter aspect has been identified as an opportunity for individuals to enhance the possibility that they can access new networks and expand on their already existing ones [21]. Moreover, by providing access to a persistent conversational log, all Tweets are searchable and contribute to a growing pool of collaboratively shared information and knowledge [22]. As a result, Twitter has really started to evolve into a *social opportunity space*. Additionally, a growing amount of research has investigated Twitter as a platform for community building and development [22]. To this end, conversations on Twitter have been labelled as a *collaborative memory aid* [23], which individuals can use to create personal notes.

Yet, despite the general awareness that informal networking and social capital formation plays an ever-growing part in individuals’ professional development, research on this topic within SNS remains to be under-researched [23] and previous research can be criticized on the basis of two main issues. First, while social capital in SNS has already been identified and analyzed in a number of SNS settings, considerable uncertainty remains about how social capital might shape (educational) policy processes. Second, teachers and educational professionals have largely been neglected from the analysis of policy processes and social capital formation within SNS. Consequently, a number of authors [24] have called for more research on how teachers use social media. The present study addresses these shortcomings by investigating whether a Twitter conversation has the potential to contribute to and potentially have an impact on an (educational) policy process. It furthermore takes a deeper look at this process in order to investigate whether and to what extent participation in SNS contributes to social capital formation. Building upon the aforementioned considerations and perceived gaps in prior research, we formulate our overarching research question as: *Can we identify social capital in the context of informal networking on Twitter?* Additionally, we formulate our main subquestion as: *What types of information and resources are shared among users on policy related topics in Twitter discussions?*

2 Method

We employ a multi-method approach to analyze Twitter conversations. First, we use social network analyses to identify underlying activity patterns [25], user clusters [26] and (groups of) individuals that could be viewed as having prominent roles in the conversation [27]. Second, we use natural language processing techniques, such as latent dirichlet allocation [28] and topic modeling [29], to investigate what users are talking about via Twitter. Finally, we use web-scraping techniques to collect data on the type of urls and domains that are shared by the applicable users [30].

2.1 Social Network Analyses

It has been widely acknowledged that social network theory constitutes a valuable tool to assess the structural dimension of social capital [16]. Generally speaking, social network theory is concerned with the patterns of social relationships that exist among people in a social network [31]. A social network perspective extends the primary focus on individuals to understanding the interaction with the larger social infrastructure in which they reside [32]. It has been increasingly employed to analyze and visualize communication processes within SNS [33], and provides insights into the social structures and processes involved in changing education. In applying this method to the Twitter conversations in question, we first collected data on the Twitter users that have contributed to the applicable hashtag conversation [25]. Subsequently, we build a directed unweighted 1-mode network. Secondly, we computed the *in*-, *out*-, and *overall* degree centrality metrics of all users (nodes) taking part in the applicable hashtag discussions.

2.2 Bibliometric Analyses and Web-Scraping

We used bibliometric analyses to assess the cognitive dimension of social capital formation [19]. Bibliometric analyses enable us to deal with the large amounts of text data that are being produced within SNS. It has been increasingly promoted as a valuable methodological approach to map what is being contributed and shared by actors within SNS [29]. More specifically, we have employed latent semantic analysis (LSA) [34]. LSA is a technique in natural language processing, in particular distributional semantics, of analyzing relationships between words. LSA assumes that words that are close in meaning will occur in similar pieces of text. Additionally, latent dirichlet allocation [28], which is also often referred to as topic modeling [29], has increasingly been used to analyze the underlying topical structure of these big data sets [35]. More specifically, we employed the Gibbs sampling algorithm to identify this structure, which is the most commonly used method [36]. In the context of this method, one has to determine the number of topics to be assigned ex-ante. For the purpose of this study, we ran the applicable analyses for five, seven and ten ex-ante topics. We then analyzed the results and qualitatively determined which option best describes the underlying communication flows. Furthermore, we distinguish between the collated texts directly from Tweets and the texts that are shared via the Tweets. More specifically, based on the 280 character limit for Tweets, it has become common practice to include links (e.g., to blogs or websites) in the Tweets, where the indicated information is then fully displayed and reported.

Consequently, while Tweets provide good insight into the type and nature of information that is being shared via Twitter, they do not fully capture all the underlying information that forms the basis of the Tweets. We therefore programmed a web-scraper that enabled us to collect and analyze all textual elements from the links that were shared via Twitter [30, 37].

3 Data

3.1 Setting

The present study focuses on a selection of 15 US-based hashtags, including #WeLeadEd, #JoyfulLeaders and #FitLeaders, where teachers and other educational professionals exchange opinions, experiences and resources on the topic of school leadership. Using a dedicated server, we accessed the platform’s application programming interface (API), complying with the terms and conditions for Twitter [38], we collected 1,223,646 Tweets from the June 2017 until June 2019. The collected data was then imported into the R software package to produce sociograms and other visualizations, determine the SNA metrics and community structures, to conduct the bibliometric analyses and apply the web-scraping technique (mainly using the R libraries *igraph*, *rvest*, *quanteda*, *tm*, *topicmodels* and *urltools*).

4 Results

4.1 Social Network Analyses

Overall, 166,550 users took part in the collected Twitter conversations. Table 1 below provides an overview of the main summary statistics. As can be seen, there is a considerable standard deviation for all metrics. Some users merely interjected the discussion with a single contribution (out-degree), or were included once in another user’s Tweet. In contrast, the discussion also included users, who were highly active and outspoken (out-degree) or were often mentioned by others.

Table 1. Summary statistics SNA.

	D	InD	OutD
Avg	16.79	8.39	8.39
StDev	362.13	318.67	81.71
Min	1	0	0
Max	78,265	76,437	11,459

In order to put these metrics into perspective, Fig. 1 provides a sociogram to shed more light onto how the network structure looked. Given the overall size of the network, we decided to determine an induced subgraph, based on the top 1% of users, which

5 Summary

This study set out to investigate what is going on in Twitter conversations among teachers and educational professionals. More specifically, departing from the notions of *network governance* [9] and *social capital theory* [2, 16], we were interested in whether Twitter would contribute to social capital formation amongst the identified target group, and how an open discourse about policy related topics, such as school leadership, would take shape in a social opportunity space, such as Twitter. In order to investigate this issue, and possibly to identify common patterns that would help profile Twitter conversations, we collected data from a wide range of Twitter conversations on the general topic of leadership. Our investigation was based on multimethod approach, combining insights from SNA and bibliometric analyses, as well as web-scraping techniques.

Based on the results of this study, we argue that participation in Twitter conversation contributed to users' *structural* social capital. Participants shared information, got connected, and thereby contributed to their own social capital and that of others. We are therefore able to second the conceptualizations and empirical findings of other scholars, who have identified social capital as a useful concept to explain the potential benefits teachers can accrue from networking [2]. Moreover, it supports the notion that accessing just-in-time information and contextual expertise is of growing importance in an (educational) leadership setting [39]. Furthermore, the identification of users' structural social capital can also be interpreted as additional, preliminary proof that building interpersonal relationships is particularly important for school leaders since relationships create and sustain the conditions to address pressing educational and social issues within schools [40].

The results of our bibliometric analyses further contributed to our understanding of what is going on in Twitter conversations among users. First, we determined the most frequently used hashtags that were used in our dataset. Paired with the results of our topic modeling, this revealed focal topics that were at the center of the underlying conversations. This in turn allowed us to draw conclusions about what type of information is being shared among participants, namely motivational and forward-thinking Tweets about the possible future of education (e.g. #bekindedu and #futuredriven). Furthermore, our data suggests that educational leadership is also discussed in relation to wider societal movements, such as #blacklivesmatter. Using web-scraping techniques, we could then also get more insights into the types of information and resources being shared. More specifically, users predominantly shared practitioner-oriented information, commercial resources, and information from news portals. Again, these findings and considerations support early research highlighting the importance for (school) leaders to share practitioner-oriented and contextualized information [41], which is generally a common practice on social media [42] and an important factor in establishing a community.

Consequently, based on our findings, we argue that Twitter constitutes a social opportunity space, wherein people connect and share information and resources on policy-related topics, such as school leadership. Moreover, we believe that the chosen multimethod approach is well suited to provide a possible filter mechanism for users to deal with the vast amount of information that is being shared on social media. Even more so, researchers like Choo and colleagues have referred to the process of collecting information via Twitter to resemble "*drinking from the firehose*" [43, p. 3]. It is therefore

important to consider these types of filter mechanisms that help to identify important and interesting users within the Twitter realm and what type of content they contribute to a certain topic of interest. Once this has been achieved, it is possible for individual users to more effectively find and identify useful information and select (sub-)groups of others, whom they can engage with in policy-related discussions.

5.1 Limitations and Future Research

This study, although rich in descriptive and analytical data, exhibits two main limitations that can provide valuable input to future research in this field. First, in this study, we focused on the structural and cognitive dimensions of social capital. While this analysis provides a valuable contribution to our understanding of how individual Twitter accounts influence the social opportunity space of Twitter, it neglects the possible underlying reasons why individual Twitter accounts might have chosen to join a particular Twitter conversation (relational dimension). Hence, in order to further enhance our understanding of how social opportunity spaces are subject to the influence of social capital considerations, future studies should aim to triangulate all three dimensions of social capital and determine possible interaction effects between them. Second, the current data is based on user statistics from Twitter. While this objectified approach has acknowledged benefits [44], it only constitutes one social opportunity space wherein individuals engage into policy-related discussions. Future research should therefore strive to include more diverse data sources in their analyses. By following these suggested pathways, we would be able to gain additional insights on how (informal) networking is initiated and fostered within social opportunity spaces.

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Investigating Information Seeking Process Using Think-Aloud Protocol of Students Living in Rural Areas

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Abstract. In this study, we investigated how students in a rural secondary school searched for online information for their school assignments, and we employed the think-aloud protocol to reveal students' information seeking processes. In this study, three students were given three search tasks that were similar to their school assignments and they were asked to search the web for the tasks. To obtain data from each student's web search, we used screen-capture software and collected audio and video records. Recordings were subsequently transcribed and analyzed. Results showed that while the students completed the easy and medium-level search tasks to a great extent, they had difficulty in completing the difficult task. In addition, students performed the tasks with various steps and durations. Emotions such as hesitation, satisfaction, frustration and anxiety were observed in the students while they were performing the tasks. The results were also discussed in terms of the characteristics of the information seeking process.

Keywords: Rural area students · Information seeking · Think-aloud protocol

1 Introduction

It can be said that the information search process consists of the sum of the behaviors exhibited to address the need for information. Models and research examining this process suggest that searching for information takes place in a context and is a linear process consisting of stages and iterative activities [1]. Locating information in text is an activity that requires planning and judging whether a goal has been reached [2].

Nowadays, students are actively using the web as an information source. Especially for school assignments, they resort to the web primarily. However, searching the web may not be easy for rural students with limited access to the internet. Studies show that there is a gap between rural and urban students in terms of their computer and information literacy skills [3]. This skill gap results in a proficiency gap in understandings of knowledge between rural and urban students [4]. In the information seeking process, besides the act of seeking, feelings and thoughts about this process are also important [5].

Emotions and thoughts expressed by individuals in making sense of the behaviors they reveal during the information-seeking process, especially at young ages, are important data sources.

The think-aloud is a concurrent verbal reporting technique that verbalizes the ideas and brings thoughts into consciousness while problem solving [6]. The method also enables us to examine the information search process from different perspectives. Branch [6] used the think-aloud method to reveal the information seeking processes of 12–15 year-old students and she acquired useful data about the behavioral, cognitive and affective aspects of the process.

In this study, we investigated how students in a rural secondary school searched for online information for their school assignments, and we employed the think-aloud protocol to reveal students' information seeking processes. Students were given three search tasks that they used in their school assignments and they were asked to search the web for the tasks. Search tasks are designed in three difficulty levels: easy, medium and difficult, and the tasks allowed the student to interact with the web enough. Search tasks were designed by teachers regarding their course assignments. To obtain data from each student's web search, we used screen-capture software and collected audio and video records. Recordings were subsequently transcribed and analyzed. The consequent analysis of the data looked into the search performance and search process data.

The aim of this study is to reveal rural students' information seeking process in terms of search performance and search process data. We analyzed the task completion time, number of steps, and status of success for each task to obtain students' search performance. To reveal the search process, we reported the information seeking behavior of students, and also analyzed thoughts and feelings observed and recorded during each student's search task. All the observed behavior was categorized into "frame behavior" in the information seeking process. Along with the thoughts and feelings, it was also reported the difficulties experienced during searching. Results of this study are expected to shed light on rural students' information seeking processes and also detect their shortcomings about access to information in terms of technical and skill-based manner.

1.1 Information Access of Rural Students

Along with the "Movement of Enhancing Opportunities and Improving Technology", abbreviated as FATİH project in Turkey entered into force in 2010, the electricity and internet connection infrastructures of all schools across the country were planned to improve, so interactive boards were installed in all schools [7]. However, there are problems with the complete access of targeted services to all schools across the country. The problems experienced in the implementation of the Fatih project are mentioned in many studies [8, 9]. Problems also with internet and electricity connection in rural schools and students' lack of access to tablet computers have prevented targeted equal opportunities. This situation directly affects the access to information of the students living in rural areas, putting them at a disadvantage in comparison to the students living in the city center who have technological facilities.

2 Method

2.1 Research Model

This study used a case study research design and think aloud method to reveal students' information search process. Due to the small number of cases (three students), the information search process was analyzed in depth through the cases discussed also as stated by Gerring [10]. The collected data were analyzed using the content analysis method. Content analysis is a research technique in which valid comments extracted from the text are revealed through a series of processes [11]. A screen recording program and thinking aloud technique were used to record students' information seeking process and performance data. With the help of this technique, we tried to get detailed information about students' thoughts and feelings while they interacted with the web. The think-aloud method is utilized to discover the indications of the information search process and state of mind while performing the search tasks [12]. The records taken with the screen recording program were transcribed and analyzed through content analysis. Using the think-aloud technique, the students was asked to verbally express their feelings and thoughts during information seeking, and these statements were recorded by the researcher.

2.2 Study Group

Fifth grade (11 years old) students from a village secondary school participated in the study. Before the study, required permissions (including ethics committee approval) were obtained to collect the data. Initially, we got permission to work with 10 students, but due to pandemic conditions, the time that students attended school became limited across the country, so we were able to work with three students. At the beginning of the data collection process, each student was asked questions about their demographic characteristics and access to information through a brief questionnaire. The questions in the brief questionnaire were asked by the researcher, and audio recording was taken while the student answered the questions. The records were then transcribed and analyzed. As a result of the analysis of the data, the demographic characteristics of the students participating in the study and the information about their access to information are presented in Table 1:

Table 1. Demographic information of students.

Student	Gender	Age	Personal computer owner	Frequency of internet access	Num. of people using the same computer
1	F	11	Laptop	2 h/day	2
2	M	11	Tablet	3 h/day	2
3	F	11	Desktop	4 h/day	2

According to the demographic information in Table 1, two students were female and one was male. All of the students are 11 years old. One of the students participating

in the study stated that she had a laptop computer, one student had a tablet, and other had a desktop computer. Although the students did not know the exact duration of daily internet access, they expressed it approximately. Accordingly, one of the students stated that she used the internet for about two hours a day; she connected the internet from her parents' mobile phone. Student2 stated that he used the internet for three hours a day; he also accessed the internet from his parents' mobile connection. Only Student3 had a landline internet and she accessed from her desktop computer. Considering that students attend distance courses due to pandemic conditions, it can be said that they use most of this time in online courses. Therefore, the time they spend doing research on the internet is thought to be shorter than stated. At the same time, the students stated that they shared their computers with their siblings who were attending school.

2.3 Data Collection Tools

Search Tasks. In order to uncover the information search process, we asked the school's Science and technology teachers to create authentic information search tasks. We wanted search missions to be research questions that teachers routinely give their students and that they want to find by searching the internet. The questions also had to be at three different levels of difficulty, easy, intermediate, and difficult, so that the student's behavior in dealing with tasks of different difficulty levels could be revealed during the search for information. The teachers wrote tasks that were appropriate for each level of difficulty under the guidance of the researcher, and then agreed that the question expressions should be understandable and reflect the relevant level of difficulty. The search tasks created were determined from easy to difficult, respectively: "What is the relationship between heat and temperature?"; "What are the benefits and harms of technological products?"; and "What is the reason why we always see the same face of the Moon when we look from Earth?".

The easy task should be such that the research question could have been found by typing it directly into the search engine and does not require complex query formulation, while the difficult task should have required the research question to be analyzed and transformed into a search query. The medium difficulty task should have been between these two.

Video and Audio Records. The think aloud technique was used in order to reveal the behaviors, feelings and thoughts of the students while performing their information seeking tasks. To obtain data from web searches of the students, we used screen-capture software and collected audio and video records during the implementation of tasks of students. A total of 35 min 53 s of video recording was obtained (12 min 23 s, 10 min 54 s, and 12 min 36 s for each student, respectively). The video recording includes screenshots and speech recorded; not any image of the student taken with the camera. Recordings were subsequently transcribed and analyzed. The consequent analysis of the data looked into the task completion time, number of steps and status of success at solving each task. It was also reported behavioral indicators when searching and thoughts and feelings during searching.

Brief Questionnaire. A questionnaire about demographics and facilities of information access of students was applied to students at the beginning of the data collection process.

The statements in the questionnaire were read by researcher and the answers of the students were recorded through audio recording.

2.4 Process

The study was carried out in a rural secondary school at approximately 40 km distance from the city in Adana province. In this bussed education school, students from the surrounding small villages with no schools come to school via a bus. We received the support of the classroom teacher in selecting volunteer students for this study. The students participated in the study at appropriate hours on a voluntary basis. Considering the reservations of students and teachers due to the pandemic conditions, we did not request more students and we were content with the volunteers. During the research, the students used the researcher's laptop computer in an empty classroom in the school to search for information in accordance with the instructions given to them. We interacted with students on different days; we got an appointment for the appropriate time, taking into account the intensity of the course. When starting the study, students were informed about the research; they were informed that audio and screen recording would be made. We started collecting data with a brief questionnaire, and then asked the research questions.

In a qualitative case study, direct interpretation is a process of pulling the data apart and putting them back together in more meaningful ways, also establishing patterns and looking for correspondence between categories [13]. In this study we assumed each student as a case, so we used the direct interpretation technique in order to analyze and interpret data. Also as stipulated in the technique, we drew a behavioral patterns table to show the framework behaviors based on similarities among cases during their information search.

2.5 Shortcomings of the Study

Due to the pandemic conditions, schools in Turkey remained open at limited times, in available times, it was left to the parents of the students to attend school. The participation rate in the village school where the study was conducted is quite low. The school principal stated that the participation was around 10% at the time of the research. It is also coincidental that the volunteer students participating in the study have a personal computer. Although the school principal does not share numerical data, he stated that few students have a personal computer and internet connection across the school.

3 Findings

3.1 Findings on Search Performance

Table 2 shows the status of success and task completion times of the students participating in the study:

Table 2. Task completion time and status of success of students regarding each task.

	Easy task	Status	Med. level task	Status	Dif. Task	Status
Student1	3 min 14 s	+	5 min 09 s	+	3 min 15 s	–
Student2	3 min 45 s	+	3 min 28 s	+	1 min 49 s	–
Student3	3 min 08s	+	2 min 53 s	+	3 min 29 s	+

+: Completed + : Partially completed –: Not completed

As seen in Table 2, students completed the easy and medium-level search tasks on a large scale. On the other hand, students had difficulty in completing the difficult-level task. In the partially completed tasks, the student gave the answer to the question, although s/he was not sure of herself/himself, and did not search further to reach a clear result. Therefore, the expression “partially completed” is used in the answers given without being sure. Students completed each task with a different number of steps. Table 3 shows the number of steps used in performing each task:

Table 3. Number of steps regarding each of the tasks.

	Easy task	Medium-level task	Difficult task
Student1	7	11	7
Student2	4	4	7
Student3	5	8	8
Average	5.3	7.6	7.3

According to the data in Table 3, the average number of steps used to perform the task at each difficulty level is 5.3, 7.6 and 7.3 for easy, medium-level and difficult tasks, respectively. In the shortest operation step used (4 steps), the students performed query formulation, click the result, examine the page and answer the question sequentially. In the operation that used the highest number of steps (11 steps), the student did the following in order: query formulation, click the first result, examine the page, turn back, examine the results, click one randomly, examine the page, turn back, click one randomly, examine the page and answer the question. It was observed that the average number of steps decreases slightly in the transition from medium level to difficult. This situation is thought to stem from the students’ tendency to exit the difficult task.

3.2 Findings on Search Process

In this section, the steps taken by the student while performing the task are given in detail, at the same time, the data of thinking aloud (thoughts and feelings) related to the operations performed are conveyed. We present only the data about the difficult task implementation below. During the search process students used think-aloud protocol,

and were encouraged to talk about search procedures and also their thoughts and feelings. In cases where the student was not willing to speak, the researcher stepped in and gave directions in order to encourage the student to think aloud.

Difficult task Implementation of Student1: Despite the fact that the research question was long, she wrote the entire question to create a query. Without entering the page, she read the brief explanation of the first result. She clicked that page and examined it but was not satisfied and turned back. For a while, she studied the results but did not click on any of them. She did not continue searching from this point.

Student1: *“Most of the time I read the information on the site and compare it with the lecture, so I decide whether it is correct or not...(go on with the next result) I think this is true (select with mouse)”*. When the student could not find the answer to the question and stopped searching.

Direction: *“How do you feel when you couldn’t find?”*

Student1: *“I’m scared when I can’t find it ... if I can’t, the teacher could think I haven’t done my homework!”* (**Anxious**)

Difficult task Implementation of Student2: When forming the query, he selected among the search suggestions and examined a brief explanation of the first result. Then he changed the query and examined the new results. He clicked the first result and looked through the page. After examining it for a while, he ended the task before reaching the correct answer. He showed no willingness to continue.

Direction: *“What do you think of the results you see?”*

Student2: *“I think the top-ranked ones are correct, clicking on the below sites reveals incorrect information ... I mostly trust the top 3 sites.”* (**Frustrated** and unwilling to continue)

Difficult Task Implementation of Student3: She wrote a search query and thought over and deleted and tried to write a new query. She formulated the third search question as “Why do we always see the same face of the moon from the world?”. She looked through the search results and read the brief explanation of the first page. She clicked the third result and examined the page.

Student3: (Examine the brief explanation of first result) *“I should not enter here, this is Facebook”* (After examine the 3rd result) *“This information is a little short...”* (**Hesitant**)

Direction: *“Do you think this information is useful?”*

Student3: (Scroll up and notice the site banner) *“‘Tubitak’ is written on top, it might be true, ...the information here seemed correct to me.”* (**Satisfied**)

Direction: *“Did you have any difficulties searching for this information?”*

Student3: *“It was very difficult to write the question because the question is too long, I tried to shorten it, but this time I come across incorrect information.”*

Behavioral Patterns of Information Search Process. Based on collected data, the behaviors revealed during the search were collected in four basic groups and called the framework behavior: Query formulation, examine the results, choose from the results and reach the answer. During the search, each student exhibited these basic behaviors, but performed the behavior in different ways. These figures are listed in the table as behavioral indicators. At the same time, the feelings and thoughts expressed by the student spontaneously or as a result of the guidance of the researcher are presented in Table 4 when performing the relevant behavior.

Table 4. Behavioral patterns, feelings and thoughts regarding information search process.

Frame behavior	Indicators of behavior	Thoughts and feelings
Query formulation	Write the question text directly Choose among the search suggestions Formulate an original query Delete and write new query	Think over the query formulation Hesitation
Examine the results	Read the brief explanation of a result Matching the title of result with the search question Search for familiar sites	Search for known site Hesitation
Choose from the results	Click the first result Click one randomly Click the familiar site	Matching with familiar result Uncertainty Hesitation Familiarity
Reach the answer	Examine the page Read the highlighted parts Answer the question Quit without answer	Deciding on the accuracy of information Anxiety Frustration Satisfaction

In the first two stages, a feeling of intense hesitation was observed in the students. Especially the third student was more cautious while creating a query; moreover all students were hesitant in examining the results and choosing among them. While choosing among the results, the students searched for the web addresses they knew before. While the fact that previously-known addresses are among the results creates familiarity, they hesitantly made a random selection when they encountered unfamiliar sites. In this case, it was observed that they felt uncertain about the information on the page; therefore, they were not sure of the right answer.

In the last stage, while deciding on the accuracy of the result, the students took into account the amount of information they encountered, its similarity to the information given in the course, the top-ranking status of the result, and the familiarity of the

web address. It was observed that they experience feelings of anxiety, frustration, or satisfaction while making a decision.

4 Conclusion and Discussion

The information collected as a result of analyzing the screen recordings and think-aloud data taken during the information search has been discussed under two headings: Search performance and search process. In terms of search performance, students completed the easy and medium-level tasks, however they had difficulty in the last task. In the partially completed tasks, students answered the search question uncertainly, but they showed no willingness to search further. Although students spend a little more time performing the difficult task, it can be said that the time spent on the difficult task and the number of steps taken are not evidently different from other tasks. It was observed that student1 and student2 who could not accomplish the difficult task experienced feelings of anxiety and frustration. While the third student had a sense of satisfaction when she completed the difficult task, she was also hesitant about examining different results in detail.

It was observed that the students experienced feelings of hesitation, uncertainty and frustration while performing the last task. Especially the feeling of uncertainty played a preventive role for student1 and student2 in planning the next step, in this case, the students chose to end the task. The difficult information search task requires formulating a functional query that directs students to answer the question. Writing the correct query affected the willingness of the student to continue the task, as it made the results more refined.

Only the last student formulated a search query while performing the difficult tasks. She tried to create a more general query statement by somewhat simplifying the long and complex search question. Broad queries containing fewer terms than the search question make it easier to get more relevant results; in her study, Aula [14] showed that creating broad queries was correlated with users' experience with using search engines and the web, also, the average number of search terms within the query increased with the web experience. Another study [15] also showed that information-seeking behavior can be influenced by web-search experience. In this study, considering the last student's frequency of internet access, we can say that she interacts with the web more than others. The students' lack of opportunity to interact with the web prevents them from acquiring basic skills in the information seeking process, especially in query formulation.

Factors such as the information being similar to the ones in the book/notebook, the coherence with what the teacher said and the familiarity of the web site were effective in the satisfaction of the student. There is a list of 'reliable sources' in the minds of the students with the guidance of the teacher or other acquaintances. When they encounter a site that they know to be reliable, they feel satisfaction and decide that the result is correct. However, when choosing among the results, they hesitate to click on unknown sites. In the face of this situation, one student expressed his hesitation with the phrase "it can be viruses!", while others did not express why they did not click. Viruses can be a serious problem for students who have limited access to a computer.

When the number of steps taken while performing the task is examined, it was expected that the average number of steps will increase as students move from easy task

to difficult, but no explicit increase was observed in first and last students. In the task of searching for information with minimum steps, the student gave the correct answer based on the first result he encountered as a result of the query. However, iterative actions while performing the same task also show that the student examines different sources. Accordingly, based on the average number of steps, we can say that students examine an average of two different results in order to reach the correct answer. This result also shows the rural students' limited ability to questioning the sources of information.

The feeling of anxiety was observed to occur when the student could not reach the correct answer. When student1 could not get the correct answer to the search question, she displayed a feeling of anxiety. The reason for the anxiety is that the problem parallels with the school assignments, and when the information is not available, it means that she does not do her homework. Homework pressure on students should be reduced in order to ensure that the student behaves comfortably during the information-seeking activity. When assigning homework, teachers should consider students' access to information and be flexible about deadlines. The student3, who successfully completed the difficult task, benefiting from the 'reliable source' information in her mind to check the accuracy of the information she had accessed. It can be said that the strategy she used during the search for information helped the student to reach the right result. By questioning the accuracy of the information source, the student got rid of the feeling of uncertainty and behaved more clearly in giving the correct answer. A study [2] with middle school students found that the metacognition awareness of students when searching for information was the determinant of their use of a search strategy. Students should be informed about information-seeking strategies and course-specific reliable sources. It will be beneficial to integrate these skills into the school curriculum for students and also teachers to be equipped with scientific communication skills [16].

Based on the interaction between the researcher and the students during the search for information, it can be said that students' information search practices are weak. The lack of experience of the students about what to do while they reach the wrong result indicates that there is no mental road map, such as search strategy, to guide them. Students need to gain more experience in this regard. [17] stated some cognitive factors are influential in web searching such as cognitive shifts among tasks and cognitive coordination to manage search process. It is thought that the mentioned cognitive competencies will be gained by practicing search exercises on the web, or by training in research skills such as reliable sources and search strategies by teachers. It is also thought that it would be beneficial to give students the opportunity to use the computer laboratory in the school, except for the information technology course.

In Turkey, the rates of having a desktop and mobile devices and internet access opportunities for primary school students are very low, especially in rural areas. Although there are no similar local studies directly on the information search processes of rural students, it has been stated by researchers that students in rural areas have problems in accessing distance education due to the lack of technological opportunities during the Covid 19 pandemic process [18]. According to the current data of the Turkish Statistical Institution, the proportion of availability of devices in households is 16.7% for desktop computers; 36.4% for portable computers; for tablet computers, it was recorded as 22.0% [19]. On the other hand, while the rate of proportion of internet users by statistical regions

is 88.7% in the Istanbul metropolis, this rate drops to 63.8% in the southern regions [19]. Although the rate of students' use of information technologies is slightly increased with the FATİH project, there are problems in students' access to information technologies, especially in rural areas. Poor access to information and communication technologies causes students living in rural areas to have insufficient information-seeking experience. This lack of experience is one of the barriers for students to cope with difficult search tasks and develop search strategies. In this study students who have a computer and an internet connection had difficulty in handling the complex search task. This carries the concern that those who do not have similar technological opportunities are in a worse situation in terms of related processes. For this reason, repeating the study with more disadvantaged samples under appropriate conditions could be useful in order to gain more insight into the information-seeking processes of rural students.



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Understanding the Landscape of Science Communication in Terms of Attitudes Towards Science: The Role of Perceived Credibility

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Abstract. This study aims to analyze the credibility of various sources of science information and examine how it predicts an individual's attitude towards science. The study is based on two representative surveys carried out in Latvia in 2019 and 2020. The results suggest that the perceived credibility of science-related sources and the perceived experiential and relational credibility are the most important factors that predict attitudes towards science. The perceived credibility of the media did not predict attitudes towards science. Where this is the case, there is a risk that personal views of non-scientists can be biased and hence may distort the perception of science messages. We conclude that scientific communication needs to become more diverse in terms of sources and channels to reach a wider audience. Not only scientists, but also public opinion leaders need to be involved in scientific communication.

Keywords: Science communication · Attitudes towards science · Media credibility · Experiential and relational credibility · Credibility of science-related sources

1 Introduction

People's attitudes toward science and credibility assessments of different science information sources and channels are important aspects in science communication as they affect the degree of attention that audiences pay to science-related information [1]. Competent judgement about source credibility and information channels is a crucial aspect of information literacy [2].

In Europe, people generally have positive attitudes towards science [3], but at the same time people report only a moderate interest in science (53% say that they are interested in developments in science and technology), and the majority feel that they are not well-informed enough (58%) [3]. Ungur [4] argued that the knowledge gap surrounding science and scientific issues is a function of the knowledge – ignorance paradox. It suggests that the over-saturation of information has created specialized interest groups and decreased the overall interest in science. Previous research has demonstrated (see, for example [5]) that interest in science and the consumption of science-related information

are strong predictors of attitudes towards science. Given this, it is surprising that the formation of attitudes towards science is often viewed as an educational issue, and previous research has paid very little attention to understanding attitudes towards science outside of school or university settings, where the term “science” is still primarily understood as belonging to exact or “hard” subject teaching (for example physics, mathematics, and chemistry) (see, e.g., [6, 7]). This study contributes to expanding our knowledge about attitudes towards science outside educational settings and, in a broader sense, by looking at attitudes towards all fields of science, including social sciences and humanities.

With the rapid development of various information and communication technologies, it has been proposed that audiences may treat the source and medium of science information as the same concept. (e.g., [8, 9]). Knowledge about science, and an interest in the latest scientific achievements and the work of scientists has been found to be related to particular media usage practices (e.g., [10, 11]). However, a lack of time and, often, insufficient information literacy skills make information users apply cognitive heuristics in assessing the credibility of science information sources [12]. The aim of this nationally representative study is to further our understanding of the credibility judgements of sources and channels of science information and examine how they predict an individual’s attitudes towards science. The research question is the following: How do the perceived credibility of the media and of science related sources, and experiential and relational credibility predict attitudes towards science after controlling for gender, age, and education? We use data from two surveys collected in 2019 and 2020.

2 Source and Media Credibility

As previous studies have demonstrated, credibility is a multi-dimensional concept. Credibility can be defined in terms of trust, reliability, accuracy, fairness, and objectivity [13, 14]. As underlined by Rieh [15], trustworthiness is a core dimension in credibility because it captures the perceived morality and goodness of the source of information. A person is considered trustworthy for being honest, disinclined to deceive, and careful in their choice of words [16]. Credibility is also equated with believability. Credible people are believable people and credible information is believable information [9]. Credibility assessment is an iterative process that involves one or more credibility judgments [17]. These judgments comprise the credibility assessment that leads to further decisions such as whether to believe or dismiss the information source and whether to accept or reject the piece of information [17]. Information and communication studies differentiates among three kinds of credibility: message, source, and medium [18]. Since this study is focused on source and medium credibility, we only examine these two aspects.

Source credibility is posited to consist of perceptions of source trustworthiness and expertise and is defined as “the extent to which a communicator is perceived to be a source of valid assertions” [19, p. 21]. As Rieh [15] points out, the assessment of a source’s expertise comes in various ways: people might have prior first-hand experience with a source; they might know that a source has a good reputation; they might have heard about a source from other people; they might recognize expertise due to a source’s credentials. However, the way that people perceive expertise is changing as social media and other online platforms are increasingly used to create and disseminate information on scientific issues [20]. While earlier definitions of source credibility

focused on the source's professional expertise on a given topic as an indicator, more recent conceptualizations increasingly point towards source credentials such as personal experience with the given issue [20]. The term *experiential credibility*, or the credibility assigned to an information source based on his or her personal experience, is one aspect recently explored as potentially influential in judgements about user-generated information in online contexts [21]. Neubaum and Krämer [22] demonstrated that while source credibility was perceived to be higher for a health institution when compared to that of a patient, experiential information from a layperson turned out to be more powerful in shaping attitudes and self-efficacy toward particular health behaviors. Other studies show similar results. Research on the use and evaluation of online health information generally indicates that people are more likely to positively evaluate information from members of online communities (for example, fellow sufferers of a particular disease) based on perceived similarity with the health information sources even if they do not know them personally (for example, see [23]). Theories of social identity indicate that the perceptions of similarity between members of a group, such as shared traits between people, can shape people's attitudes and behavior [24]. Applying these notions in information and communication studies, it has been demonstrated that perceived similarities between an information seeker and an information source may significantly impact credibility perceptions [23].

Media credibility focuses on the perceived believability of various media channels such as television and the Internet through which a message is sent [25]. Both credibility categories (source and medium credibility) have been found to intersect in impacting the overall credibility assessment. The perception of something being insufficient in one category (for example, the medium) may influence judgements regarding the credibility of another category (for example, the source) [9, 25, 26]. However, with the rapid development of various information and communication technologies, studies demonstrate that the source and medium are often assumed as a similar or even the same construct (for example, [8, 9]), suggesting a collapse of the two originally distinct theoretical constructs. As explained by Sundar and Nass [8, p. 54], "receivers sometimes treat the medium itself (in other words, computer box or television set) as an autonomous source worthy of human social attributions". They also argue that a source might be whoever the information receiver or evaluator perceives the source to be [8].

3 Credibility and Attitudes Towards Science

Attitudes towards science are explained as feelings, beliefs, and values held by someone relating to scientific work, the impact of science on society, or to scientists themselves [27 p. 1053]. Previous studies indicate that attitudes towards science in general and towards specific topics (for example, genetically modified foods, nuclear power, climate change) are influenced by a broad set of factors such as a person's knowledge about science, interest in scientific topics, the perceived credibility of the information sources, deference, values, and personal characteristics [28, 29]. Nisbet, Sheufele, Shanahan et al. [11] found that both "procedural" science knowledge (about science as a mode of inquiry, what it means to study something scientifically), and "factual" science knowledge (terms, basic scientific facts, concepts) were associated with more positive attitudes towards

science. In this study, they also found that individuals with higher levels of education not only had more positive attitudes towards science, but they also consumed more hard news content (for example, read newspapers) to learn about science. Since mainstream media channels do not regularly report science news [11], individuals who have interest in science seek additional information and look for particular media sources for the information they are interested in. Takashi and Tandoc [30] found that people who are more interested in science also tend to use the Internet to search for science information, instead of using traditional media platforms such as the press, TV, and radio.

Cognitive Heuristics and Credibility of Science Information and Its Sources. Prior studies regarding judgement and decision-making show that people are likely to use heuristics or mental shortcuts when judging source credibility [21]. Perceived credibility can act as a heuristic or a biasing agent (for a review, see [31]). *The reputation heuristic* is one such mental shortcut: people may believe that the source with a recognizable name is more credible than an unfamiliar one [12]. For example, audiences are more likely to believe information that is provided by people or organizations which they view as being credible (for a review, see [32]). Sanz-Menéndez and Cruz-Castro [33] found that the credibility of scientific information is higher when the source is perceived as closer to trusted and reputable scientific institutions and is lower when it is linked to businesses and governments. Priest, Bonfadelli and Rusanen [34] found that “trust gaps” (in other words, the size of the difference in trust in different stakeholders) emerged as a predictor of biotechnology attitudes. Scientists are generally viewed as credible sources for information regarding scientific topics due to the professional, technical expertise attributed to them. However, the perception that scientists have hidden interests or political leaning can increase levels of skepticism and lower the credibility of scientific information [35].

The technological functionalities of digital media channels have also been found to be influential in shaping people’s attitudes toward science in general as well specific science issues (for example, [36]). In the social media environment, the interpersonal relationships between the information sharer and receiver, reciprocity, perceived proximity, and familiarity with the source are also increasingly associated with credibility evaluations [37]. *The endorsement heuristic* proposes that people perceive information as more credible if others also do so (for example, by “likes”, “shares”) [38]. Metzger, Flanagin and Medders [39, p. 433] underline that “social pooling, personal opinion confirmation, enthusiast endorsements and interpersonal resource sharing are increasingly privileged mechanisms invoked by individuals to evaluate the credibility of information found online”. Materska [12] points out that the studies on heuristics allow us to better understand the habits of mind that facilitate information processing behavior and help us to understand the contexts in which information literacy becomes a social practice.

4 Method

Sample and Data Collection. A total of 2,023 respondents (51.8% female, age range 18–75, $M = 46.02$, $SD = 15.7$) participated in the survey. The respondents formed a representative sample of the Latvian population – 1,014 in 2019 and 1,009 in 2020. The SKDS, a marketing and public opinion research company, collected data using an Internet-based

survey. Informed consent was obtained from the participants for participation in the study.

Table 1. Factor loadings for the rotated factors

Item	Factor loading			Communality
I would trust the results of scientific research if...	The perceived			
	Credibility of the media	Credibility of science-related sources	Experiential and relational credibility	
If I read it in a magazine	0.85			0.85
If I read about it in a newspaper	0.83			0.83
If I saw it on TV	0.80			0.77
If I saw it on the Internet	0.80			0.77
If I saw it on social media	0.74			0.70
If I knew that the results of the research had been confirmed by other scientists		0.79		0.69
If I knew that international scientists had participated in the research		0.78		0.69
If the results of the research were presented publicly by the researchers, who did it		0.75		0.65
If I could familiarize myself with the original research		0.62		0.65
If it was published in a scientific journal		0.51		0.63

(continued)

Table 1. (continued)

Item	Factor loading			Communality
	The perceived			
I would trust the results of scientific research if...	Credibility of the media	Credibility of science-related sources	Experiential and relational credibility	
If the institution that conducted the research was known to me		0.48		0.62
If I personally knew someone who was involved in the research			0.79	0.59
If I had contributed to the research myself			0.69	0.58
If my friends/family thought it was true			0.62	0.57
If it was consistent with that which I already know			0.61	0.55
If it was told to me by someone (authority) I trust			0.58	0.55
If I heard the same thing from different sources			0.50	0.53
Eigenvalue	4.15	3.49	3.35	
% of variance	24.38	20.53	19.70	

Note. Loadings < 0.40 have been omitted.

Measures. We designed a set of 17 items to measure the perceived credibility of three sources – the media, personal experience and interpersonal relations, and science-related sources. Based on face validity, we predicted that five of the items would measure the perceived credibility of the media, six of the items would measure perceived experiential and relational credibility, and six of the items would measure the perceived credibility of science-related sources. This was supported by a factor analysis of the scale items, and the internal consistency of index variables computed for three factors. See Table 1 for the scale items and details of statistical analysis.

Attitudes towards science were measured by a set of three items. The respondents were asked to rate the extent to which they agree (1 – strongly disagree, 4 – strongly agree) with items such as: (1) “The research and work done by scientists is valuable to society”; (2) “Overall, I trust scientists and scientific research”, and, (3) “Scientists need to research issues of public importance and propose solutions”. We computed an index variable of the attitudes towards science across all three items (Cronbach’s alpha = 0.70).

5 Results

This study deals with the role played by the perceived credibility of the media, perceived experiential and relational credibility, and the perceived credibility of science-related sources in the prediction of attitudes towards science. First, descriptive statistical data were calculated for all variables and a correlation analysis was carried out, as seen in Table 2. It was shown that the perceived credibility of all three sources—the media, personal experience and interpersonal relations, and science-related sources—positively correlate with attitudes towards science.

Table 2. Descriptive statistics, internal reliability, and Pearson correlation coefficients (Correlation is the relationship between two variables, and the correlation coefficient shows the extent to which the two variables are related. The value of the correlation coefficient is between –1 and +1).

Variable	α	M	SE	SD	2	3	4
1. Attitudes toward science	0.70	3.23	0.01	0.52	0.23**	0.43**	0.41**
2. The perceived credibility of the media	0.94	2.39	0.02	0.74	–	0.53**	0.51**
3. The perceived credibility of science-related sources	0.90	2.93	0.01	0.63		–	0.66**
4. The perceived experiential and relational credibility	0.87	2.21	0.02	0.80			–

Note ** $p < .01$, * $p < .05$. α – Cronbach’s alpha, M – mean, SE – standard error, SD – standard deviation

Regression analysis¹ was carried out to assess to what extent the perceived credibility of the media, the perceived experiential and relational credibility, and the perceived credibility of science-related sources contributes to explaining attitudes towards science. Assumptions about regression analysis were true in all instances: the relationships between the dependent variable and predictors were linear; the residual values complied with normal distribution; none of the independent variables was a combination of other independent variables, and there was no multicollinearity.

The year of data collection, gender, age, education, and the perceived credibility—the media, personal experience and interpersonal relations, and science-related sources—were included in the model when doing the regression analysis for attitudes towards science. The regression model was statistically significant (Table 3).

Table 3. Results of regression analysis for attitudes toward science

Independent variable	Adjusted R square	<i>F</i>	<i>B</i>	<i>SE B</i>	β
	0.23	73.96***			
Year (0 – 2019, 1 – 2020)			0.05	0.02	0.05*
Gender (0 – Female, 1 – Male)			0.01	0.02	0.01
Age			0.001	0.001	0.02
Education			0.04	0.02	0.04
The perceived credibility of the media			–0.03	0.02	–0.05
The perceived credibility of science- related sources			0.25	0.03	0.30***
The perceived experiential and relational credibility			0.21	0.02	0.25***

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. *F* – F-test (Fisher test), *B* – unstandardized coefficient, *SE B* – standard error, β – standardized coefficient Beta

The regression shows that the perceived credibility of science-related sources ($\beta = 0.30$, $p < .001$) and perceived experiential and relational credibility ($\beta = 0.25$, $p < .001$) play the most important role in explaining attitudes towards science. The perceived credibility of the media, as well as age, gender, and education do not predict attitudes towards science.

6 Discussion and Conclusions

This study aimed to analyze the perceived credibility of various sources of science information and examine how this predicts an individual's attitude towards science. Our

¹ Regression analysis is a statistical analysis in which the relationships between two or more variables are analysed simultaneously.

main conclusion is that the perceived credibility of science-related sources and perceived experiential and relational credibility are the most important factors that predict attitudes towards science. As our data analysis showed, the perceived credibility of the media, as well as age, gender, and education do not predict attitudes towards science. Below, we discuss this conclusion with reference to previous studies.

On one hand, our results support the findings of previous studies about personal and social attributes of science information consumption and their contribution to credibility assessment (e.g., [20–22]). Our results show that the experiential credibility and the relational credibility in an online environment competes with the professional expertise in shaping people's attitudes. Subsequently, there are certain risks associated with information processing guided by source-related heuristics [39]. One could argue that the digital media environment provides an opportunity for everybody to reflect publicly on the information that we encounter in the mass media or receive from scientists, but there is a significant risk that user-generated content created by lay people may affect risk judgements.

As our data indicates, the perceived credibility of the media did not predict attitudes towards science. The explanation could be twofold. First, we know from previous research that the mainstream media do not regularly report science news [10], and this might lead to an assumption that our results are related to the limited existence of scientific news in the media. But in our analysis, we not only included traditional media but also social media that have proved to be an important source of information about science [32]. Here our results seem to contradict the limited but convincing findings of previous studies, where a positive relationship has been found between the consumption of social media news about science and trust in science (e.g., [40]). We draw attention to this as the ability to recognize reliable science-related sources is related to information literacy. Scientific information is not directly available to most of the population. Even where it is available, for example, as Open science, then not everyone can access and interpret it accurately. Therefore, future research should focus on perceived credibility of traditional media sources, such as the press, radio, and TV, separately from social media platforms.

Previous studies have demonstrated that people who are more interested in science are also increasingly using various social media platforms to look for information about science. It is known that audiences prefer to receive information directly from scientists rather than journalists. Information presented by experts is perceived as more precise, trustworthy, and objective [3]. Such results from the previous research should encourage more active science communication online. However, it should be kept in mind that social media is an environment where disinformation becomes increasingly prevalent, including disinformation about science and scientific findings. Social media are also the space where the audiences are becoming increasingly fragmented since the “filter bubbles” may strongly limit the diversity of information that we as users face. Hence, an important question for future research is how people deal with the cognitive heuristics that are related to social media environments such as the modality, interactivity, navigability, and – most importantly – the agency of the perceived information source [36] when judging the credibility of information about science online.

The perceived credibility of various sources of information is an important predictor of attitudes towards science. However, it only partially explains these attitudes. To address the limitations of this study, other variables could be included in the research design. For example, the need for cognition, openness to experience (personality), ideology, and religion. Although formal education does not appear to be an important factor in this study, the link between education and science knowledge could be explored much more extensively.

To conclude, the role of perceived source credibility is important in shaping attitudes towards science. Both the perceived credibility of science-related sources and the perceived experiential and relational credibility play an important role in promoting science literacy. However, it is not enough that scientists themselves communicate scientific findings to their audiences. Knowing the role of experiential credibility in shaping attitudes towards science, it is important to think about involving opinion leaders in science communication. This is especially important on issues that evoke strong emotions in society such as climate change, vaccination, and GMOs. Scientific communication needs to become more diverse in terms of sources and channels if it is to reach a wider audience.

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Information Literacy, Libraries and Librarians



Connecting New Trends and New Skills for Academic Librarians

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Abstract. Guiding documents of professional associations are revealing the main future trends around the globe in information science. This study seeks to systematize and identify the skills expressed in them and aimed at information professionals. Thus, the content of the guiding documents is analyzed to find the trends for the area, systematizing them in areas of interest. The skills needed by the professionals that emanate from it are identified. In addition, a survey of future professionals (graduate students) is carried out to try to understand what skills are valued in the future performance of their profession. It is noted that it is important to be aware of current trends and recommendations for the sector. Therefore, the preparation of students in information science for the prospects for the future will be more appropriate and meaningful, bringing benefits to themselves and to the academic communities in which they operate, if future librarians in higher education become aware of a changing world in which they will have to act.

Keywords: Information skills · Higher education · Librarians · Professional skills

1 Introduction

Recently, librarians' associations around the world have been reflecting on the professional development of their members. At the same time, researchers and practitioners seek to think and act following the contextual evolution of the profession [1–3]. Growing and diversified information to manage, submerging technologies that need to be mastered, spaces that take on new roles, the growing context of open science, the systematic evaluation of research and bibliometrics, and the multiplicity of requests from users who call for updating their information literacy, require new and updated skills from these professionals. In higher education institutions, whose social mission is to educate future generations, create knowledge, and ensure innovation in all subject areas of the public sphere, meeting emerging trends is imperative. This paper reflects on the current context regarding the competencies of the librarian, specifically those who work in higher education, trying to demonstrate how these competencies should be a response to the new trends. This is verified in the guiding documents of national professional associations [4] and international relevant institutions [5] consolidating and strengthening the daily

professional practices. I added current published studies to the key guidance documents to identify the skills required of information professionals are collected in the key guidance documents and. I clarified the main areas, creating action clusters, proposing an articulation of these with the learning, teaching, and research needs to design a skills map for future librarians. This map can be used in training skilled librarians through being aware of current trends and recommendations for the area. I then administered a questionnaire survey to students in library and information sciences (LIS) to assess their perception of the librarian's new roles and competencies. The results should be motivating factors for academic institutions in their commitment to providing conditions for the continuing education of information professionals, but also for the professionals who are already in the field who must permanently seek their updating.

To this end, I present a two-step investigation. In the first stage, I carried out an exploratory survey of the strategic references emanating from professional associations and national and international organizations related to information professionals. The criteria for choosing the documents to be analyzed were the timeliness and its strategic vocation, that is if they are current and include the explanation of trends in information science. The content analysis of each of the documents made it possible to list a set of skills that professionals must master. In a second stage, I distributed a survey to LIS students undergoing training to become future librarians to understand their perceptions regarding the skills to be developed.

2 Future Trends and Future Skills in Academic Libraries

2.1 Needed Skills for Librarians

Several studies on innovation in academic libraries have already been carried out [6–9]. They all converge on a central idea: the academic librarian's role is fundamental to change and innovation. Whether it is about studies focused on technology and its impact on libraries, organizational structure, or leadership, the key to understanding innovation lies in the vision held by the main actor - the librarian. Academic librarians should, therefore, be encouraged to understand this changing environment as an additional challenge, prepare to face conditions as opportunities for improvement, and assume their central role in this process. To this end, it is important that librarians invest significantly in developing and adapting their professional skills.

The meaning of competence [10] can vary in different contexts and generally refers to the quality of a person's mental or physical abilities. In the professional field, competence is related to a certain ability to do a job, to be successful, to actively participate in actions or processes, or even to interact properly with other people in different contexts.

Librarians' skills have been widely discussed in the professional literature. In Portugal, where there is no formal updating of professional requirements, the guidelines of the defunct European Council of Information Associations [11] continue to prevail, whose Portuguese translation was published in 2005 by the the Portuguese Association for Information Management (Incite). In this guiding document, the five groups of competencies and skills of European information-documentation professionals were formulated:

- Information: basic knowledge of the professional relating to the information documentation;
- Technology: skills related to computer and internet technologies;
- Communication: skills related to interlocution and internal and external communication;
- Management: skills related to budget, project marketing, human resources, training, and pedagogical actions;
- Other Knowledge (specificities).

Twenty main skills were also listed, mentioned as dispositions of spirit, grouped under the following topics: relationship, research, analysis, communication, management, and organization. This document, although dated, remains quite comprehensive, demonstrating that the dynamic environments of libraries does not prevent a certain continuity of required characteristics, as long as adaptation to new and demanding responsibilities is listed as one of these characteristics. In a recent study [12], resuming the international debate around the new skills of the information professional, an intense reconfiguration of the profession has emerged. The idea of the relationship between public and European policies is reinforced given the options and models of teaching existing in universities that train these professionals.

Some years ago, another study reflected on these characteristics [13]. Approximately two hundred job advertisements for the area were analyzed for their employability requirements. Qualifications and skills, were identified and serialized. The most significant areas mentioned by potential employers were certification in information science, work experience, followed by skills in communication, organization, collection management, and teamwork. In addition, competencies were mentioned in the area of user training and the area of digital content management. Also, in 2009, in an observation made in New Delhi [14], academic librarians were asked about their perception of the most relevant competencies for the profession. The competency they identified as the most important was communication, followed by competence with technologies. Management, organization, research, marketing, and negotiation skills were also indicated. Later, some investigations began to focus on the impact of the digital age on the reconfiguration of the skills of information professionals, identifying the contextual changes that demonstrate a more direct impact on the performance of librarians [15, 16]. These works stand out as responses to changes in higher education, technological developments, the nature of academic communication, user obligations and legal issues, along with changes in spaces or the need for collaborative work. In a panoramic and in-depth investigation [17], the study on the skills of librarians is systematized, focusing on more piecemeal works that, in turn, focus on the classifying librarians' skills according to the areas they work in and the roles they assume (management, collections, technologies, reference, among others), proposing, in several cases, a descriptive professional profile.

In 2016, three documents presented partial profiles for information specialists working in academic libraries. The documents issued by the Joint Task Force on Competencies for Librarians in Support of Research and Academic Communication disseminated competency profiles that professionals must develop: from sources management to support new functions, specifically in the areas of academic communication and research in the digital age. Explicit in their general objectives, these profiles will enable library

managers to identify skill gaps in their institution, form the basis of job descriptions, enable professionals to carry out self-assessments, and act as a foundation for the development of training programs for librarians and library professionals. This Task Force brought together representatives from the Research Library Association (RLA), the Canadian Research Library Association (CARL), the European Research Library Association (LIBER), and the Confederation of Open Access Repositories (COAR). In these documents [18–20], it was shown that libraries are at the forefront of digital transformation and digital information infrastructures, in addition to taking on the management and curation of collections and cultural heritage and, therefore, support for research and digital communication. Data management was also included, a task that requires a high level of interaction with researchers and also promotes interaction with other support services, including technicians. Finally, the profiles affirm the library activities that fit into academic publishing services such as open access repository services; advice on copyright and open access; and evaluation of academic resources.

A 2018 study collates the needs of researchers in the field of digital humanities with the profile of the open digital librarian based precisely on the digital ecosystem in which both professionals move, including access platforms, digital files, databases [21]. Both have to know how to handle information and be up to date in areas such as Big data, scientific data, routing, website management, database building, social networks, dissemination, publication, collaborative work, and issues of copyright. In the path of professional updating and preparation for a profession, an investigation points out nine domains of personal competencies that are most relevant to information professionals, namely:

- critical thinking;
- creative thinking;
- interaction & relationship;
- leadership;
- presentation skills;
- media literacy;
- cultural sensitive/intelligence
- effective listener;
- and negotiation skills [22].

These were determined based on the literature on communication and personal skills.

It can be seen, therefore, that given the objectives of academic libraries, libraries continue their mission by updating their roles through their changing context. The evolution of the academic library mission can be seen when looking at the new roles currently played by its librarians. These librarians may be editor of digital academic content; designer of online publications; scientific data librarian; web content specialist; digital preservation librarian; digital humanities librarian; digital repository manager; data visualization coordinator. Therefore, the list of roles involved in supporting digital scopes increases the range of performance of these professionals as they seek to respond to the challenges presented by their users - students, teachers, and researchers [23]. In summary, the analyzed literature reveals an evolution of the profile required of academic librarians, particularly if one considers a diversification and comprehensiveness of their areas

of activity. “This differentiation can benefit the creation, development, and acceptance of new profiles, accelerating the needs of the labor market and, finally, consolidating a vision for information science in higher education” [12, p. 37].

It is evident that updating skills is a challenge for academic librarians. This involves matching new trends in the sphere of information sciences to an updated, diversified, competent, and committed workforce who can meet the expectations of their audiences, scholars, and researchers, while they promote and support the Open Science movement, all in a context of wide change.

3 Methods

3.1 Content Analysis

In the first stage, I carried out an exploratory study of the strategic references emanating from professional associations and national and international organizations related to information professionals’ competencies. I grouped the main trends in academic librarian competencies into performance clusters.

3.2 Questionnaire Survey

In the second stage, I distributed a questionnaire survey to future librarians. This aimed to analyze the perceptions of students of library and information science (LIS) regarding the skills that they thought professionals in the field must develop. The survey enabled me to observe what skills students valued for their learning and those they valued in professionals in practice, particularly those who practice the profession in higher education. The study was confidential and guaranteed the participants anonymity.

4 Results and Discussion

4.1 Future Trends in the Main Guiding Documents

In the first stage of this study, I defined criteria for selecting the documents to analyze. Reviewing their guiding outline and strategic profile enables an understanding of the surrounding environment at a macro level. It means that these documents are recognized, accepted, and potentially adopted by their professionals’ community. They provide these actors with an orientation for their performance since they explain future trends in information, particularly in higher education. Additionally, the documents’ timeliness was confirmed by their chronological scope. I made a global search of this type of documents, checking to verify if they came from countries traditionally designated in reference to academic librarians in Portugal. The results of this research make it possible to list the producer organisms or associations, the documents under analysis, and the countries of origin and their influence area (Table 1).

After this research, I carried out an in-depth reading of each of the documents, extracting the main concepts associated with the core competency domains that librarians have to develop. It became clear that the centrality of the library is associated with

Table 1. Strategic current documents recovered

Org.*	Document	Origin/Influence
ACRL/ALA	<i>Standards for Libraries in Higher Education (2018)</i> http://www.ala.org/acrl/standards/standardslibraries	USA
ALIA	<i>LIBRARY AND INFORMATION SERVICES: The Future of the Profession Themes and scenarios 2025</i> https://read.alia.org.au/library-and-information-services-future-profession-themes-and-scenarios-2025	Australia
CARL	<i>Strategic Framework - May 2019 to May 2022</i> http://www.carl-abrc.ca/wp-content/uploads/2019/06/Strategic-Framework-May-2019-to-May-2022.pdf	Canada
CAUL	<i>CAUL's 2017 - 2019 strategic plan</i> https://www.caul.edu.au/about-caul/strategic-directions	Australia
EDUCAUSE/NMC	Alexander, B., Ashford-Rowe, K., Barajas-Murph, N., Dobbin, G., Knott, J., McCormack, M.,... & Weber, N. (2019). EDUCAUSE Horizon Report 2019: Higher Education Edition (pp. 3–41). EDU19. https://www.lea.rntechlib.org/p/208644/	USA
IFLA	IFLA Strategy 2019–2024 https://www.ifla.org/units/strategy/	World
LIBER	Research Libraries Powering Sustainable Knowledge in the Digital Age https://libereurope.eu/document/liber-strategy-2018-2022/	Europe
REBIUN	<i>Cenários do III Plan Estrategico de REBIUN 2020</i> https://www.rebiun.org/sites/default/files/2017-11/Plan%20Estrat%C3%A9gico%20REBIUN.pdf	Spain
RLUK	<i>Reshaping Scholarship Strategic Plan</i> https://www.rluk.ac.uk/reshaping-scholarship-rluk-strategy-2018-21/	UK
SCONUL	2019–2022 Strategy https://www.sconul.ac.uk/sites/default/files/documents/SCONUL%20Strategy%202019%20-%202022.pdf	UK and Ireland

* ACRL – Association of College and Research Libraries, American Library Association; ALIA – Australian Library and Information Association; CARL - Canadian Association of Research Libraries; CAUL – Council of Australian University Libraries; EDUCAUSE/NMC – New Media Consortium; IFLA – International Federation of Library Associations and Institutions; LIBER - Ligue des Bibliothèques Européennes de Recherche – Association of European Research Libraries; REBIUN -Red de Bibliotecas Universitárias Españolas; RLUK - Research Libraries UK; SCONUL – The Society of College, National and University Libraries.

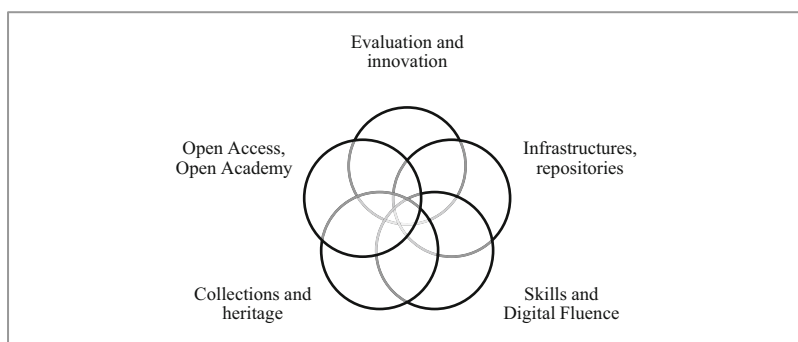


Fig. 1. Core competency domains

learning and research, but the documents also highlight the great themes of open access, the digital environment, content management, and the development of resources and skills of professionals (Fig. 1).

The Open Science movement has definitively transfigured the areas of activity of academic librarians. There is currently talk of openness, in a broad sense, involving open access, Open Science, and open education, to ensure the transparency and reproducibility of science. The impact is visible throughout the research cycle; also librarians must be prepared to continue to support learning and research from research to publication. To this purpose, it will be essential to deal with the need for research and storage and information data, as well as its description, curation, and dissemination. New pedagogies based on flexible and technology-based learning continue to require close monitoring, and it is desirable to ensure digital fluency for professionals and users. Finally, the functions of custody and preservation are not forgotten: the collections remain a hardcore of the librarians' activities; however, its diversity and scope have increased, including, in addition to heritage concerns, the need for inclusion, diversity, connection and reach, so the infrastructure aspects remain highlighted. It is possible to confirm the ideas of some studies [1, 24, 25] that indicate a global tendency to change the focus of action: the shift from centralizing the management of collections and the provision of content to that of service providers and access facilitators. In this sense, "skills of library and information professionals will once again be recognized, especially the ability to detach ourselves from the specific content and instead concentrate on the metadata around it. 'Find, filter, connect' will become the mantra of our profession and organizations will be eager to recruit our members, to help them find a way through the mass of intelligence, which is useless without a guide and interpreter. The most desirable skills will be a combination of information, knowledge and records management" [26, p. 29].

4.2 Perceptions of the Information Skills Needed

In the second stage of the research, I carried out a survey with LIS students undergoing training. The main objective was to understand their perceptions regarding the skills to be developed to prepare for a career in librarianship. The data collection instrument was a questionnaire with three closed questions and an open question, allowing for

quantitative and qualitative analysis. I developed the questionnaire using Google forms and distributed it through my social networks. I sent the survey by mail to a list of university institutions in Portugal over one month, April 2021. The first set of questions were to identify the respondents: gender, age, and study attending degree. The sample consisted of 45 valid responses from the survey, 33 (73.3%) are female, and 10 were male (22.2%); two preferred not to answer. Regarding the degree attended or completed, the students were divided: seven (15.6%) were from an undergraduate course, 13 (28.9%) from doctoral studies, and the majority, 25 (55.6%), from master's degrees.

The second part of the survey included three questions, all quantitative.

Question 1: In 2005, five groups of competencies and skills of European information-documentation professionals were defined. Among these, which ones do you consider to have acquired in your training? And in a professional environment? (Fig. 2).

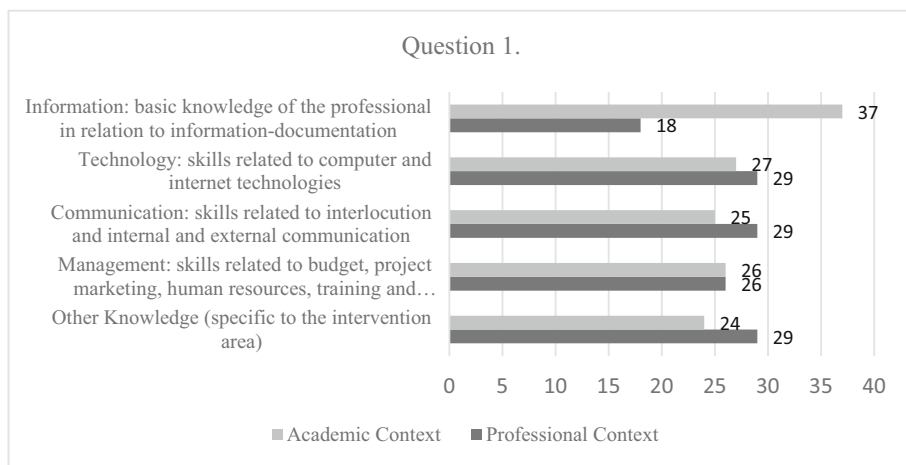


Fig. 2. Acquired skills in academic and professional contexts

Most competency-based approaches are based on the need to train professionals and to establish a profile of skills outside of basic training. In addition to basic training, in order to demonstrate competence it is necessary to have adequate levels of understanding and ability to act in a given environment, that is, a set of knowledge, skills, and attitudes mobilized for high performance in a given professional situation. In the answers to this first question, it is observed that academic competencies are more generic and related to the scope of documentation and information. Those that are preferably acquired in a professional context seem to be related to specific knowledge of a subject area.

Question 2. The World Economic Forum foresees ten areas of competence for professionals in the next decade. From your point of view, which will be the three most important for librarians to develop? (Fig. 3).

In each area of expertise, there are skills required. I asked the the students, to consider which of ten areas of competence they considered to be the most important for the next decade. These areas were inspired by the World Economic Forum [27]. Respondents choose creativity, originality, and initiative first (27, 60.0%); then, analytical thinking

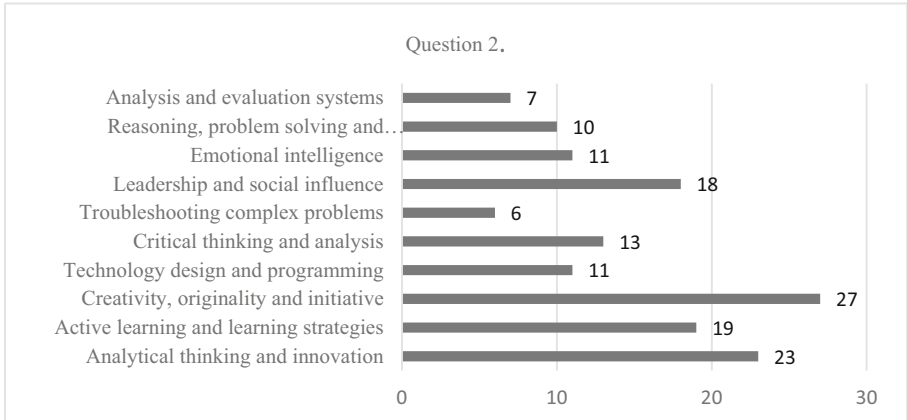


Fig. 3. WEF areas of competencies

and innovation (23, 51.1%); and, finally, active learning and learning strategies (19, 42.2%), closely followed by leadership and social influence (18, 40.0%). All choices are considered to be interconnected with the requirements of areas of expertise emanating from the guiding documents, revealing an alignment and confirming the pioneering, scope, and transdisciplinarity of the information and documentation area.

Question 3. Currently, information management requires professionals who are well prepared to work in different environments. Which area do you choose as the most important, soon, for librarians (particularly those working in higher education), to develop professional skills? (Fig. 4).

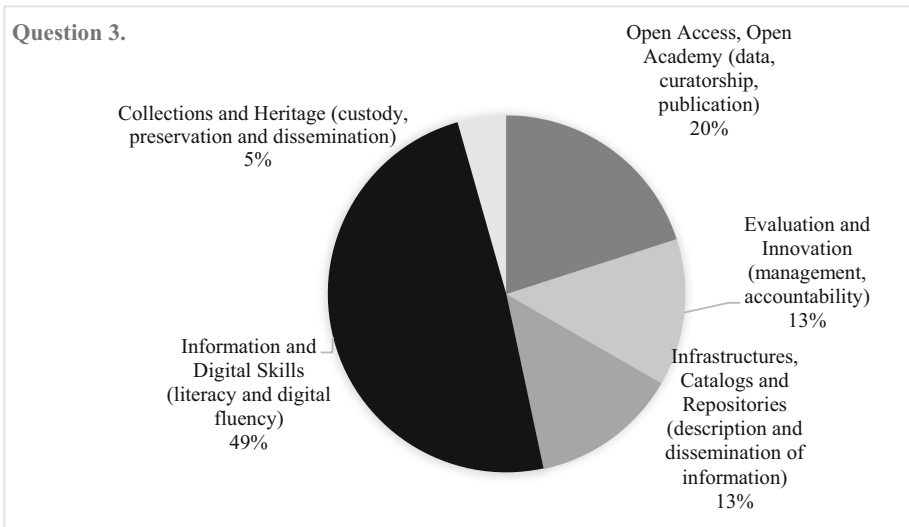


Fig. 4. The most important area to develop

Previously, based on the analysis of the guiding documents, it was possible to reach the five areas of competence for future professionals. In this question, the respondents commented on what they thought was the one that soon needs more investment. The respondents clearly preferred (22.49%) information and digital skills (literacy and digital fluency) as the competency area they felt should be most immediately addressed. The technological areas are highlighted and the issues related to open science and infrastructures appear as the following choices. Future librarians seem to be particularly sensitive to the need to develop skills in these areas. Finally, the third part of the survey included an open question. The qualitative analysis refers to the data obtained from the 9 comments left by the respondents in the space intended for the purpose. The qualitative data show that some students perceived their academic training as too theoretical: “on master’s degree learns theory, but the real world is very different. We lack the practical part, the skill to apply. We feel lost and despite having an academic ‘degree’ seems that in practice we know nothing. In my view there is a huge job to be done in terms of the training professionals, the affirmation of the professional class, their appreciation, and the skills to be developed”. In addition, they criticized the way the curriculum is constructed: “Information and Documentation courses in Portugal are not currently preparing professionals in this area for the challenges of the coming decades in terms of skills. Masters are a distortion of what were the postgraduate courses in the late ‘90s and 00 focussed on a strong technical component. The academic courses are a potpourri of generalities, not deepening the themes that can prepare future librarians to be leaders in their field”. Students also revealed that future professionals will need to develop leadership skills and a strong strategic, technical, and social position and the full ability to show “what they are in the world for”, as we move towards a scenario in which digital literacy should be a basic competence of almost all professionals.

5 Conclusions

Attentive and better-qualified professionals enhance their performance, bringing advantages to the institutions of which they are a part and to the users with whom they deal. Institutions, teachers, and students benefit from the investment in knowledge and learning of information professionals, that is revealed in greater expertise and professional competence in the service, in the answers to the reference questions, in the management of collections, spaces, human resources, and information, in the teaching skills and supporting research in its various aspects. This means knowing in-depth information resources, terminologies, methods, and professional practices, to respond adequately to each request, in addition to a permanent update of transversable skills to all documentation and information professionals that include a visible adaptation to the demands of the Open Science movement and its implications. A very recent study raises concerns regarding the updating and professional development of librarians, but points out some solutions, identifying the need for continuous training on the part of employers [28], the creation of positive and dynamic learning environments, and, above all, participation in cooperation networks and social networks as excellent opportunities for professional growth and updating. The consequences of improving librarians’ skills, which imply keeping abreast of current trends and recommendations for the sector, include tangible benefits in reducing costs, optimizing resources for the management of libraries,

management of knowledge, collections, and information, increasing students' academic success, improving teaching requirements and enhancing the conditions for the production and projection of developed research. These results should be motivating factors for higher education institutions in their commitment to providing conditions for the initial training of librarians, but also for the professionals themselves who must constantly seek to update them. Studies like this should be pursued to contribute to the visibility and influence of librarians but also accountability and commitment to the profession and its impact on higher education.

Acknowledgements. This work is financed by national funds from FCT – Foundation for Science and Technology under UIDB/04107/2020 - Unidade de Investigação e Desenvolvimento em Educação e Formação, Instituto de Educação, Universidade de Lisboa.

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Measuring the Relationship Between IL and Course Grades

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Abstract. There have been many efforts to investigate the relationship between information literacy (IL) skills or library resources and academic achievement in higher education. Yet many instruments researching this important topic are not in alignment with recent theoretical advancements in IL in that they fail to treat IL as situational and context-dependent. This paper describes the preliminary results from the Informed Learning scale, a new instrument intending to measure students' self-perceptions of their ability to learn to use information while also learning disciplinary content. Although self-reporting scales have their limitations, using IL instruments like the Informed Learning scale can provide real insight into the relationship between using information, student learning, and other metrics for academic success. Utilizing results from thousands of students across different disciplines provides actionable insights for instructors, academic librarians, and administrators.

Keywords: Assessment · Informed Learning · IL theory

1 Introduction

A significant portion of library and information science (LIS) literature has investigated the relationships between grades—typically cumulative grade point average (GPA)—and students using library resources or services. Such research generally does not necessarily provide insight into broader, more strategic aims for higher education, like how the use of information enables student learning. Accordingly, we wanted to research the relationship between a student's perceptions of using information within disciplinary courses and perceptions of their learning. There are strong theoretical ties between using information and learning [1]. Yet, difficulties remain in teasing out the contributions of IL to disciplinary student learning. The approach to IL one takes in such an undertaking matters a great deal. Skills-based approaches, while easier to assess, have been succeeded by context-dependent theories of IL. How can we measure such an IL approach? How can academic librarians collect enough data across disciplines to be justified in saying

there are material benefits to students engaging with information in the intentional, sophisticated ways that recent IL theory postulates?

Through deploying a newly developed survey instrument, this research investigates the relationship between IL and student learning by correlating students' perceptions of their ability to use information to learn with course grades as well as their motivation and perceptions of the learning environments. This research builds from a previous investigation that found a relationship between how instructors reported tasking students to use information in their course and students' course grades [2]. While issues exist with using grades as a proxy for student learning and in using a survey instrument to measure a context-dependent approach to IL—this paper argues that to further IL efforts in higher education some pragmatic considerations should be considered. These include the scalability of such efforts across institutions with thousands of students and the prevalence of student success metrics like course grades. We present preliminary findings from a dataset including responses from 6,791 unique students (42% response rate), including exploratory correlations found between student self-perceptions of using information to learn and course grade.

2 Grades as a Measure of Student Learning

Practically speaking, grades are the dominant measure of student academic achievement and aim to assess student learning in a reliable, valid way. Instructors, theoretically, quantify what students have learned or have demonstrated a capacity to learn via grades [3]. One can also re-state this as grades being an epistemological assertion of what or how much students have come to know. This is not intrinsically problematic as one can create systems where students will understand in advance, or even co-create, what you are asking of them and why certain grades are associated with certain levels of success. Many instructors likely find grades to be an imperfect but necessary approximation of student learning. So, grades as a measure of “learning” are replaced with the more qualified term of “achievement,” denoting less of a philosophical commitment and instead simply evidence of what a student has accomplished.

A major concern with grades is that, while intellectual talent is equally distributed across race, class, socio-economic status, and various other ways to categorize students, there are clear achievement gaps that disproportionately affect underrepresented, first-generation, and low socio-economic status students [4]. Efforts to address inequities in student outcomes include the use of frequent low-stakes assignments to encourage transparency about student progress towards intended learning outcomes. Providing students with a choice in how they provide evidence of their learning and/or achievement may work against institutional bias. One example would be to provide a multiple-choice, oral, and written final examination, allowing students to choose the method they prefer. This could be a more valid and equitable way for grades to serve as a measure of student learning and/or achievement. The student as partners movement is also instructive here where students are viewed as partners in a collective learning enterprise and instructors actively solicit their feedback and perspectives. Cook-Sather et al. describe how students can co-construct grading rubrics or use peer-assessment [5].

Pragmatically, when measuring the efficacy of a course of study, a curriculum, or even a college within a university, certain metrics are the best available data at this

scale of assessment given average resources for instructors and administrators. In the aggregate, course grades may give an imperfect snapshot, but a snapshot nonetheless of student achievement in a broad sense. Put differently, grades serve as an imperfect proxy for student learning or academic success. Yet, there is value in grades serving as a proxy. If changes at the individual instructor level concerning student grading and learning practices change, this could still counteract some of the core issues with using grades while also providing administrators strategic insight into student learning across thousands of students. While more student-centered approaches to grading should be adopted, grades continue to be a powerful instrument for HE educators and administrators when it comes to documenting and measuring student academic achievement.

3 The Relationship Between IL and Course Grade

A recent review of IL instruments found 22 different scales, some of the more popular being Project SAILS and the IL Self-Efficacy Scale (ILSES) [6]. While some of these scales draw from different theoretical approaches the vast majority are primarily based in the ACRL *Standards for Information Literacy*, a document that has since been rescinded by the ACRL and generally viewed as surpassed by other theoretical IL developments. Some recent scholarship have developed scales using more contemporary IL theory like the ACRL *Framework for Information Literacy*, but such instruments are still outnumbered by those based on the *Standards* [7]. There is a clear need for more instruments measuring IL in ways that align with recent theoretical developments that view IL as relational and context-dependent as opposed to the binary of whether an individual meets the standard of evaluating information or not. For instance, Lloyd conceptualizes IL as a practice that can only be understood with a social context [8]. Whitworth's critical approach and Bruce's Informed Learning pedagogy treat information experiences and information literacy with equal nuance and complexity, using language not describing skills but instead information landscapes, ecosystems, and experiences.

How one investigates the relationship between IL and student learning varies significantly across using assignment grades, course grades, and cumulative GPA. Some small-scale studies focused on assignment-level performance gains [9] while others focused on course-level grades [10, 11]. Additionally, study sizes ranged from a few hundred students to data from 5,000 students [12] or even 70,000 individual student records [13]. Practical concerns, like limited time one can dedicate to research or access to student data, limits LIS research. Yet it continues to be a legitimate question to ask educators and academic librarians who want to research the relationship between student learning and IL or academic libraries: what is a useful proxy for student learning? Put differently, should LIS researchers focus on assignment grades, course grades, or cumulative GPA? Part of the considerations for the answer should include how academic libraries can make a persuasive argument to stakeholders who may not be as invested in IL. We argue that assignment grades are too small of a target for an administrator needing evidence for broad trends across thousands of students in different majors. On the other hand, GPA is too large a target as there are simply too many variables that have a role in determining GPA, including factors that may come into play before a student sets foot on campus, like socio-economic status and high school academic achievement [14]. IL

scales and other metrics investigating the relationship between IL and student learning should focus on course grade. Doing so provides the scalability required to measure IL across thousands of students while also attaching IL to a metric that is important for HE administrators as they monitor efforts to ensure students graduate on time and are retained year to year. All of these metrics are impacted by course grades.

4 A Scale Grounded in Informed Learning

The scale described in this paper specifically links IL to learning. The scale is underpinned by ‘Informed Learning,’ an approach to IL that views using information as part of the process of learning [1]. Unlike other IL scales that typically measure students’ perceptions of their capability to perform information skills, the Informed Learning scale measures students’ perceptions of using information to learn within disciplinary courses.

Informed Learning draws from research that identifies teachers [15, 16] and learners’ [17, 18] experiences of using information in learning contexts. These studies reveal that experiences of information literacy occur across a range from acquiring information skills, such as locating and evaluating sources, to using information to develop a deeper understanding, or even use information to support a social good [1]. Recognizing this pattern, Informed Learning strives to enable learners to experience the full range of ways of using information that it may be experienced within a learning context.

Informed Learning and a design model that leads educators through a process of creating instruction to enable Informed Learning [1, 19] have been applied in the development of higher education course curricula [20, 21]. From a pedagogic point-of-view, three principles guide informed learning:

- 1) Build on learners previous Informed Learning experiences.
- 2) Promote simultaneous learning about disciplinary content and the information using process.
- 3) Enable learners to experience using information and disciplinary content in new ways [22].

Twelve of the initial set of 16 statements included in the scale are based on the three principles of informed learning, while four statements used on the scale were drawn from earlier research [22]. Questions were also influenced from previous research using thematic analysis to investigate instructor’s experiences of teaching students to use information [23] and quantitative research evaluating the frequency with which instructors tasked students to use information in specific ways [2]. Evaluated on a 7-point Likert scale ranging from 1 (“Strongly Disagree”) to 7 (“Strongly Agree”), four statements aligned with one of the three principles. For example, the statement, “I believe I can learn in this course by using information” relates to the second principle, which emphasizes simultaneous learning about disciplinary content and the information using process. The statement, “My instructor encourages me to use information in new ways to complete assignments” relates to the third principle of enabling learners to experience using information and disciplinary content in new ways.

Applying the Informed Learning scale requires recognition on the part of stakeholders of the significance and benefits of measuring how students perceive using information

to learn within disciplinary courses. If the data are available, any IL scale can be related to indicators of student performance, such as course grades. Grounded in Informed Learning [1], the scale described in this paper aims to ascertain how students perceive the role that information plays in their learning experiences. Going beyond student perceptions of their capability to perform information skills, the Informed Learning scale identifies perceptions of how using information enables the learning of disciplinary content. Relating student responses from the Informed Learning scale to course grades links perceptions of using information to learn with an indicator of course-level student performance telling a more nuanced story.

5 Select Results of a New Informed Learning Scale

We collected data at a large public university in the United States during two semesters in 2018 and 2019. We sent a combined 18,927 surveys to students enrolled in 151 courses that were re-designed through a course transformation program. Assessing the efficacy of librarian involvement in this program was one of this research's goals, although not relevant to the thrust of this paper). A total of 7,992 surveys were completed by 6,791 students, a 42% response rate. We used the "full" 16-item scale for one semester and a "short" 8-item scale the following semester. We used the first semester of data to validate the scale. Initial findings of the analysis from both semesters are recently published [24]. We conducted further analysis using the second semester of data from the short version of the Informed Learning scale after accessing student university records of numerical course grade data.

Student perceptions as reported through completion of the Informed Learning scale displayed a small correlation with student achievement as measured by course grades ($r = .191$, $p < .001$). Results of an exploratory study of more than 6,700 students indicate that students who self-reported low or high ability to use information to learn correlated with higher or lower course grade. These findings do not provide evidence of a causal relationship but do justify further research using course grade data. Study results also found moderate relationships between student perceptions of how they used information to learn in a disciplinary context and student perceptions of their learning climate and self-determined motivation. Given educational psychology scholarship providing evidence for the importance of learning climate and self-determined motivation for academic achievement, these results further support the possibility for a positive relationship between IL and student learning.

Interestingly, our analysis did not reveal significant differences between students in various demographic groups. We ran an independent t-test to compare Informed Learning scores between international students ($N = 1102$) and domestic students ($N = 6890$). We found no significant differences between international students ($M = 5.31$, $SD = 1.10$) and domestic students ($M = 5.34$, $SD = 1.10$) on the Informed Learning Scale ($p = .42$). Additionally, there was no correlation between age and IL ($r = .016$, $p = .203$); specifically, no significant difference between 18–19 age group ($M = 5.32$, $SD = 1.06$) and 20–22 age group ($M = 5.34$, $SD = 1.14$; $p = .522$). Our analysis also found no significant differences between students from marginalized groups ($M = 5.37$, $SD = 1.14$; $N = 521$) and students from non-marginalized groups ($M = 5.33$, $SD = 1.10$; 6101;

$p = .452$). The lack of significant differences may be surprising given that IL scholarship has identified varying experiences and needs of students across demographic groups, and merits further investigation. This could include gathering data from multiple universities using the informed learning scale quasi-experimentally with matched student samples, and so on.

Our findings suggest that the Informed Learning scale may act as a proxy where no other IL evaluations are possible for measuring the efficacy with which students learn to use information to learn in a disciplinary context. The results warrant further use of the Informed Learning scale in varied institutional and educational contexts, both as a standalone instrument as well as used in conjunction with other instruments measuring such variables as learning climate and motivation.

6 Implications for IL and Academic Libraries

The Informed Learning scale provides academic libraries with a tool for sharing data that may be of interest to a broad audience by allowing a comparison of student perceptions of using information to learn with student learning outcomes as defined by grades. It should be noted that to date the scale has only been applied in courses in one research university in the United States. More research is necessary to provide further evidence of the scale's ability to accurately measure students' perceptions of using information to learn. In the initial pilot project described in this paper, the scale was completed by 6791 unique students (42% response rate) enrolled in 151 courses, which contrasts with other IL scales that tend to be implemented in one course or a sequence of courses. The project described in this paper specifically focused on measuring the relationship between IL and course grade at scale. Measuring IL at scale is integral for the aim of determining how well IL contributes to or supports student learning. No matter how reliable, valid, and insightful an instrument might be, if it is only useful to measure a small percentage of the student population it will not provide actionable data for educators, academic librarians, or administrators who all balance competing priorities and limited resources.

There is precedent for investigating the relationship between course grade and IL (see [9, 10, 25]) although such studies typically portray IL as separate from the disciplinary context in which it is being used. In linking IL to measurements of student learning such as course grades, the Informed Learning scale may be used in a variety of ways to address specific assessment needs. Course-level findings from the Informed Learning scale could be shared with individual instructors, who may use them to refine learning aspects of the course such as learning outcomes, assessment instruments, or classroom activities. Academic libraries may want to relate findings from the scale to interventions such as instruction provided by librarians. This could be achieved in several ways, for example by comparing responses to the scale from students in courses that received instruction from a librarian with those that did not. If implemented in a pre-/post- fashion in which students complete the scale before and after undergoing instruction, the data collected could shed light on changes to students' perceptions of using information to learn as a result of instruction. The scale could also be used longitudinally to track large cohorts of students' perceptions of using information to learn as they advance through a curriculum. While this study discusses a single analysis of the possible relationship between IL and

student learning as measured by numerical course grade, it provides proof of concept that such a scale can provide some insight for decision-makers across a broad swath of students.

It is worth noting that the Informed Learning scale could also be related to other important metrics to student academic achievement, like motivation or student engagement. Autonomy-supportive learning environments tend to be more motivating to students and through decades of research are linked through research to positive student outcomes ranging from persistence to academic achievement [26]. Given the complexity of HE learning environments it may be useful to investigate the intersection of IL, student learning, and student motivation by analyzing the three concepts together to yield greater insight for academic librarians, educators, and administrators about how to best enable student learning.

The importance of IL may be communicated more clearly when seen considering a strategic goal that campus stakeholders find valuable. A strategy for success of IL programs is to join efforts with key teaching and learning initiatives on campus [19]. To focus on library resources alone, devoid of a larger strategic and institutional context, is myopic as many HE educators do not see the intrinsic value of IL in a pedagogical context. Moreover, academic libraries are an under-utilized pedagogical resource. They are capable of providing sophisticated faculty development efforts and can embrace the role of a fellow educator, offering instructors far more than insight into navigating information resources but also ideas for how to enable students to use information to learn disciplinary content [27, 28]. This does not necessarily need to be burdensome. One strategy for the implementation of the scale may be to partner with other campus organizations to add the Informed Learning scale to an existing student survey. This may allow for a comparison between the findings from the Informed Learning scale and relevant findings from other surveys focused on student perceptions of aspects of their learning, such as motivation and engagement. The scale could also be used to work with an individual department or course of study, again through being attached to existing data collection efforts rather than serving as a standalone instrument.

The Informed Learning scale provides a tool for administrators, both internal and external to an academic library, to better determine and communicate the value of academic libraries in furthering student learning across curricula. While additional use and analysis is required for the informed learning scale, it demonstrates the feasibility for the utility of investigating IL in relation to course grade. Embedding the scale in an educationally purposeful way, linked with other student data, may provide an opportunity to demonstrate to instructors and fellow educators the value of IL in enabling student learning. IL may be valuable for its own sake, but it becomes more valuable when related directly to an important institutional goal like student learning.

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Is There a Librarian 4.0 in the Library? A View on Librarians' Knowledge and Skills in Light of Industry 4.0 and Education 4.0 Paradigms

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Abstract. As more aspects of our lives have been transformed into digital dimensions, different professions have become aware of their potential deficiencies in knowledge and skills necessary for participation in the Industry 4.0 paradigm. This paper focuses on librarians in public libraries in Croatia, one of the crucial professions for development of society in general. Their job requires constant updating and expansion of knowledge and skills to stay relevant in the digital society to serve better library users with whom they interact daily. This paper presents the results of the research study carried out in public libraries in Croatia about knowledge and skills necessary for participation of librarians in their daily interactions with the library material, interaction with library users and development of librarianship as a profession. The results of the research study would help universities in redesigning curricula in accordance with Education 4.0 and Industry 4.0 paradigms.

Keywords: Public libraries · Librarians · Long term knowledge acquisition · Workforce education · Education 4.0 · Industry 4.0 · Croatia

1 Introduction

As more and more aspects of our lives now have digital dimensions [1, p. 104] individual members of the society and whole professions have become aware of their potential deficiencies in knowledge and skills, limiting their abilities to participate in the growing digital society. New knowledge and skills have become essential to everyone because of the recent and frequent changes in many work processes and information and communication technology “set to drive future growth across industries, as well as to increase the demand for new job roles” [2, p. 27]. The new and diverse internet related technologies already have made great impact on education of people because only qualified and highly educated employees will be able to control them [3]. As a result, the global job market has been shifting, in search of highly educated and specialised workforce [4]. This paper focuses on librarians in public libraries in Croatia, a profession crucial for long-term development of society whose job requires constant updating of knowledge and skills including different types of literacies to remain relevant partner in the society based on Industry 4.0 and Education 4.0 paradigms.

2 Industry 4.0

Industry 4.0 is synonymous with the Fourth industrial revolution (4IR) and is “characterised by the parallel development of a swath of seemingly independent technologies, each with world-changing potential” [5, p. 506]. In industry 4.0, people, machines and products communicate with one another via the internet, and this means the convergence of industry and internet technology [6]. Industry 4.0 is frequently described as influenced and driven by disruptive technologies [5].

Industry 4.0 implementation will require a shift of skills towards industries which will gain more importance in near future: r&d and human interface design, IT and data integration, logistics, robotics and automation, sales and services, design and setup etc. Some jobs will be lost, but new ones will be created [7]. Schwab [8], the inventor of the term Industry 4.0 proposed four different types of intelligence to help us adapt, shape and harness the potential of disruption to come:

- 1) contextual (the mind) – how we understand and apply our knowledge
- 2) emotional (the heart)
- 3) inspired (the soul)
- 4) physical (the body).

Industry 4.0 is now partially implemented, and much more is yet to come. This is why the process of change in many sectors and industries will last long, and it will provide enough time for individuals to acquire necessary knowledge and skills, including information literacy as one of the core skills.

3 Education 4.0

Industry 4.0 creates a demand for high-quality education in quantitative terms and innovations in curricula including use of smart technologies [9]. The latest educational paradigm is called Education 4.0. Education 4.0 is believed to be a response to the needs of Industry 4.0 where humans and technology are aligned to enable new possibilities [10] and can be described by use of nine trends [11]. Education 4.0 aims to generate new professionals who will be highly competitive and can respond to the needs and challenges of today and the future [12]. The World Economic Forum’s published report “The Future of Jobs Report 2020 [2] listed the top 15 skills for the year 2025 and the European Commission published a document, “Curriculum Guidelines 4.0 Future-proof education and training for manufacturing in Europe” in 2020 [13] to help the educational sector prepare new curricula that will support Industry 4.0. Due to the page restriction, trends, groups of knowledge and skills mentioned in this part of the paper can be found in sources listed at the end of this paper. Information literacy should not be left out of these lists as it is one of the core skills necessary for the ability of an individual to work as part of Industry 4.0. Information literacy is focused on digital disruption fundamental to Industry 4.0 because individuals need to be skilled to deal with a lot of digital information possibilities [14, 15]. In this paper information literacy was not explicitly researched but subsets of various concepts and theories of information

literacy were included in the research. Generally speaking, Education 4.0 should help in achieving the goal of advancing knowledge and skills for Industry 4.0 at universities by redesigning curricula in line with the Industry 4.0 demands [16]. There are many examples of organizations across the globe which will benefit from Education 4.0. The next part of the paper introduces one such organization, public libraries in Croatia and their views and attitudes on current knowledge and skills necessary for their daily work, and development of librarianship in the existing and new societal conditions.

4 Public Libraries in Croatia

According to the Croatian bureau of statistics, in 2019 in Croatia there were 1814 libraries (of all types), and there were 4214 persons employed in these libraries [17]. As important employers in Croatia, libraries expect their employees to have the knowledge and skills necessary for daily work and the future development of libraries and librarianship. Most librarians in Croatia acquire their knowledge and skills during their formal education at three universities: in Zagreb, Osijek and Zadar (all in Croatia). After the end of their formal education, librarians continue their education either by taking short courses in the Centre for continuing education of librarians (as part of the National and university library, Zagreb, Croatia), participate in conferences, workshops, and other forms of additional knowledge acquisition. As current views and attitudes of librarians on their duties and knowledge and skills necessary for fulfilling the duties are unknown, a research study was initiated.

5 Research Study in Public Libraries About Librarians' Views and Attitudes on Knowledge and Skills in the Context of Education 4.0 and Industry 4.0 Paradigms

The purpose of the research study in this paper was to find out whether public libraries in Croatia have been active in keeping track of changes in their own needs for additional knowledge and skills necessary for active participation in Education 4.0 and Industry 4.0 paradigms. Public libraries are deeply integrated in the society in Croatia and as such, they offer their holdings and services to users for their personal and professional development. To do so, librarians themselves must possess adequate knowledge and skills. The main hypothesis of the paper was that though librarians possess adequate knowledge and skills necessary for fulfilling their professional duties, they still need to consider acquisition of new knowledge and skills if they want to remain active and relevant members of the future society. The results of the research study would help universities in Croatia that are educating librarians, in redesigning their curricula. An online questionnaire with 12 questions was chosen as the principal research method. The collected data were then analysed by use of descriptive statistics. The invitation for participation in the research study was sent to public libraries in Croatia by e-mail aiming at the heads of libraries as principal participants in the research study. Portal of libraries in Croatia at <http://www.knjiznica.hr> [18] listed 219 public libraries and this number was used as the starting point for collecting data about public libraries in

Croatia and their e-mail addresses. Not all of 219 public libraries had public e-mail address listed in the Portal. Google was used to find the missing e-mail addresses as well as to find additional e-mail addresses of public libraries, because some public libraries had multiple official e-mail addresses read by heads of libraries. The total of 369 e-mail addresses were collected and invitations for participation in the research study were sent on April 15th 2021 with the closing date for participation on April 26th 2021. The total of 131 answer sets were collected, representing 59.82% of all public libraries listed at the Portal of libraries in Croatia.

6 Findings

6.1 Length of Service in the Library

The first question aimed at collecting data about length of service of the respondents ($N = 131$). The median value of length of service was 19.5 years, and the average length of service was also 19.5 years. Both values indicate that the librarians who participated in this research study had substantial experience of work in libraries.

6.2 List of Duties in Library

Table 1. List of duties of a librarian in a library (multiple answers were possible) ($N = 130$).

	N	%
Work with users	93	71.5
Library material processing	75	57.7
Library management	72	55.4
Library material acquisition	68	52.3
Public relations	60	46.2
Technical preservation of library material	46	35.4
Other	23	17.7

Other duties in public libraries: job related to managing library finances (2), organizing cultural events, educational events and different library programs (6), services for monitoring, supervision, providing professional help and advice (4), and at least five other jobs (5), organizing workshops (3), head of a department (1), EU projects (1), head of a collection (1).

The number of duties of a librarian in a public library depends on the size of that library and the number of librarians. In case of very small public libraries with a single librarian employed, he or she performs all duties by himself/herself. In public libraries with a large number of employed librarians, allocation of duties is a common thing. Every librarian in every library in Croatia (regardless of its type) has multiple duties

which he or she fulfils during their daily work and these duties are usually listed in the document about the internal organization of work in a library. The results in Table 1 indicate that the respondents have multiple duties in their public libraries, mostly related to typical library activities.

6.3 Knowledge and Skills Important for Performing Daily Duties

Table 2. Knowledge and skills important for performing daily duties (multiple answers) (N = 130)

		N	%
1.	Responsibility in work	119	91.5
2.	Communication skills	116	89.2
3.	Organizational skills	115	88.5
4.	Learning new things	115	88.5
5.	Problem solving	111	85.4
6.	Social skills	110	84.6
7.	Creativity	106	81.5
8.	Finding, organizing, and searching information	104	80
9.	Independent work	103	79.2
10.	Planning skills	101	77.7
11.	Teamwork	101	77.7
12.	Flexibility	100	76.9
13.	Media literacy	99	76.2
14.	Critical thinking	98	75.4
15.	Personal computer functioning skills	94	72.3
16.	Data analysis	75	57.7
17.	Interpersonal skills	74	56.9
18.	Knowledge transfer	73	56.2
19.	Networking	73	56.2
20.	Time management	72	55.4
21.	Working under pressure	71	54.6
22.	Analytical thinking	69	53.1
23.	Leadership	67	51.5
24.	Cooperation in virtual environment	63	48.5
25.	Statistical knowledge	59	45.4
26.	Cognitive load management	42	32.3

(continued)

Table 2. (continued)

		<i>N</i>	%
27.	Design	42	32.3
28.	Programming	12	9.2

Table 2 presents a long list of knowledge and skills necessary for performing daily duties in public libraries. None of these knowledge and skills are exclusive or brand new to librarians. Knowledge and skills in Table 2 are ranked according to the importance to librarians and this ranking could and will change in time as new duties and activities are designed.

6.4 Estimation of Knowledge and Skills Adequacy for the Librarian's Current Job

Table 3. Estimation of knowledge and skills adequacy for the librarian's current job

	1 completely inadequate	2	3	4	5 completely adequate	Total (N)
Librarianship	0	2	8	56	54	120
ICT	0	5	25	64	35	129
Management	4	23	46	43	13	129
Scientific research	12	37	53	23	4	129
Communicating	1	1	12	50	67	131
Interpersonal skills	1	2	25	63	39	130
Group/Teamwork	0	4	18	42	65	129
Digitization	19	34	38	32	6	129
Digital resources development	8	32	55	27	7	129
Managing library finances	8	20	35	50	17	130
Marketing	3	22	49	44	10	128

Results in Table 3 show areas of knowledge and skills still less than ideally acquired by the librarians. These areas include management, scientific research, marketing and even digitization and digital resources development, usually very popular among librarians generally. Data in this table are pointers for the universities educating librarians to redesign their curricula to the needs of the library practice.

6.5 Opinion About Influence of the Labor Market Changes and Need for New Knowledge and Skills on the Duration of the Formal Education

Table 4. Opinion about influence of the labor market changes and need for new knowledge and skills on the duration of the formal education (N = 130)

	<i>N</i>	%
Too short	16	12.3
Adequately long	96	73.8
Too long	18	13.8

The duration of formal education is a frequently posed question in public communication of many employers in Croatia to the higher education sector. Some employers consider formal education being too long and inadequate for demands of the today's labor market. Most respondents in this research study (Table 4) thought that the formal education (for librarians) was adequately long.

6.6 Opinion About How Fast Librarian's Knowledge Necessary for Doing Daily Work Becomes Obsolete

Table 5. Opinion about how fast librarian's knowledge necessary for doing daily work becomes obsolete (N = 131)

	<i>N</i>	%
1 It becomes obsolete shortly	9	6.9
2	18	13.7
3	76	58
4	24	18.3
5 It will not become obsolete at all	4	3.1

Obsolescence of knowledge is one reason why employers lobby for shorter duration of formal education. This is also the reason why librarians were asked about their opinion about obsolescence of their knowledge. The distribution of answers (opinions) in this question (Table 5.) indicate that librarians chose the middle value which means that their knowledge did not become obsolete quickly or they managed to avoid knowledge obsolescence completely.

6.7 Opinion About How Often Should Librarians Receive Additional Education

Following the question of obsolescence of knowledge, this question aimed at collecting data about the frequency of receiving additional (post-formal) education. According

Table 6. Opinion about how often should librarians receive additional education (N = 131)

	<i>N</i>	%
Several times a year	93	71
Once a year	31	23.7
Once in two years	4	3.1
Less than one in two years	3	2.3

to the data in Table 6. The respondents decided that additional education should be received several times a year. The next question offered specific answers about additional knowledge and skills that would serve librarians well after the end of formal education.

6.8 Additional Knowledge and Skills that Would Serve Librarians Well After the End of the Formal Education

Table 7 offers data about additional new knowledge and skills that would serve librarians well after the end of formal education. The first three positions in the table include librarianship (new knowledge, new skills), ICT and development of digital information resources. Additional knowledge areas and skills were represented less frequently in answers, nevertheless, they were all recognized by the respondents and are significantly represented.

Table 7. Additional knowledge and skills that would serve librarians well after the end of the formal education (multiple answers) (N = 131)

	<i>N</i>	%
Librarianship (new knowledge, new skills)	108	82.4
ICT	108	82.4
Digital information resources development	94	71.8
Digitization	93	71
Marketing	91	69.5
Communication	71	54.2
Finances	65	49.6
Scientific research	60	45.8
Information institution management	59	45
Interpersonal skills	54	41.2
Group/Teamwork	51	38.9
Other	6	4.6

Other: everything enumerated in the list (1), publishing (1), not specified/answer to broad (2), pedagogy (children) (1).

6.9 Opinion Whether Libraries Can Be Part of the Digital Society

Table 8. Opinion whether libraries can be part of the digital society (N = 131)

	<i>N</i>	%
Yes	130	99.2
No	1	0.8

Almost all participants in the research study agree that libraries can be part of digital society. Public libraries are already active participants in development of the society in general. By acquiring new knowledge and skills (Table 8) libraries will remain a relevant social partner in the digital society.

6.10 Opinion About Working Environment Adapting to the Technological Development of the Society

Table 9. Opinion about working environment adapting to the technological development of the society (N = 131)

	<i>N</i>	%
Yes	86	65,6
No	28	21,4
I do not know	17	13

Another question in this research study was related to the adaptation of librarians' working environment to the ongoing technological development of the society. About two thirds of participants in this research study (Table 9) thought their working environment was adapting to the technological development of the society preparing public libraries to stay relevant institutions in the future.

6.11 Opinion About the Ability of Librarians for Participation in the Digital Society Based on Their Knowledge Acquired During the Formal Education

This question aimed at collecting answers about librarians' ability to actively participate in the digital society. More than half of the participants confirmed that they would be able to participate actively in the digital society (Table 10). However, one-fifth of the respondents needed some type of support to face future challenges of the digital society.

Table 10. Opinion about the ability of librarians for participation in the digital society based on their knowledge acquired during the formal education (N = 131)

	<i>N</i>	%
Yes	76	58
No	27	20.6
I do not know	28	21.4

6.12 Familiarity with the Term Education 4.0 Linked with the Term Industry 4.0?

The final question aimed at finding out whether participants (N = 131) were familiar with the term Education 4.0. 62.6% (N = 82) of the participants were not familiar with this important term representing the new paradigm of education aiming to generate new generations professionals including librarians. 37.4% (N = 49) were familiar with the term Education 4.0.

7 Conclusion




Industry 4.0 has created demand for high-quality education, asking for constant updating of knowledge and skills from different social groups to stay relevant in the labor market. The focus of this paper was on librarians in public libraries in Croatia, a large group of professionals whose job is highly dynamic and requires frequent updating of different sets of knowledge and skills. Public libraries are deeply integrated in every change of society in Croatia and as such, they offer their users content, services and activities preparing them (among other things) for Industry 4.0 paradigm. To do so, librarians themselves must possess adequate knowledge and skills. The research study in this paper tested the hypothesis that even though librarians in public libraries in Croatia possessed adequate knowledge and skills necessary for fulfilling their professional daily duties, they still needed to consider acquisition of new knowledge and skills related to Education 4.0 if they want to remain a relevant partner in the future society to come. The results of the research study in public libraries in Croatia confirmed librarians' possession of adequate professional knowledge and skills necessary for performing their daily duties. The results also indicate librarians' awareness of the necessity of knowledge and skills update to stay relevant in the changing environment. The research also shows that formal education (for librarians) is adequately long which is also an important indicator to claiming that formal education in general lasts too long. The respondents in this research study also confirmed the longevity of their knowledge which, as they think, did not become obsolete shortly after the end of formal education, but they were also aware that they will not be able to avoid knowledge obsolescence completely. New knowledge and skills would include librarianship (new knowledge, new skills), ICT and development of digital information resources. Another important result of this research study was the opinion of public libraries that their working environment is adapting to the technological development of the society, that is, that they are not left out of the development cycles in society and that they can be part of the digital society.

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Improving Wayfinding in a UK Higher Education Institution Library

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Abstract. This paper provides an analysis of ShelfMap, an online wayfinding tool which was the centrepiece of a mixed methods case study which aimed to improve understanding of the information practice of students interacting with classification schemas in order to find material in the stacks. It measured changes in wayfinding skill levels resulting from the introduction of ShelfMap to a UK Higher Education Institution (HEI) library. There was a 39% time saving to find the correct stack which held the item sought and a 33% time saving to find the item itself. Locating the stack was found to be more difficult than finding the item itself, so this time saving is encouraging. A reduction in anxiety levels was also detected suggesting a more positive relationship between the students and their environment had been fostered. There are recommendations on how libraries can improve their wayfinding and boost students' information literacy.

Keywords: Wayfinding · Self-efficacy · Impact

1 Introduction

The research which led to the creation of ShelfMap emerged as a result of the researcher's observation as a member of a university library's helpdesk team that students had difficulty finding items on the shelf. A prototype wayfinding system was deployed to try to assist such users. It was well-received by students and staff alike and it was felt that research into this area would be beneficial.

ShelfMap, a wayfinding app, was developed to reduce the barriers to access that students experienced by providing three-dimensional images of the location of a stack in the space which contained the item which was being sought. It was developed by one of the authors of this paper, who had previous programming experience. It was installed at the academic library of Goldsmiths, University of London, a UK Higher Education Institution which specialises in creative arts subjects. A hypothesis was made that the impact of introducing an online wayfinding App would positively change the experiences and ability of students to find items on the shelf following its introduction. A further aspect of the research concentrated on identifying study level differences which may persist in this area.

The objectives of the research were to review and critically assess the literature in order to understand wayfinding issues and approaches to resolve them; to assess the impact of students' experience and study level on their ability to find material located in the online catalogue; to explore the impact of introducing a wayfinding App with physical signage on the ability and perceived experience of locating such material; and to indicate the study's contribution to the field, making recommendations for future research.

2 Literature Review

Wayfinding is the specific area of information behaviour that was being examined. Mandel [1, p.116] describes wayfinding as:

'The ability of users of the built environment (i.e., a facility) to navigate through that environment to find specific destinations.'

More specifically, it relates to the information gap or Anomalous State of Knowledge [2] which can appear when someone seeks information. It also touches upon information use [3] in respect of the many paths that may be taken to retrieve information. With respect to information literacy, how users become information literate and the impact of context (for example being a student at a university) [4] is of relevance. Digital literacy is also relevant and the use of wayfinding tools is an example of the changing nature of this term over time [5].

Both Mandel [1] and Hahn and Morales [6] observed that humans can find wayfinding stressful or frustrating. Schmidt [7] found that it can lead to heightened anxiety for library users. Levels of self-efficacy could also be harmed, a situation in which individuals' thoughts and feelings can potentially affect their actions (Bandura [8, p.543]). A link between low self-efficacy and an avoidance of challenging activities correlating with less inclination to develop information literacy competencies [9] is also of relevance in wayfinding.

Evidence of user confusion in finding physical items was discovered, ranging from it being a popular help desk question [10] to the frequency with which shelving assistants are asked for help in this area [11]. Kress [12] has noted that confusion starts early on, with a lack of understanding of what a classmark is for and a desire for that information to be a clickable link in the library catalogue, leading to further help. Murphy [13] has found that students find it difficult to decode classmarks and McKay and Conyers [15] state that Bowker and Star [14] noted that confusion arose from a lack of collocation between related items (e.g. a book and its accompanying CD).

Building navigation difficulty has long been recognised as an issue [16] and has led to techniques being created for identifying pinch points in the library's navigation using the technique of spatial syntax [17]. This allows a library's space to be better configured for easier connectivity by identifying areas of higher and lower visibility.

On the theme of improving navigation, various suggestions have been made ranging from removing the Dewey Decimal system altogether [18] to improvements in signage [19–21]. Schmidt's research [22] adopted a user-experience focus and described using "touch points" - the places on their journey where customers get assistance, such as a Service Desk.

Basic forms of virtual wayfinding have also been considered and in use for some time. Li and Deng [23] used maps in a library catalogue, something which has become more common over the last decade. More sophisticated solutions using technologies such as Wi-Fi, Geographic Information Systems (GIS), Global Positioning Systems (GPS), Radio Frequency Identification (RFID), Optical Character Recognition (OCR) and QR code technology have all been considered but have not perhaps developed as far as one might expect. One of the common issues in wayfinding for physical items is a lack of granularity. Xia [24] proposed a paper-based blueprint for a wayfinding App recognising that the level of granularity achievable (for example identification of the exact item via GPS) is linked to both the maintenance overhead and the accuracy of the result. The latter may be compromised due to shelf-level classmark boundaries shifting over time. In terms of hand-held devices, Hahn and Morales [6] carried out research on using a mobile website for wayfinding and found that it was positively received and the participants supported further development of it.

There was a dearth of information in the literature about differences between undergraduate and postgraduate student level issues relating to wayfinding, but more about the benefits of experience of using libraries. Zaug et al. [25] compared novices and experts drawn from the undergraduate group and found that it did not take much experience for the skills gap between novices and experts to dramatically reduce.

3 Research Methods

A mixed methods case study approach was taken using the format of a specifically designed case study incorporating an ethnographic element. This allowed for a more detailed focus on the practical application's use in the field and was felt to be the most effective way to achieve the objectives of the research. Reassurance that this decision was correct was gained from similar approaches taken by other researchers in the field [20, 26]. Indeed, Mandel's investigation of wayfinding in a library used a case study approach because it helped to 'understand a particular setting in its entirety' [26, p.65]. The setting was a single-site academic library with three floors and 212 stacks containing the open access print collections. The main components of the current study [28] are as follows:

A short online survey was delivered via the Qualtrics web software system in order to establish a base line understanding of our target audience's characteristics and an indicative view of their broad perceptions about finding material on the shelf.

The main technique used was semi-structured interviews which Galletta and Cross have described as 'lived experiences as narrated in the interview in relation to theoretical variables of interest' [28, p.9]. Convenience sampling of six subjects representing the 8,525 FTE students at Goldsmiths was used. These were recruited via university noticeboards with a small gift voucher incentive. Efforts were made to recruit an even number of undergraduate versus postgraduate students and at differing stages of their courses. There were four female and two male volunteers. Three were undergraduates and three postgraduates.

The sessions incorporated a field exercise in which the participant was asked to find four items in the library – only two of which allowed for the use of the App. This was

a technique successfully used by Lanclos [29], who recommends that librarians adopt this technique to help us think about how we use technology to engage users. The use of concurrent think-aloud (CTA) protocol where the user verbalizes what they are doing during a task was adopted, in part because it had been successful in one of the key wayfinding studies [20].

The embedding of the field exercise within the semi-structured interview was deliberate in order to allow comparisons of levels of self-efficacy before and after the exercise. The same scale to measure self-efficacy that had been used before for information literacy work [30] was used here. In particular, in Kurbanoglu et al.'s 28 point scale, C8 "locate information sources in the library" was the one most closely matching this study [30].

The interviews, which were recorded on audio with consent of the users, were later coded into themes for analysis via an iterative process as described by Tracy [31]. The main themes chosen included wayfinding barriers, study level and familiarity, specific information literacy skills, ability, experience, seeking assistance and self-efficacy.

The ShelfMap app itself was installed for use by all Goldsmiths' library users over a four month period and the log files examined for overall usage. Finally, library staff feedback was elicited in order to provide an alternate perspective and see if the results were confirmed by their experiences as providers of the library service.

In terms of external validity, immediate generalisation was sacrificed for depth. Mandel [1] recognised that there is a potential for the obtrusiveness of the researcher to inhibit the user. In order to mitigate this during the field exercise, this was sequenced to run after the first part of the semi-structured interview in the hope that trust would have been developed between the researcher and subject. Wolff [32] has found that levels of dyslexia amongst art students are significantly higher than average, and as Goldsmiths is an institution which specializes in art, it was therefore relatively more likely that the sample would include such students. Whilst it was not within the scope of this study to investigate the ways that dyslexia may affect wayfinding, participants could opt to share this information should they wish to.

4 Findings and Discussion

4.1 Survey

The online survey was answered by 69 students (roughly divided between undergraduate and postgraduate). 58% stated that they were in the first year of their course at Goldsmiths' and 52% used the library once a week or more. 74% felt confident about finding books on the shelf.

26% had received information literacy training at the university related to the finding of items on the shelf, but slightly more that had never received any such training. Larsen and Tatarkas's study [21] has noted that only 30% of students attended induction sessions which showed how to read a classmark, suggesting that these figures were likely to be accurate.

The training that was provided was perceived to be either too quick ('[the induction] was so fast I couldn't remember what we did afterwards and you probably needed to

do it three times’) or unnecessary, for example, where a postgraduate may already have received such training before at another institution and felt that attending would be an unproductive use of their time. One user stated that they felt training on finding books ‘could not be taught’ and that he had learnt to do this ‘by osmosis’.

No interviewees stated that they had received formal instruction on how to use libraries before reaching university in relation to finding books or using a classification system. This echoes the findings of Murphy et al. [13] who found that training on finding materials in libraries was often lacking.

In terms of seeking help, the majority of users (over 50%) stated that they do so if unable to find an item (Fig. 1).

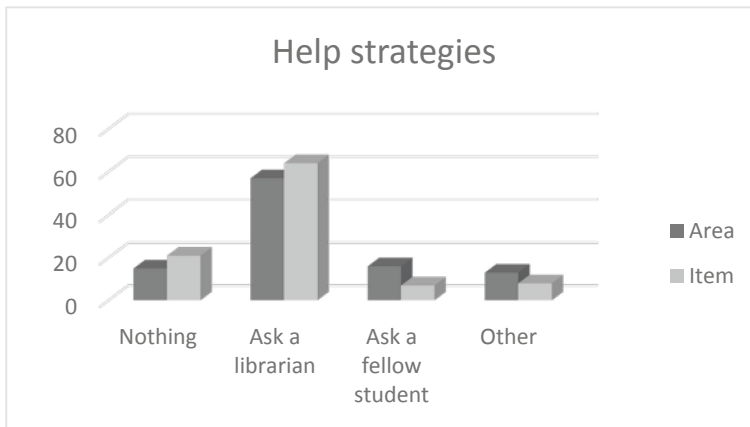


Fig. 1. Help strategies used by students looking for items on the shelf

4.2 Experience and Study Level

The transition from using public or school libraries to using higher education libraries was described as challenging by the participants. For example:

‘...when I first came to an academic library, I really couldn’t make head or tail about how it worked’. (Participant B).

Some postgraduate participants reported avoiding the library stacks in all but their final year of a course, whereas others felt comfortable sooner. The wide and contrasting range of views given make it difficult to say much more than that there seems to be a relationship between studying at a higher level and experiencing reduced anxiety.

As there was only one novice user in the sample, the following inference should be treated with some caution, but the fact that they demonstrated competence in Dewey class number decoding suggests that even a modest amount of academic library experience aids finding ability and that this increasing experience (regardless of study level) may be just as significant if not more so than course level alone. This would fit with the findings of Zaug et al. [25] who discovered that it does not take much for the skills gap between

novices and experts to be reduced. In general, the study did not elicit as much detail about study level differences in wayfinding as had been hoped.

4.3 Field Exercise

Of the 24 tasks tested, 87% were completed successfully and without seeking assistance. This correlates well with other studies such as Eaton [33] who reported a 97% success rate and Carr [19] who reported 92%. Library stack navigation was the top fail point in this study. Hahn and Zitron [20] reported this as one of their top two fail points too.

As shown in Table 1, the overall time saving benefit from using the App to find items (as opposed to without) was 39%. The calculation in respect of determining average time is described in Scaife [28, Appendix H].

Table 1. Average time taken in minutes and seconds per task by participants in the field exercise to successfully find the stack in which an item is located

Scenario	Average completion time - all	A and B (lowest ability)	C and E (highest ability)
With shelfmap	01:12	02:04	00:58
Without shelfmap	01:59	03:11	00:42
Saving (secs) per item	47	67	16
% time saving	39	35	27

In respect of finding the item once an area had been successfully identified, 73% of survey respondents claimed to be confident about their understanding of how to decode Dewey decimal class numbers and find an item on the shelf. A high level of aptitude was demonstrated. For finding the area (i.e. the stack), there was less confidence and this was borne out by the research in which there were more “area” failures than “item” level failures. Additionally, time saved at item level was slightly less than at area level.

Participants were asked to report their feelings of self-efficacy both before the field exercise and then afterwards on a scale of 1 to 10. More experienced users of the library stated that the availability of the app was of more marginal assistance than those with less. However, although the time saved was of slightly less consequence for the highest achievers, it appeared to show that their perception of there being only marginal benefits of the App may be somewhat exaggerated.

4.4 Other Themes that Emerged

First, if the directional flow of shelves was broken interrupting the sequence, then this could cause problems (Fig. 2):

Also, the shelving of material in different areas (for example oversize books) caused some anxiety as did either the lack of, or incorrectly labelled, signage. This was also found by McKay and Conyers [11].

005.3 – 006.68	006.68 – 070	GAP	133 - 150	150 – 150.19
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Fig. 2. Gap in shelf stack sequence

End stack classmark range signage which described two sides of a book stack via a single range was found to be unhelpful due to confusion about which side the sequence started at. For this research, end stack aisle numbers were added and made prominent in the App which matched the branding. There was a very positive reaction to this. For example, Participant A said ‘Oh hold on a minute, I’ve just seen the aisle number, 46 so thank you’.

Xia [24] found a similar technique helped with shelf range navigation. A particularly interesting element that was noticed was the blurring of the physical with the digital environment. Users were observed looking at the App and then looking up - making connections between the aisle numbers depicted on the App with the signage they were spotting on the stacks themselves (Fig. 3).

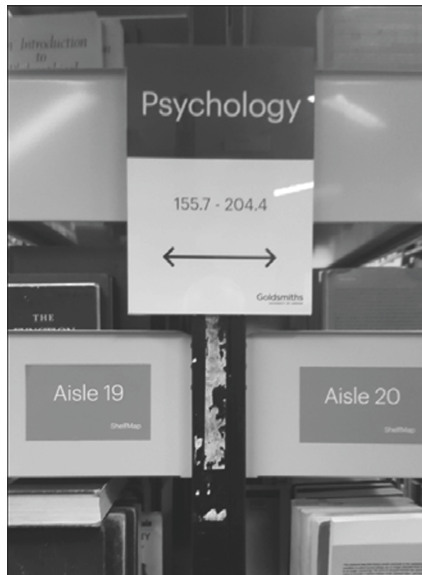


Fig. 3. One-sided granularity (aisle numbers) versus two-sided

Lobby signage was underused or simply unnoticed, possibly due to its small size as found by Hahn and Zitron [20]. These issues led to two reactions as described by Folkman [34]. First, “problem focussed coping” in which participants simply persevered, and second, emotionally focussed coping in which pent up emotions were released such as those exhibited by one participant during the third task of the field exercise:

‘I feel like I’m sitting with like stress of definitely the mislabelled [shelf stack]’. (Participant C).

The lack of a floor number in the library catalogue was also seen to be problematic and points to shortcomings in respect of the online catalogue information provided. It matches the findings of Calhoun et al. [35] whose respondents said they would like more detailed and explicit location information in the catalogue.

One participant’s comments about encountering two doors on a stair landing which looked similar and not being sure which to use chime with the findings of Li and Klippel’s study of wayfinding in a library where spatial syntax methodology was used to identify areas of navigational confusion in a building [17].

Help strategies employed when a user became stuck only once led to a member of staff being asked to assist. The reluctance to ask for help is nothing new [36]. More popular were self-help strategies including walking the aisles or opting to use an alternative but subject related item. Hahn, et al., [37] found the same when they used handheld devices as part of their wayfinding study. Coupled with this was a strong element of resilience and determination not to give up in the face of perceived adversity. For example, one participant said if she couldn’t find the item, she would simply “look harder”.

There was a wide range of emotions and feelings exhibited regarding the finding of materials, some expressed via cognitive maps drawn by the participants. Claustrophobia, apprehension that there might be an unsuccessful outcome, frustration and stress were the negative ones. This also reflects the findings of Kuhlthau [38] in relation to anxiety being embedded in the information seeking process. On a more positive note, the result of successfully finding a book led to feelings of relief and joy. This matches Hahn and Morales who stated that ‘some responded with joy when they found the desired book’ [6, p.419].

Unexpected themes were gleaned from two users with self-declared specific learning disabilities (SpLD). One who suffered from dyspraxia found that the three dimensional map of ShelfMap had helped her to place herself in the space more easily. Together, these two users made average time savings of 35% when using the App, indicating that the relationship between negative effects of SpLD and less opportunity to benefit from the App is not strong. Similar but slightly lower time savings are found here in relation to time to find the actual item.

There were 13,582 requests to the App from the library catalogue which would have resulted in a map being displayed over the four month period. The requests made to the App during the four month trial when compared to the loan statistics showed that there is substantial demand for such a service (Fig. 4).

In summary, the introduction of a wayfinding App had a positive impact, in particular on ability to locate the area of the library in which an item is to be found in a timely manner. The effect on ability was more significant for users with less familiarity with a library than expert users, but expertise does not necessarily align with a user being an undergraduate (inexperienced) as opposed to a post-graduate (experienced). Use of the App appears to reduce perceived stress associated with finding items and increase self-efficacy. In terms of perceived stress, the majority of participants (66%) used more positive language to describe the process of finding materials afterwards, compared with

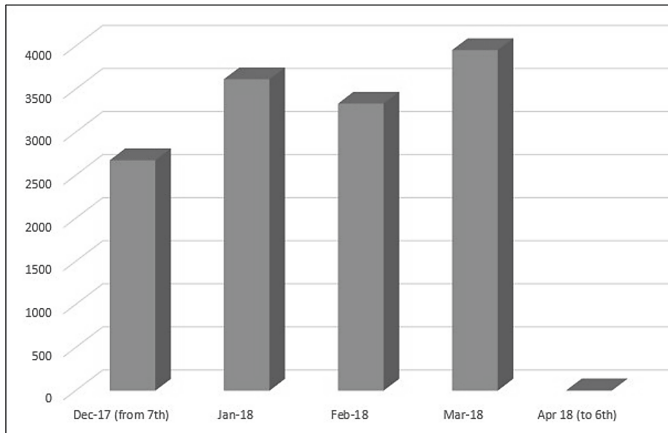


Fig. 4. Requests per month to the App

before the field exercise. In respect of increased self-efficacy, Participant A's comments illustrate this well:

'We saw it there. I was zoomed to finding that shelf. And I have been in that area before [using the App] and I was there 20 min.'

5 Conclusions and Recommendations

5.1 Conclusions

In terms of ability to locate material on the shelf, this study concluded that students find it rather more difficult to find the stack than to find the item when they get there. Experience is a more significant factor than study level in regard to predicting ability of students to find items. The lack of study level differentiation in the sample has led to little new information being elicited in the area of study level as was originally anticipated, which may go some way to explaining the lack of literature in this area.

Regarding the impact of introducing the App on ability and perceived experience, the conclusion was that doing so allows students to find a book more quickly than they would otherwise do, although it has only a modest impact on changing the eventual outcomes themselves. A unique contribution of this research is that it compares times without and with the App in order to give a more quantifiable idea of difference between the two scenarios. A time saving of 32% to find the book and 39% to find the stack was observed when using the App. Benefits were also observed for both low and high ability users. It is also clear from the log file analysis that there is a healthy demand for a service of this type.

Using a wayfinding App improves self-efficacy, reduces anxiety and improves the perceived student experience. There is some evidence that the three-dimensional layout of the maps, with prominent landmarks judiciously added, can help a user to more easily place themselves within the space. Additionally, there is evidence that those with a SpLD

benefit from the technology almost as much as those without. Aisle numbers used in conjunction with the App reduce barriers to wayfinding more effectively than simply using the App in isolation.

5.2 Effect upon Information Literacy

Low attendance levels at information literacy induction sessions [21] suggest that students' wayfinding problems may not always be effectively addressed through the traditional learning routes. The existence of a wayfinding App such as ShelfMap at the point of use (when they wish to retrieve an item in the catalogue) can mitigate the adverse effects of this. By providing assistance which reduces anxiety and cognitive load, the student is given a better chance of a satisfactory outcome which builds self-efficacy. The same can be said about the reluctance to seek help [36] because an App provides an alternative digital self-help option that was previously not available. Thus, the question becomes to what extent the App can supplement existing information literacy skills.

5.3 Limitations

As a case study, the extent to which this research can be generalised is limited. Nevertheless, it gives a good indication of what can be expected in a small to moderate sized university library setting. In order to be able to make any further generalisation about its applicability in different library sectors, it would be necessary to repeat the research.

It was not possible to recruit PhD students as part of the sample, and therefore these results are limited to postgraduate and undergraduate levels. Had PhD students been included, it is possible that more information would have been elicited relating to varying experience at differing levels. Also, as Library Student Representatives (LSRs) made up the whole sample, there is a possibility that this means they do not fully represent the student population at Goldsmiths in general. However, it was ascertained that LSRs do not receive extra end-user training but only what any standard student is offered.

The researcher had predicted a possible excess of students with a specific learning disability and indeed it transpired that two of the six participants in the sample (33.3%) declared a SpLD. Although it was not within the scope of this study to investigate the reasons this may affect wayfinding, there were some unexpected and interesting findings here which may benefit future researchers.

5.4 Recommendations

This study's key recommendation is that academic libraries introduce an online wayfinding system with companion signage which matches aisles displayed in the system. It should be embedded in the online library discovery system so that it is available at the point of use. The reason for making this recommendation is threefold. First, this research demonstrates that students can save time in finding materials when using an App, thus releasing further study time which may benefit overall student outcomes. Second, an App can reduce information seeking anxiety by providing the student with relevant but

distilled wayfinding information. Finally, an overall improvement in the student's perceived experience matches a key objective of many learning institutions which is to increase student satisfaction levels.

Other recommended actions are:

- Ensure that end stack signage is maintained and accurate.
- Place prominent maps within lobbies and areas of key wayfinding decision making where visual distance is restricted and there are multiple direction choices.
- Ensure that a signage policy exists which has been developed, preferably involving users in its creation, building on this study's experience that a student perspective offers a unique insight into the problem of wayfinding.
- Review location information included in the library catalogue to ensure that only relevant locational information is displayed, and only where this contributes to finding the item, as opposed to irrelevant or non-contextualised information which may simply confuse the user. For example, a collection name that is not related to a geographical location might be better excluded.

Relating to the App, it was recommended that the button or link which is embedded in the library discovery system is sufficiently prominent and descriptive for users to understand its purpose. The embedding of links from third party applications in discovery systems is nothing new. Link resolvers have been used in this way for some time. Their objective is to connect users with a full text electronic version. An analogous objective exists with a wayfinding App which aims to connect users with the full text *physical* version. Are there lessons to be learnt from the experience of making link resolver systems intuitive to use that could be applied to wayfinding Apps?

Where possible, it is also recommended that images in the wayfinding App are oriented in such a way as to highlight the position of landmarks within the building such as stairs and lifts, in order to reduce the cognitive load of understanding the relative location of the stack being sought.

Here are several potential areas for future research:

- Noting that there is a trade-off between the maintenance overhead of labelling each shelf and bay within a library and the perceived or actual benefits that a student might gain from this, a study in which the App was used in a shelf-level library setup, comparing the results with this study, might help to calculate this cost-benefit more accurately.
- Exploring the impact of presenting different App views based on the current location of the user in the space so as to afford a more accurate spatial perspective and whether this further reduces wayfinding anxiety.
- The impact of a specific learning disability on the ability to find materials in libraries and the contingent benefit from wayfinding tools would benefit from further research as it appears to be an area in which a positive impact can be made.
- A watching brief on developments in the area of indoor navigation should be maintained. Organisations such as Indoor Atlas (2018) are working on the ability to use satellite navigation and other technologies inside buildings. These may not yet be

accurate enough to use in a library shelf mapping setting, but if that changes, there may be benefits in incorporating it into a library wayfinding App.

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Information Literacy in Different Cultures and Countries



Culturally Grounded Approaches to Information Literacy Understanding

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Abstract. This paper is based on a doctoral study, which aimed at illuminating a culturally situated understanding of Information Literacy (IL) contextualized by a particular landscape (geographic region) with related socio-cultural characteristics. The information literacy experiences and practices of Bulgarian academic librarians showed that their understanding of IL is highly influenced by the socio-cultural characteristics of the region. The five significant aspects revealed were: subject expertise rules, academic librarians often consider familiarity with information technologies as Information Literacy, a piece of information is significant and useful if it helps to solve a problem and/or to advance knowledge, Bulgarians do not like to ask for help, and that there is a lot of pressure to catch up with developments and best practices in the outside IL world. The assessed IL paradigm in the country facilitates further inquiry into suitable framework and practices. A new literacy paradigm, Info-cultural Literacy, emerged from the study.

Keywords: Information literacy · Academic library · Info-cultural literacy · Bulgaria

1 Introduction

This paper is based on a doctoral study and explores Information Literacy (IL) experiences and practices of Bulgarian academic librarians. The IL experiences encompass people's engagement with information [1, 2]. IL can be established and operationalized as a specific practice within a specific context [3] while both experiences and practice are correlated to specific understanding of IL. The understanding of IL defines the frameworks for teaching IL in academic settings and impacts pedagogy. The body of literature suggested that IL understanding may vary in different parts of the world depending on factors such as historical perspective and socio-cultural characteristics [1, 4, 5]. Hence, existing frameworks and best practice models from abroad cannot be copied or nested into IL policies. The study examined 176 sources, 98 titles in English and 78 titles in Cyrillic. The concept of 'information literacy', also called in Europe 'information competence' [6], is relatively new to the Bulgarian library field and practices. The study

aimed at illuminating a culturally situated understanding of IL contextualized by a particular landscape in terms of a specific geographic region, Bulgaria (country in South-East Europe), with related socio-cultural characteristics.

The study's research question was: How do Bulgarian academic librarians understand information literacy? Regarding its methodology, this study explored and generated insights into Bulgarian librarians' understanding of IL by employing instrumental (with exploratory and ethnographic elements) case study [7]. Data was collected and analyzed through 20 semi-structured in-depth interviews (indicative questions) with Bulgarian academic librarians from 17 academic libraries (representing three different types of academic libraries/universities identified for the purpose of this study); unobtrusive data set(s) collection and examination (publications, etc., by Bulgarian academic librarians; handouts and flyers; publications from professional organizations; grants & corresponding findings or developments); artifact analysis (websites, tutorials), and field observations and analysis on the information environment and activities in the three different types of academic libraries). The selected libraries were fair representation of the three types of academic libraries and were located across the country.

The study provided a view of the IL understanding among Bulgarian academic librarians and added to the international pool of knowledge in the field while addressing the need to apply culturally grounded approaches to IL to better serve specific groups. Three terms were identified as used interchangeably as an equivalent or closely related to the term IL: (1) Информационна грамотност – Information Literacy; (2) Информационна компетентност – Information Competency; and (3) Информационна култура – Information Culture. Detailed information on the literature review and methodology of the study is available in other publications, including the dissertation published by the University of Library Studies and Information Technologies, Sofia, Bulgaria, in 2020 and [8, 9]. This paper focuses on the five significant sociocultural aspects of IL understanding that the study revealed. The assessed IL paradigm in the country facilitates further inquiry into suitable framework and practices. A new literacy paradigm, Info-cultural Literacy, emerged from the study and could be substantiated further by future research.

2 Bulgarian Academic Libraries Included in the Study

According to the Bulgarian National Statistical Institute [10] there were 50 universities in Bulgaria. The selected libraries were fair representation of the **three types** of university libraries identified for the purpose of this study and were located across the country:

Type 1 Library Studies related only, e.g., University of Library Studies and Information Technologies, Sofia.

Type 2 The libraries of general, broad scope universities in terms of disciplines (older and newer), for example, the libraries of Sofia University and New Bulgarian University.

Type 3 The libraries of specialized universities, for instance, the libraries of Sofia Medical University, the University of Chemical Technology and Metallurgy at Sofia, and the University of Architecture, Civil Engineering and Geodesy at Sofia (Fig. 1).

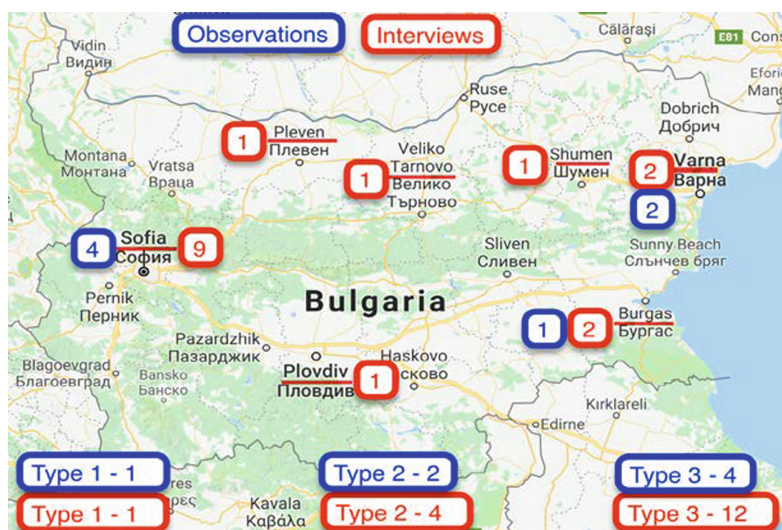


Fig. 1. Map of the Bulgarian Academic Libraries included in the study

The map above shows the number of library observations in blue and the number of libraries in red where librarians were interviewed (17 libraries–20 librarians) with their distribution across the country of Bulgaria as well as by type of academic library.

Table 1. Demographics of the interviewed librarians

Interviews	Total	Type 1 Library Sci. University Libraries	Type 2 Broad Scope University Libraries	Type 3 Specialized University Libraries
Interviewed librarians	20	2	4	14
Female	17	2	4	11
Male	3	—	—	3
Library science degree	14	2	2	10
Other degree	6	—	2	4
0–4 Years Work Experience	4	1	—	3
5–10 Years Work Experience	3	1	—	2
11+ Years Work Experience	13	—	4	9

The participant profile defined ‘Bulgarian academic librarian’ as: Bulgarian professional librarian employed in Bulgarian academic library. The demographic information of the interviewed librarians after being coded and analyzed was cross-examined for possible correlations with significant patterns to help with underpinning the significant study findings (Table 1).

The gender representation in the librarians’ profession in Bulgaria involves predominantly females. The representation of 17 female and 3 male academic librarians was a fair exemplification of this gender representation.

3 Revealed Significant Sociocultural Aspects of IL Understanding

Bulgaria is an old country in Southeastern Europe with a rich history and long-standing cultural traditions. The Bulgarian state was founded in 681 CE and thus dates from the time of the Eastern Roman Empire (Byzantium). Bulgarians have their own language, Bulgarian, and have given the Cyrillic alphabet to the world [11, 12]. Bulgaria became a part of the European Union in 2007, which triggered significant legislative transformations after 45 years (1944–1989) of communist regime and consecutive economic hardship. Bulgarian librarianship has been going through significant changes since 1989, concurrently with the democratic reforms in that country after the end of the communist era, by transforming the librarian’s role as a curator and gatekeeper to a new user-oriented paradigm of librarianship. The ongoing makeover of Bulgarian libraries has been amplified not only by the changing political and social milieu, but also by the cycles of economic turmoil and recovery in Bulgaria, as well as by the increasing implementation of new technologies.

The expectation of the researchers was that for Bulgarian librarians, IL would be informed and bound by the social/cultural position in which the librarians were situated. In other words, their understanding of IL and the way in which it was enacted by them, was dependent on the social and cultural conventions, concepts, boundaries and understandings that were implicit in their Bulgarian-ness. The data provided rich information on space use, collections and access, offered services, and activities and interactions at the Bulgarian academic libraries. That information revealed many similarities in terms of services and at the same time significant differences in terms of access.

The overall analyses of the data revealed the following five significant sociocultural aspects of IL understanding:

1. Subject expertise rules
2. Academic librarians often consider familiarity with information technologies as Information Literacy
3. A piece of information is significant and useful if it helps to solve a problem and/or to advance knowledge
4. Bulgarians do not like to ask for help
5. There is a lot of pressure to catch up with developments and best practices in the outside IL paradigm.

3.1 Subject Expertise Rules!

Overall, the IL experiences and practices of Bulgarian academic librarians showed that they understand IL mainly as notions closely related to subject area competency, including subject content knowledge and expertise. This has been underpinned by the data from each of the methods utilized (observations, unobtrusive data sets analysis, and interviews).

Most of the publications by Bulgarian academic librarians (not related to the most popular theme which was library achievements) were related to compiling or reviewing subject field bibliographies, or to the importance of specific subject competencies and knowledge of subject specific resources, e.g., [13–23].

Here is an example from statements on subject expertise from the interviews:

“We have such, first he was a specialist in a given field, then acquired a library degree or vice versa - first he was a librarian, then acquired some education in another field, another degree. We have both cases among our library colleagues, they are extremely effective”.

All available library manuals at different libraries started with some commendation of the library book collections. Most of the librarians expressed great pride in the book collections of their libraries, especially in relation to specific subject fields. Statements expressed pride in never rejecting faculty book requests. A lot of the librarians outlined how important it is to have the works of the most prominent Bulgarian scholars in specific fields. Many of the academic libraries were hosting (as special collections) the private libraries of some of these scholars as well as the personal libraries of prominent Bulgarian writers. Usually, these private libraries have been donated by the living relatives of the scholars or the authors. Bulgarians in general keep personal libraries in their homes and they take huge pride in having significant numbers of books in their personal collections including multivolume sets by well-known writers from across the world.

Most of the librarians articulated that a significant importance is placed on providing textbooks in most of the academic libraries, since students are there to gain the necessary expertise in their fields of study by accumulating knowledge through reading the textbooks, performing up to par on their finals and graduating with their degrees. Below are a couple of examples of librarians' statements. The first clearly states that a main responsibility of the library is to provide textbooks:

“One of our main activities, in fact is lending textbooks. One part of the library collection are textbooks and guides we get through different channels. Some of them are provided by the publishing house here on the second floor, those published by the university. ... The most important part of our holdings is the circulating collection, which consists primarily of textbooks. There is the greatest turnover there - textbooks, guides, guides, mostly this is borrowed and maybe 80, not to say 90% of what is sought is there”.

The next statement also accentuates faculty privileges while emphasizing the importance of providing textbooks and explaining the available options to do that:

“We provide textbooks and teaching aids. In fact, this is our most sought - after literature in our university library, which is normal. We mainly serve university faculty and students. We lend them textbooks and teaching aids, for the duration of the semester and our faculty are entitled to borrow for six months the scientific literature necessary for their scientific research, publications, and the like”.

It is a common practice that the textbook is written by the professor teaching the course or by a predecessor who has taught the course and/or is considered the most prominent scholar in the field. A lot of the universities have university presses and they publish the textbooks in addition to other publications such as periodicals and monographs.

It was quite common that the university library was directly connected with the university press and in some cases the library director also managed the university press. Students were not involved in any way with publishing or being hired to work at the libraries. Apparently, the universities do not hire students at all in general, because they are not considered competent yet to work at the university at any level. In other words, they do not possess the necessary subject competency before completing their degrees.

Faculty and students are treated quite differently in most of the Bulgarian academic libraries. In general, faculty are given huge preferences in terms of access, services and any other accommodations. For example, a lot of libraries still maintain closed stacks and only university faculty are allowed to take books outside of the library. Students are granted library use only. Everyone has to make a request either through the online catalog or at the library circulation window by filling out a paper request. At most of the libraries only faculty and PhD students have remote access to the provided databases. Many librarians shared that their libraries curate online collections of their faculty publications and the dissertations of their doctoral students.

Also, at most of the academic libraries a significant part of the space accessible to users is practically reading rooms. These reading rooms have, in general, similar rules in all of the libraries. Being quiet while using them is a must. No cellphone use is permitted inside the reading rooms. Absolutely no food or drink is allowed on the premises. In general, library users in Bulgaria are called 'readers'.

Bulgarian academic libraries had separate reading rooms for students and faculty. Also, any available Special Collections were accessible only to faculty at the university. An outsider must be a very prominent scholar to be able to gain some access after petitioning (Fig. 2).



Fig. 2. Separate reading rooms for faculty only

The sign on top of the entrance in the picture on the left reads: “Reading room for faculty”. The picture on the right is an example of a special collections room accessible only to faculty as well.

The Bulgarian academic libraries definitely resemble their university attitudes and policies, such as, a lot of the universities have separate cafeterias for faculty and students on campus.

These findings on the context suggested how Bulgarian academic librarians were setting the boundaries of IL, for example, instruction seemed to be limited to how to use the library. This was supported by the reviewed publications by Bulgarian academic librarians as well, for instance, [21, 24–26]. Only a few publications by practicing academic librarians, such as [21, 27], acknowledged clearly any means of IL instruction beyond how to deal with library resources. It has to be acknowledged that these were joint publications with a faculty member at the University of Library Studies and Information Technologies (ULSIT), Sofia.

Most of the librarians indicated that faculty members and doctoral students use the databases through a typical practice, which is to ask a librarian to find and deliver the full text of specific articles or to prepare a bibliography on a specific topic. Then the faculty member reviews the bibliography and requests the full text of all or some articles to be retrieved and delivered by the librarian.

Most of the interviewed librarians started with talking about the services provided to faculty and doctoral students when explaining the existing information services at their libraries. Many of them described that they were very busy with preparing citation impact documents, which faculty need for their review and promotion as well as with applying for grants with the European Union.

Overall, the data from all types of sources showed that subject expertise rules in Bulgarian academic libraries. The observations and interviews revealed that prioritizing services and accommodations was obviously correlated with the rank in terms of subject expertise and the obvious order of priority was: faculty, PhD students, students. The prioritizing of faculty and doctoral students was well seen also in the reviewed publications, for example, [18, 21].

3.2 Familiarity with Information Technologies = Information Literacy

The data from observations, interviews and reviewed publications in Bulgarian, for instance, [22, 23, 28–30] by academic librarians and teaching faculty at a Library and Information Science university or department also showed that academic librarians and professors often consider familiarity with information technologies as IL or as part of IL.

“The technological knowledge and skills required by the information process” were listed as part of information competency [30, p. 111]. “The European Computer Driving License (ECDL) was translated as certificate for information literacy by using the Term 1 ‘Информационна Грамотност – Information Literacy’ [22, p. 121]. When discussing the elective course on Information Literacy (used Term 1) in the curriculum of the Philosophy Department at Sofia University, numbers 1–3 (out of 4) learning outcomes for the development of knowledge and skills were: “be familiar with and proficient in

the recent information technologies, format texts, and develop & deliver presentations” [24, p. 217].

The following statement was in response to defining the meaning of the term information literacy. “To me it is a type of culture - to be able to cope with the innovations that are provided by the information technology that is daily in our lives, in our needs either at the workplace in front of the computer, or outside”.

Almost all of the interviewed librarians commented on digitization and digitizing technology. When the interviews were conducted on the library premises, interviewees showed the state-of-the-art digitizing scanners acquired by the libraries through European Union grant projects. Interviewees referred to digitization skills as information literacy skills most of the time.

3.3 Information is Significant and Useful When Solving a Problem and/or Advancing Knowledge

The data showed that a piece of information is considered significant and useful if it helps a person to solve a problem and/or advance knowledge. This was very pronounced through the interviews and the publications in Bulgarian as well. Many of the librarians stated it directly even though in different ways.

Here is a typical example: “Well, effective use of information for me is when I manage to find enough journal articles and other publications on a specific topic, so the person requesting them will be able to write their thesis or dissertation”. This statement also shows the prioritizing of subject expertise and why Bulgarian librarians still value above all the service of preparing bibliographies.

A lot of the librarians expressed that a piece of information is significant and useful if it helps a person with a problem: “If a person seeks information to solve a problem, it means that this information is significant and valuable for the specific person”, and or advances knowledge when needed, including the notion of ‘useful if timely’.

Many of the librarians focused on the notion that information is significant only if it solves a problem. It would be interesting to conduct further research and find out why information used for entertainment, for example, might not be considered significant.

3.4 Bulgarians Do not like to Ask for Help

The data revealed a very pronounced suggestion that Bulgarians do not like to ask for help. Below are some examples:

“That is, the Bulgarians are stubborn, they are really searching to no avail and they continue to search, so they have to have a little more confidence to know that there is someone to help them. The Bulgarians are like that, they do not like much to ask for help. ... They are not people who rely on help, that is, they have fallen, even if they are in trouble, they will learn on their own how to save themselves”.

“A lot of times they (Bulgarians) do not even think they can ask for advice, seek help...”

“Bulgarians look for information and knowledge everywhere and in everything..., and the aim is usually to find solutions by themselves”.

“I think effective use of information, as we talked about solutions, is to solve problems. That is, we work on problems specifically, see them clearly and solve them on our own”. This statement also supports the finding that a piece of information is considered significant and useful if it helps a person to solve a problem and/or advance knowledge.

“Bulgarians don’t like to seek help. This is perhaps the syndrome that we do not read help menus and manuals”.

Many of the librarians outlined that Bulgarians in general do not like to seek help because they believe they have to be able to deal with an issue at hand on their own. This might be because of the notion that to be able to deal with information needs is regarded as an inseparable part of person’s overall intelligence.

When asked whether they think Bulgarians are capable of dealing with their information needs or not, most of the librarians started their answers along the lines of the statement that “it is very hard to say in general because it is a matter of the overall intelligence of a person”. Another librarian said that people are “demonstrating their intelligence and capability of critical thinking when searching for information”.

Overall, the prominent suggestion was that Bulgarians would request a service but would not seek help. This might be one of the reasons for librarians to offer the service of preparing thematic bibliographies and list of bibliographic references formatted according to the appropriate citation styles.

3.5 Pressure to Catch up with Developments and Best Practices in the Outside Information Literacy Paradigm

All the types of collected data through observations, interviews and unobtrusive data sets revealed pressure to catch up with developments and best practices in the outside IL paradigm.

Most of the librarians interviewed mentioned in many ways pressure to catch up with developments and best practices in the outside IL paradigm mostly in relation to grants coming from the European Union. Bulgaria joined the EU in 2007. In front of the buildings, in the library lobby or somewhere else inside in most of the 17 academic libraries, which the researcher visited for observations and/or interviews, there was a billboard sign or a wall sign with the information about a completed or ongoing project, financed with a substantial grant by the European Union.

Although these were not specifically IL related grants as a whole, some parts of them as well as a lot of other smaller grants of the same kind were devoted directly or indirectly to information literacy. Many of the publications by Bulgarian librarians and Library & Information Science faculty in the dataset were directly describing developments as results of such projects or referred to such projects, e.g., [21, 29].

The pressure to develop IL education practice as part of the curriculum of the University of Library Studies & Information Technologies and the Library Science program at the Department of Library Studies, Scientific Information and Cultural Politics at Sofia University as well as corresponding IL courses and workshops at the academic libraries based on best practices from abroad is well documented in the publications of Bulgarian Library & Information Science faculty, for instance, [21, 24, 25, 32, 33]. These practices have not been adapted in a very helpful way by the academic librarians in their daily professional duties and especially in response to the pressure they were feeling to

adapt IL best practices directly from abroad. Transitioning from theory to practices that work has always been a complicated process. Some of the librarians shared that they were expected to design and develop pilot IL programs, courses, and/or workshops and seemed to feel quite unsure how exactly to approach that. This is quite understandable since these best practices imported from abroad might not be directly applicable to the milieu in Bulgarian academic libraries and to the understanding of information literacy, which is closely contextualized by the socio-cultural characteristics of the country.

4 Conclusion

The intrinsic quality of the IL agenda is embodied in understanding and utilizing “the power of effective information use in all social and cultural contexts” as stated by Bruce [5, p. back cover]. This study has attested that the IL understanding varies in different parts of the world due to the influence of specific sociocultural aspects derived from the sociocultural and historical perspectives, and traditions in education. This study of IL understanding among Bulgarian academic librarians added to the international pool of knowledge in the field and addressed the need to apply culturally grounded approaches to IL to better serve specific groups. The results of the study are useful not only to Bulgarian university librarians, researchers and educators in academic and continuing education in the field of library and information sciences, but also have a significant interdisciplinary reflection. New knowledge has been provided on specific cultural aspects of the understanding of IL in the Bulgarian context, which will stimulate further research and facilitate the development of appropriate frameworks, practices and educational strategies in the country.

The IL experiences were closely related to the socio-cultural characteristic of the country. Being socio-culturally literate has emerged as a prerequisite of being able to define an information-literate person in a specific country or geographic region. This new paradigm was named Info-cultural Literacy and could be substantiated further by future research. The information professionals in different parts of the world will need to account for the sociocultural characteristics of the country or the region to be able to comprehend the intrinsic quality of the understanding about specific phenomena and then to be able to successfully transfer theory into practice. Designing and developing IL programs based solely on imported best practices would not serve best the targeted groups. Even more, an attempt to implement such programs would prove to be, in the best-case scenario, only partially successful because of the unavoidable clash with the regions’ existing understandings and needs.

Acknowledgements. The authors would like to thank all the Bulgarian academic libraries and librarians who participated in this study.

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Bookending ARFIS: The Development, Final Results, and Current State of the Academic Reading Format International Study

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Abstract. The Academic Reading Format International Study (ARFIS) is the largest study conducted to date on tertiary students' reading format preferences and behaviors. It was born at the European Conference on Information Literacy (ECIL) and has been tied intimately with it throughout its formation and development. From 2014–2017, forty-three researchers in 33 countries participated in ARFIS, many of whom first connected and networked through attendance at ECIL. As of this writing, Google Scholar shows over 30 articles and reports on results of individual ARFIS participant countries and the amalgamated ARFIS results, 15 of which appear in various ECIL proceedings. The project has generated much interest from many academic fields. This paper will present its background and highlights from the findings, a list of ARFIS and ARFIS-related publications and researchers, discussions of the current status, and future directions. We will also discuss the impact of ARFIS on future scholarship, especially in the wake of potential changes in educational practices as a result of the COVID-19 pandemic.

Keywords: Multi-national studies · Print reading · Electronic reading

1 Introduction: The Origins of ARFIS

Mizrachi's interest in students' reading format preferences piqued when she was conducting research for her doctoral dissertation. Her ethnographic study of undergraduates' personal academic information environments in their dormitories at the University of California Los Angeles (UCLA) produced a surprise finding: the overwhelming preference to read academic texts in print rather than online [1]. The interviews of 41 students took place in fall 2009, and was consistent with casual conversations and other anecdotal observations she had with students. Five years later, after i-pads and smartphones became more common, Mizrachi wondered whether students' attitude had changed; were they more favorable to electronic formats because access had become much easier and devices more efficient? Were the attitudes uncovered in the original study still consistent among a younger cohort of students, born approximately five years later? How prevalent

were these attitudes among a much larger sample population?¹ To answer these questions, she created the Academic Reading Questionnaire (ARQ) which was distributed to undergraduates at UCLA in winter 2014 [2, 3]. Nearly 400 students responded to her survey, and again she found that close to 80% of them believed that print format was more conducive for learning, even though many liked the convenience and lower cost of electronic texts.

2 ARFIS at ECIL

After presenting her UCLA study findings at ECIL 2014, fellow attendees Serap Kurbanoglu and Joumana Boustany proposed replicating the study on a multi-national scale to create a large comparative study. The first tasks included slight revisions to the original research questions and the survey instrument in order to ensure relevance and interest across multiple educational cultures and circumstances. The general structure of the procedures and methodologies followed those established by Kurbanoglu and Boustany in their earlier multinational studies [e.g., 4]. ARFIS organizers then recruited additional researchers through their personal and professional networks. Each researcher was responsible for the integrity of their translated survey (if relevant), data gathering, cleaning and submission to the study organizers. They could then analyze and disseminate their country data as desired. They were also responsible for local review board or ethics committee permissions, even though the UCLA Institutional Review Board (IRB) approved the international study. Interest in participation was high. The first round of data gathering began in winter 2015 and included 21 scholars in 19 countries. By October 2015, ARFIS organizers were ready to present a progress report of the project at ECIL, and seven researchers presented results from their local institutions.

Simultaneously, more scholars asked to join ARFIS and the study expanded. Attendees at ECIL 2016 heard reports from five additional country participants and preliminary findings from the amalgamated analysis [5]. During a conference break, the research team met to develop plans for future directions. One decision was to discuss and disseminate ARFIS findings outside of the Library and Information Science (LIS) fields by publishing in a general science journal. Mizrachi asked Alicia Salaz to join the study coordinators by contributing her writing and statistical expertise. Because some researchers were still collecting data, the team decided to perform analysis in two stages; the first (ARFIS 1) consisted of data from 10,293 students in 21 countries collected in 2014–2015. The second round (ARFIS 2) consisted of the data gathered in the years 2016–2017 from 10,973 students in an additional 12 countries. ARFIS team member Nicole Johnston conducted studies in two countries during that time, Qatar and Australia, after relocating to a new institution. Even though additional researchers inquired about joining ARFIS, it was decided to close the study with ARFIS 2. Individual researchers were welcomed to continue using the ARFIS survey, but their data was not included in our analysis. Attendees at ECIL 2017 and 2018 heard three more country reports and a panel of some of the participants who discussed their experiences. Mizrachi, Salaz,

¹ For an overview of popular beliefs regarding millennials and e-books in the 2010s, see: <https://www.vox.com/culture/2019/12/23/20991659/ebook-amazon-kindle-ereader-department-of-justice-publishing-lawsuit-apple-ipad>.

Boustany and Kurbanoğlu later published an article based on that panel discussion in *College & Research Libraries News* [6]. Finding an appropriate general venue for publication outside of LIS took time and much effort. Finally, in May 2018, results from ARFIS 1 were published in the prestigious online journal *PLOS One* [7]. College & Research Libraries published findings from a qualitative analysis of English language comments supplied by respondents in both rounds in July 2020 [8]. The final results from ARFIS 2 and findings from the complete ARFIS data analysis were published in July 2021 [9].

3 Summary of ARFIS Results

The research questions for the worldwide comparative study were:

1. What format, print or electronic, do university students prefer for the majority of their academic course materials?
2. Do format preferences vary by country?
3. How does the language of the reading impact format preferences?

Results for all these questions are discussed in the various ARFIS publications which report that majorities in all participating countries expressed a preference to read their academic texts in print rather than electronic. The ARFIS 1 analysis discussed in *Plos One* [7] compares responses to statements in the three dimensions of the survey: Format preference, Learning engagement, and Impact of language. These show the size of majorities favoring print varied from country to country. For example, in Israel, only 41.8% agreed or strongly agreed with the statement “I prefer to have all my course materials in print format;” 38% disagreed or strongly disagree while 20.1% were neutral, a fairly even distribution. Students in Finland showed similar percentages. In China however, 81.1% agreed/strongly agreed and only 6.1% disagreed/strongly disagreed with this same statement. Analysis for ARFIS 2 and the amalgamated set does not explore responses to individual statements. Instead, it categorizes each respondent as either a print preferrer, electronic preferrer, or neutral (no distinguishable preference), determined by computing the overall average of each individual’s scores to the 12 statistically reliable Likert-style statements in the format preference and learning engagement dimensions. Again, print preferrers were the majority in all ARFIS 2 countries, and the combined ARFIS data set. But here too were variations by country. We found print preferrers ranged from a 54% majority (Iceland) to 84.5% (Croatia) with the median at 69% (UK).

Because tertiary students are often required to read academic material in a language that is not the institutional language of instruction nor the student’s native language, we introduced three statements to measure whether the language of the reading impacts format preference. Reliability testing using Cronbach’s alpha showed that two of these statements did not correlate strongly with each other. Therefore, only one statement was used in the analysis: “My preferred reading format, electronic or print, depends on the language of the reading.” Combined results showed that the majority (53.3%) did not believe this to be true, however, there were variances among individual countries.

Mizrachi and Salaz also conducted a comparative analysis of English language comments by 328 ARFIS participants in 15 countries who were categorized as print preferrers

with comments by 325 electronic preferrers [8]. The goal was to investigate the reasons for their preference choices, when they might consider compromise, and whether there were any discernable patterns. Our findings showed that print was preferred primarily for better learning engagement and learning quality, whereas electronic was preferred because of convenience. Behaviors could be fluid, and the less preferred format might be used under certain circumstances and contexts.

Among some of the challenges we faced with such a large number of institutions was our attempt to collect and analyze data according to respondents' field of study. Different schools title and categorize their programs according to internal criteria, thus making consistency in the amalgamated dataset extremely difficult. For example, UCLA considers psychology a health science and its curriculum reflects different demands from other institutions who consider it a behavioral science. To overcome this obstacle, we instructed the country teams to categorize their fields of study data by the Web of Science criteria, into the general categories of Arts and Humanities, Social Sciences and Sciences before submitting to ARFIS. Not everyone in the second round did so, which prevented us from completing this analysis. Another weakness is the lack of internal diversity within each country. Country data was collected from one, two, or three institutions. This provides a general picture, but does not allow for exploration of differences within a single country.

4 ARFIS Reach Beyond ECIL

Beyond ECIL, Salaz and Mizrachi have presented on ARFIS together and individually at other international gatherings. These include:

1. Association of College and Research Libraries (ACRL) conference, the United States, 2017.
2. Gloriana St. Clair Lecture Series on 21st Century Librarianship, Qatar, 2017.
3. International Technology, Education and Development (INTED) 2018, Spain.
4. Qualitative and Quantitative Methods in Libraries (QQML) 2019, Italy.
5. Reading in a Digital Environment, 2019, Germany.
6. National Council of Teachers of English (NCTE) 2019, the United States.
7. Microlearning Series (online) sponsored by Maskwacis Cultural College, Canada, 2021.

ARFIS team members have shared their experiences and ARFIS findings in both local and international contexts. Several have held discussions with their institutional administrators using the data to demonstrate that students' preferences do not necessarily follow preconceived notions or popular beliefs. The more information available to pedagogical policy makers, the more informed their decisions can be. One participating university established an Ethical Commission Approval process for social sciences based on their ARFIS experience and honored the ARFIS researcher with an award in recognition of her contributions. A senior scientist from Google contacted Mizrachi with questions about ARFIS. Their phone conversation lasted over an hour during which they

discussed methodologies and the unexpected results showing that the majority of students in all participating countries preferred reading important texts in print. Executives from a large paper company based in Portugal contacted the local ARFIS researcher for more insights into her study and its conclusions. They then invited her to present highlights from the worldwide ARFIS at their international meeting. In December 2019, the president of a medical technicians' educational company in the United States emailed Mizrachi to share his own experiences with the format choice issue. He stated that results from his company's surveys of their learner population indicated a much stronger preference for reading print materials. The executive stakeholders were pushing to save costs by going electronic, but he used the ARFIS results to strengthen his decision. He claims that his company enjoys a very high success rate with their educational goals.

5 Current Status

Naomi Baron, a renowned linguist and reading scholar from American University, identified herself as one of the peer reviewers of the ARFIS *PLOS One* article. She provided numerous insights and guidance for that paper and advise for future directions. Baron invited Mizrachi and Salaz to participate in 'Medium Matters,' a group of international scholars she is leading who study the effects of reading in a digital environment [e.g., see 10]. Among the other scholars in this group are Maryanne Wolf (UCLA) and Anne Mangen of the University of Stavanger, Norway. The NCTE presentation noted above was a panel discussion of reading scholars from Medium Matters for which Salaz presented the ARFIS findings. We look forward to more collaboration with this prestigious group. Baron also cites ARFIS in her latest book, *How we Read Now*, for which she asked us to contribute a blurb to the book jacket [11].

6 Reading Event Analysis Model (REAM)

Combined qualitative and quantitative ARFIS analysis, along with other studies, indicate that students' reading format preferences are not a binary issue – print versus electronic. Actual behaviors are nuanced, very individual, and dependent on contexts and circumstances. Each time a person reads (a reading event,) their format preference may differ. Mizrachi and Salaz therefore created the 'Reading Event Analysis Model' (REAM) for illustrating the factors and considerations of when a person might prefer print and when electronic [12]. Epistemologically, REAM stands on three primary theoretical bases:

1. Chandler and Sweller's Cognitive Load Theory [13], which states that "effective instructional material facilitates learning by directing cognitive resources toward activities that are relevant to learning rather than toward preliminaries to learning," (p. 293). That is, the material should facilitate an ease of learning rather than a need to expend cognitive energy on manipulating a format or learning environment efficiently.
2. Learner Approach Theory [14], which observes that students strategically take different approaches to individual learning tasks, resulting in an array of learning outcome depths.

3. Zipf's Principle of Least Effort [15]: humans naturally choose the path of least resistance or effort.

Even though ARFIS only studied tertiary students and academic reading, we believe REAM could be used for all types of readers and reading events. We have received positive feedback from a select number of scholars so far, and are excited to promote the model to as broad an audience as possible. Interface designers and engineers, educators, institutional policy and practice managers, and national regulatory and economic policy makers can all influence factors that affect format behaviors. We believe that creating effective learning and satisfying reading experiences for everyone must be the primary principles of future technical and pedagogical development.

7 ARFIS as a Benchmark in the Post-COVID World

Beginning in winter 2020, educational institutions worldwide cancelled in-person instruction and implemented enforced remote learning as part of the fight against the COVID-19 pandemic. At the time of this writing, we do not know when life will return to normal and what the 'new normal' will look like. How will students' format preferences and behaviors be affected after being forced to rely almost entirely on electronic instruction and resources for academic purposes? Will they yearn for the days of print or competently adjust their learning strategies and fully embrace electronic media? How will the return to 'normal' affect publishers and other resource providers? Will they expand upon the emergency open access measures enacted during these extraordinary times, or will they return to the market and profit-driven model as before? Libraries and institutions will be impacted either way. To investigate the impact on format attitudes and other reading issues, Mizrachi, Salaz, and ARFIS team member Jane Secker are currently conducting a study titled 'Reading Format Attitudes during COVID'. We are surveying tertiary students in the US and United Kingdom, using some of the same questions from ARFIS, which will enable us to compare attitudes and address any differences. As the largest and most comprehensive study of students' attitudes in the pre-COVID era, scholars and educators can confidently use the ARFIS results as a benchmark when conducting their own follow-up studies to measure the impact of this historical disruption on students' reading format attitudes.

8 ARFIS Countries and Researchers

The authors wish to take this opportunity to thank all the ARFIS participants and to recognize ECIL for its indispensable role in this project. Table 1 lists all the country research participants, their home institutions at the time of the study, and the number of student responses they gathered.

Table 1. ARFIS countries and researchers.

Country	Researcher(s)	Institution(s)	n =
Australia	Nicole Johnson	Edith Cowan University, Perth	582
Brazil	Helen de Castro Silva Casarin	São Paulo State University	803
Bulgaria	Tania Todorova	ULSIT, Sofia	237
China	Pan Yantao; Jiuzhen Zhang	Sun Yat-Sen University; Peking University	1165
Croatia	Darija Pešut; Daniela Živkovic	University of Zagreb	232
Czech Republic	Michal Lorenz	Masaryk University Brno	2984
Estonia	Mai Poldas	University of Tartu	1260
Finland	Terttu Kortelainen	Oulu University	681
France	Joumana Boustany	Université Paris-Est Marne-la-Vallée	1630
Germany	Corinna Wulf (Lohmann)	TU Dortmund	128
Hong Kong	Victoria Caplan	Hong Kong University of Science & Technology	1140
Hungary	Laszlo Karvalics	University of Szeged	47
Iceland	Agusta Palsdottir, Sigriour Einarsdottir	University of Iceland	674
Israel	Judit Bar-Ilan, Noa Aharony	Bar-Ilan University	135
Italy	Elena Collina	Università di Bologna	1007
Latvia	Līga Krumina	Latvijas Universitāte	1192
Lebanon	Hanady Geagea	Lebanese University	132
Lithuania	Jurgita Rudzionienė	University of Vilnius	53

(continued)

Table 1. (continued)

Country	Researcher(s)	Institution(s)	n =
Mexico	Egbert Sanchez-Vanderkast	Universidad Nacional Autonoma de Mexico	23
Moldova	Silvia Ghinculov	Academy of Economic Studies	213
Norway	Ane Landøy; Almuth Gastinger	Bergen University, University of Science & Technology	1063
Peru	Aurora de la Vega	Catholic University of Peru	208
Portugal	Ana Lúcia Terra	Oporto Polytechnic Institute	262
Qatar	Nicole Johnson, Alicia Salaz	University College London, Qatar	105
Romania	Angela Repanovici	Transylvania University	188
Singapore	Shaheen Majid	Nanyang Technology University	49
Slovenia	Polona Vilar	University of Ljubliana	260
South Africa	Theo Bothma, Janneke Mostert, Leone Tiemensma	University of Pretoria; University of Zululand; University of South Africa;	3230
Switzerland	René Schneider	Haute Ecole de Gestion	170
Turkey	Serap Kurbanoglu, Güleda Doğan	Hacettepe University	214
United Arab Emirates	Patricia Jamal	Khalifa University	130
United Kingdom	David Bawden, Jane Secker, Chris Morrison	City University; London School of Economics & Political Science (LSE); University of Kent	696
United States	Diane Mizrachi	University of California Los Angeles	373
33 countries	43 researchers	38 institutions	Total n = 21,266

9 List of ARFIS Publications (Chronological Order)

- Mizrachi, D. (2014, October). Online or print: Which do Students prefer? In *European Conference on Information Literacy*. 733–742. Springer, Cham.
- Mizrachi, D. (2015). Undergraduates' academic reading format preferences and behaviors. *The Journal of Academic Librarianship*, 41(3), 301–311.
- Mizrachi, D., Boustany, J., Kurbanoglu, S., Doğan, G., Todorova, T., & Vilar, P. (2016, October). The Academic Reading Format International Study (ARFIS): Investigating students around the world. In *European Conference on Information Literacy*. 215–227. Springer, Cham.
- Mizrachi, D., Salaz, A., Boustany, J., & Kurbanoglu, S. (2018). Preferring print in a digital world: An international study of students' academic reading behaviors. *INTED2018 Proceedings*, 1328–1336.
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9.1 Published ARFIS Country Reports (Chronological Order)

- Boustany, J. (2015, October). Print vs. Electronic: What do French students prefer in their academic reading material? In *The Third European Conference on Information Literacy (ECIL) Abstracts*. 17.
- Kortelainen, T. (2015, October). Reading format preferences of Finnish university students. In *The European Conference on Information Literacy (ECIL)*. 446–454. Springer, Cham.
- Landøy, A., Repanovici, A., & Gasting, A. (2015, October). The more they tried it the less they liked it: Norwegian and Romanian student's response to electronic course material. In *European Conference on Information Literacy (ECIL)*. 455–463. Springer, Cham.

- Terra, A. L. (2015, October). Students' reading behavior: digital vs. print preferences in Portuguese context. In *European Conference on Information Literacy (ECIL)*. 436–445. Springer, Cham.
- Zabukovec, V., & Vilar, P. (2015, October). Paper or electronic: Preferences of Slovenian students. In *European Conference on Information Literacy (ECIL)*. 427–435. Springer, Cham.
- Johnston, N., Salaz, A., & Alsabbagh, L. (2016, October). Print and digital reading preferences and behaviors of university students in Qatar. In *European Conference on Information Literacy (ECIL)*. 247–255. Springer, Cham.
- Pálsdóttir, Á. & Einarsdóttir, S. B. (2016, October). Print vs. digital preferences. Study material and reading behavior of students at the University of Iceland. In *European Conference on Information Literacy (ECIL)*. 228–237. Springer, Cham.
- Pešut, D., & Živković, D. (2016). Students' academic reading format preferences in Croatia. *New Library World*. 117(5/6). 392–406.
- Pešut, D. (2016, January). Print or digital literature? Student survey at the University of Zagreb. In *Skupština Hrvatskoga knjižničarskog društva* (41; 2016).
- Põldaas, M. (2016, October). Print or electronic? Estonian students' preferences in their academic readings. In *European Conference on Information Literacy*. 238–246. Springer, Cham.
- Ríos Amaya, J., & Secker, J. (2016). Choosing between print and electronic... Or keeping both? Academic Reading Format International Study (ARFIS) UK Report. *Learning Technology and Innovation (LTI)*, London, UK. <http://eprints.lse.ac.uk/67028>.
- Rudžionienė, J. (2016). Print or Electronic: Vilnius University Faculty of Communication students' format preferences for study readings. In *The Fourth European Conference on Information Literacy (ECIL) Abstracts*. 84.
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- Bothma, T. J., Mostert, J., & Tiemensma, L. (2017). Print versus electronic reading preferences in South Africa: A case study at three South African Universities. In *The Fifth European Conference on Information Literacy (ECIL) Abstracts*. 24.
- Collina, E. (2017). "Print vs Electronic"... scontro o incontro?. *Biblioteche oggi*, 35, 25–32.
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- Johnston, N., & Salaz, A.M. (2018). Print versus digital preferences of university students in Australia. In *Proceedings of the VALA 2018 Conference*. <https://drive.google.com/file/d/17dcLKjR18QYsaStOTuhKt5uzbuGWirjW/view>.
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Secondary School Teachers' Attitudes to Information Literacy in Hungary, Lithuania and Poland

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Abstract. The paper presents the results of a questionnaire study in three countries on teachers' awareness of and attitudes towards information literacy instruction in secondary schools. Here we summarise the results of a survey we administered to the top 250 secondary school teachers (9–12 classes) in Hungary, Lithuania, and Poland (total 801 teachers) at the start of 2019. Our approach to the state-of-the-art definition of information literacy is developed by CILIP in 2018. Our main results indicate that the topic itself is unclear or unimportant for the teachers in all three countries. Almost one fifth of all respondents dropped out of the survey soon after demographic questions and questions on relevant concepts started. Those teachers who answered all questions overestimated their knowledge on information literacy, also, teachers in all three countries admitted they were not capable of teaching media and information literacy. The majority of teachers did not see librarians as responsible for information literacy teaching. Teachers saw themselves as leaders with the support of librarians. Over one third of teachers thought information literacy skills develop effortlessly.

Keywords: Information literacy · Teachers · Secondary school · CILIP

1 Introduction

1.1 Aims of the Study

This paper summarizes the results of a survey of secondary school teachers in Hungary, Lithuania, and Poland. We tried to gain a picture of their awareness and attitudes toward information literacy education. Also, we wanted to see if there was a difference between countries. Hungary, Poland, and Lithuania have similar histories of the development of information literacy (IL) activities. In each country, IL started only after the 1990s when the communist governments fell apart. IL in these countries has a weak foundation. They do not include information Literacy in school curricula systematically in any of the countries.

1.2 Background

In 2018, the authors of this paper from Hungary, Lithuania, and Poland investigated the prerequisites of coupling information literacy theory with school pedagogy¹.

We based our approach on the state-of-the-art definition of information literacy (IL), according to which it is “*the ability to think critically and make balanced judgements about any information we find and use.*” [1]. We have chosen this definition because it comprises not only information literacy itself but also media literacy, digital literacy, and data literacy.

We distributed the survey among teachers working with students (pupils) in classes 9–12 in the three countries. The survey included not only questions related to IL, but we also asked the teachers if they ever heard about media literacy.

We base this survey on a pilot survey among Lithuanian teachers on a sample of 102 participants in the spring of 2018. The pilot showed that the questionnaire was consistent, but it revealed that we should shorten it [2]. The questionnaire used for the present study has been changed accordingly.

2 Theoretical Background

A non-exhaustive review of the related literature shows that authors discuss a broad range of topics related to teachers' relationship to information literacy.

Klebansky and Fraser [3] underline that the underpinning philosophy of teacher education should move away from an exclusive focus on information technology. *UTAS Teacher Education Information Literacy (TEIL) Conceptual Framework*, developed at the University of Tasmania, exemplifies the idea by requiring “facilitating teacher education students to graduate as critical thinkers, problem solvers, informed decision makers and independent, self-directed lifelong learners” [3, p. 103]. Besides declaring this, the developers of this framework expressed a hope that their graduates as teachers would develop their students' IL capabilities.

Information literacy is on its way from being regarded as a set of skills to a evolving into a constructivist perspective, described among others by Limberg, Sundin and Talja [4] and by Lupton [5].

The Information Literacy Competency Standards for Higher Education [6], developed by the Association of College and Research Libraries was an influential document that approached information literacy as a set of measurable skills. However, it has been rescinded and replaced by the Information Literacy Framework for Higher Education [7] that stands for an approach, based on social constructivist philosophy, that “holds that knowledge is constructed and reconstructed through social interactions”, thus is “less reductive and more inclusive than the Standards' positivist approach, which assumes that information is objective and measurable” [8, p. 702].

In several cases, information literacy rarely appears in educational agendas or in teachers' minds. In their bibliometric investigation, Stopar and Bartol [9] scrutinised

¹ All of them are either members or associated members of the Research Team of Information Society and Information Literacy, established by the Doctoral School of Education at Eszterházy Károly University, Hungary.

elements of such digital competences as computer skills and information literacy that are strongly connected with education, information science, and libraries. It showed that there are still gaps between different research narratives in this field. Analysis of the context of secondary education is worth the effort.

As Engen [10] underlines it, the role of the teacher has undergone a dramatic change in a relatively short period, including the growing importance of digital competences. This is also true for information literacy, even though the requirements seem to be strongly influenced by the quest for digital competences. This attention may shed light on IL.

The palpable eminence of digital competences in educational settings may explain part of the confusion around the concept of information literacy that was revealed in semi-structured interviews with eight Canadian secondary school teachers who appeared to be unfamiliar with the term and were inconsistent in defining it [11].

An empirical investigation of teachers and students in primary and lower-secondary schools in the Czech Republic also exemplifies this shift. Rambousek, Štípek, and Vaňková [12] explored searching, filtering, and evaluating information, but without mentioning IL.

A survey of information literacy skills in Singapore showed that secondary school students often approach their classmates and friends with information-related problems, instead of turning to their teachers. Majid, Chang, and Foo [13] also mentioned that there is no study available in Singapore that would investigate the preparedness of teachers to teach IL skills.

Another survey measuring digital competences examined students taking part in teacher education programmes, often called pre-service teachers. Many of them adhered to the idea that the information-related capabilities of digital natives are inherent. Eighteen percent saw digital literacy development as “unfolding automatically or effortlessly, as a natural consequence of today’s students’ being immersed in the technological affordances of the digital age” [14, p. 150]. Skill-based approaches were predominant among surveyed students with a 54% share. These beliefs would apparently characterise views on IL.

Assuming that teachers need to feel competent and confident is essential in exercising IL, Demirel and Akkoyunlu [15] studied prospective teachers’ information literacy self-efficacy and found that they perform better than average.

There is a substantial number of papers that discuss the need for collaboration in the form of co-design, co-planning, and co-teaching between librarians and teachers in promoting information literacy. In her study of secondary teachers’ perceptions regarding information literacy instruction, Crary [16] underlined that collaboration should be mutual when planning lessons and integrating IL into the curriculum. School librarians rarely have their own classes that they would teach regularly. Instead, they have to rely on invitations from classroom teachers to teach these skills. However, the main impediment of collaboration is that teachers rarely have enough time to be involved in teaching IL. Those school librarians, who have assigned classes also have less time available to collaborate with classroom teachers on information literacy instruction. Sometimes, teachers are unwilling to collaborate with school librarians or use the school librarian to find resources instead of collaborating with them.

The existence of such impediments illustrates not only the appropriateness of asking for responsibility for teaching information literacy skills, but shows its pertinence to burning questions of collaboration between librarians and teachers.

3 Method

3.1 Data Collection and Participants

We conducted the study in the form of a survey using Computer-assisted web Interviewing (CAWI). Data were gathered via an online survey tool, 1KA.SI.

Data collection started on the 4th of February 2019 and came to an end on the 4th of May 2019. Respondents of the survey were teachers from secondary schools in Hungary, Lithuania, and Poland teaching various disciplines in 9-12th grade courses. Respondents for the research were selected from the top 250 best secondary schools. We used official school ranking lists in Hungary, Lithuania, and Poland. By the end of the survey period, data were gathered from 801 teachers: 215 from Hungary (HU), 378 from Lithuania (LT), and 208 from Poland (PL). Data were collected following confidentiality procedures. At the end of the questionnaire dropout rate was 18.85%. The last question was answered by 650 respondents. We will outline the exact number of respondents while discussing the results.

Teaching experience of the participants: less than 5 years (HU – 5.30%; LT – 3,0%; PL – 4.40%); between 5 and 9 years (HU – 9.10%; LT – 4.10%; PL – 7.80%); between 10 and 14 years (HU – 11.50%; LT – 8.20%; PL – 13.70%); longer than 14 years (HU – 74.20%; LT – 84.70%; PL – 74.20%).

3.2 Measures

We created the questionnaire to develop an understanding of secondary school teachers' knowledge of IL and practices implemented in developing students' IL skills (acronym – KILS).

This tool consists of 26 items grouped into three categories. The first category – demography included questions about the main teaching discipline, levels mainly taught, experience in teaching, and age band.

The second category addressed– teachers' familiarity with IL with questions about readiness for teaching IL, the main source of IL skills, and opinion about what IL is, being prepared to teach IL and schools policy on IL, experience in IL teaching, whose responsible to teach IL, and familiarity with concepts of information literacy and media literacy.

In the third category, – students' IL skills, we asked teachers to evaluate their students' IL skills through a five-point Likert scale where 1 was very low; 2 was below average; 3 was average; 4 was above average, and 5 was very high. We based the design of this part on the Big6 six-stage model [17].

The elaboration of the questionnaire started in English. The authors discussed every question in English trying to catch possible misunderstandings while translating into the respective languages – Polish, Hungarian, and Lithuanian. Since the language of the

research team is English, and the members are using the same terminology, everyone translated the questions into their own language using a technical language, ensuring that there are as few problems as possible with linguistic understanding. The questions were written as simple constructions as possible to avoid language traps of translating complicated expressions.

The authors tested the questionnaire in a pilot study in Lithuania in 2018 with 102 teachers [18] and felt assured using the questionnaire for the wider scope survey. The results are presented in this paper.

This research will support a research project aiming to harmonize various IL theories with the proper application of IL to public (K12) education. The authors invite researchers to use the same questionnaire in their countries and share data for comparison of results.

3.3 Analytical Approach

We focused on differences and similarities between countries. We used PSS 23 version to analyse the data set.

4 Findings

4.1 Familiarity with the Concepts

Teachers in all three countries felt confident with their knowledge of media and information literacy concepts.

Most familiar with IL concepts were teachers from Poland (96.1%). Teachers in Lithuania (83.7%) and Hungary (87.6%) expressed a bit less knowledge of the concept.

It was quite a different case with regard to knowledge of concepts in Media Literacy. Teachers' knowledge in Hungary (86.7%) and Poland (87.7%) were very similar while teachers in Lithuania showed the lowest result –75.7%.

Half of the teachers from Lithuania (53.6%) and only one fifth from Poland (21.7%) and Hungary (15.3%) strongly agreed or agreed that IL skills are the same as library skills. Two thirds of teachers from Lithuania (78.2%), almost half of teachers from Hungary (41.9%), and just a quarter from Poland (25.6%) strongly agreed and agreed that IL skills should be taught explicitly. The majority of teachers from Lithuania (83.8%), 73.4% from Poland, but only half from Hungary think that IL is concerned mostly with information and communication technologies. The experience in teaching and age did not have an impact on how differently teachers knew conceptions of IL or media literacy. Almost half of the teachers from Lithuania (41.9%), but only a quarter of teachers from Poland (27.1%) and Hungary (23.9%) thought IL skills develop naturally while students do research assignments. Teachers with longer than 14 years' experience more often agreed or strongly agreed that IL skills could be acquired doing research assignments. Almost half of the teachers from Lithuania (41.9%) thought it is teachers' responsibility to teach IL skills, while more than half of the respondents from Poland (56.2%) and Hungary (63.8%) thought IL skills should be taught in collaboration with librarians but led by teachers (see Table 1). A bigger part of more mature teachers, especially teachers with longer than 14 years' experience, in comparison with less experienced teachers, think that this is solely a teacher responsibility.

Table 1. Responsibility to teach information literacy skills (percent)

	LT	PL	HU
Teachers' responsibility	41.9	33.5	24.8
Librarians' responsibility	0.3	5.4	2.9
Led by teachers, but in collaboration and support of librarians	33	56.2	63.8
Led by the librarian, but in collaboration and support of teacher(s)	15.1	4.9	8.6

4.2 Experience and Knowledge Acquired on Information Literacy

More than half of the teachers from Lithuania participated in special additional courses dedicated to IL (more details in Table 2). Half of the teachers from Poland and Hungary said they acquired knowledge in IL by themselves. Just one fifth of teachers from Lithuania and Hungary said a course on IL was part of their study programme. Teachers with longer than 14 years of experience more often than those having less experience in teaching, said they participated in special additional courses dedicated to IL or IL was part of their study programme.

Table 2. The main source of your information skills (percent)

	LT	PL	HU
It was part of my study program	22.1	7.4	17.7
I participated in special additional courses dedicated to IL	59.9	20.6	14.2
I learn with help of my colleagues/ family	3.5	11.3	9
I learn myself	8.4	53.9	43.4
I have never had the courses dedicated to IL	1.4	6.4	9.7

Two thirds of teachers from Lithuania and half from Poland and Hungary said they included some materials connected to IL during their courses. Less than one tenth of teachers teach the course dedicated to IL (see Table 3). A bigger part of experienced teachers (working 5 years or more) compared with teachers teaching less than 5 years, taught a course dedicated to IL or cooperated with other teachers in teaching/preparing course dedicated to IL compared to teachers working less than 5 years.

4.3 Preparedness to Teach Information Literacy

Only one tenth of teachers from Lithuania and Hungary felt very well prepared to teach IL courses, while in Poland 20% of teachers felt well prepared. See more in Table 4. A larger proportion of experienced teachers (working 5 years or more) compared with teachers having less than 5 years experience felt very well prepared to teach IL courses compared to those working less than 5 years.

Table 3. Experience in information literacy teaching (percent)

	LT	PL	HU
I taught the course dedicated to IL	10.2	8.3	5.5
I was cooperating with other teachers in teaching/ preparing course dedicated to IL	3.6	8.8	11.8
During my courses, I included some materials connected to IL	72	57.4	53.6
I think that IL teaching is not the topic I should be concerned	9.4	24.5	20

Table 4. Readiness for teaching information literacy (percent)

	LT	PL	HU
I feel very well prepared to teach IL courses	10.2	20	11.7
I think I should learn more myself to teach IL courses	25	30	39.8
I would like first participate myself in organised IL course to teach IL courses	23.3	17	25.2
I would like to teach IL courses in cooperation with some other person (i.e. librarian)	5.4	11.5	5.8
I don't think I could teach IL courses	34.7	21	14.6

Half of the teachers from Hungary (48.6%), but only a third from Lithuania (26.2%) and Poland (29.5%) felt prepared to teach IL skills by themselves. Half of the teachers from Lithuania (57%) and Hungary (55.4%) and a bit less from Poland (38) were suited with common methods/processes for helping students to deal with information. One third of teachers from Poland (32%) and Hungary (32.7%), but 42% from Lithuania expected students coming to secondary school already have good IL skills. Just one fifth of teachers from Poland (19.0%), but one third from Lithuania (34.6%) and Hungary (29.7) saw a librarian as an expert in educating students in IL. A third of teachers from Lithuania (28.6%), Poland (23.5%) and Hungary (32.7%) admitted that their school had a school-wide IL skills development plan. Also a third of teachers from Lithuania (32.7%), Poland (36.5%), and Hungary (27.7%) think they were provided at their school with a variety of strategies for teaching information skills to students.

5 Discussion

Teachers in all three countries did not look capable of teaching media and IL. A minority of them understood the concepts and ways of implementing IL in school curricula and most started their studies and career at school more the 14 years ago. This means they had a rare chance to study concepts of media and IL at university as first introductions to IL. Their respective countries started teaching about IL approximately 20 years ago and wider implementation into studies took place just ten or fewer years ago. Interestingly,

12% (74) of teachers with longer than 14 years' experience said IL was included in their study program. This fact is open for further analysis. No one respective country had analysed the history of IL implementation in study programmes, especially those preparing teachers. Also, we saw that teachers had diverse practices of how IL should be implemented in school curricula. Not any of the three countries had a systematic state-wide approach to IL. In most cases, IL was seen just as a temporarily activity completed in one or two yearlong projects that had no backup after the project. Just a minority of teachers outlined that their school had school-wide information literacy skills development plan and believed their school provided a variety of strategies for teaching IL.

The majority of teachers overestimated their knowledge of IL. Most said they knew concepts of media and IL. But answers to other questions let us see with suspicion their confidence because of their inconsistency of defining it. First, some teachers commented that two questions were identical when we asked separate questions on the concept of IL concept and the concept of media literacy. Second, most of the teachers thought IL was the same as library or ICT skills. It seemed teachers saw IL primarily as skills, while nowadays, the much bigger assertion is given to seeing the conception via a constructivist approach Limberg, Sundin and Talja [4] and by Lupton [5].

We saw a high number of dropouts – almost one fifth of all answers. It showed that some teachers did not feel comfortable with the topic. They stopped answering the survey soon after they completed demographic questions. The highest dropout rate started with the questions about concepts of media and IL.

The majority of teachers did not see librarians as responsible for IL teaching. Teachers saw themselves as leaders with the support of librarians. It recalls the most recent research in the field where the importance of co-design, co-planning, and co-teaching between librarians and teachers is highlighted [16]. On the other hand, one third of teachers saw librarians as qualified in IL. This trust in librarians' competencies could be seen as a motivator for co-teaching.

The results showed that teachers have scarce experience and knowledge gained on IL and were not prepared to teach IL. It goes in line with the insights of Engen [10] who underlined dramatic change over a short time and problems teachers face gaining digital competencies.

Interestingly, over one third of teachers thought IL skills developed effortlessly. This was twice as high a result as in List's research [14, p.150]. This could be the reason why one fifth of teachers thought IL teaching was not the topic they should be concerned about. Also, it could be a reason why over one third of teachers expected students coming to secondary school should already have good information literacy skills. It is important to underline that teachers with longer than 14 years' experience more often than their younger colleagues thought they were well prepared to teach IL, and IL skills can be acquired just by doing research assignments.

6 Conclusions

Hungary, Lithuania, and Poland teachers' awareness and attitudes toward IL education were different. Despite having more or less the same foundation on the field, teachers'

views were different in most cases. Poland and Hungary had more aspects in common than Lithuania with Poland and Hungary. Poles and Hungarians indicated independent learning as the primary source of acquiring IL skills (see Table 2) and most believed that learning of the IL elements should be, first of all, the responsibility of teachers or teachers cooperating with librarians (see Table 2). Their previous experience with learning IL was also similar: more than half included elements of IL in their classes, and about 20% did not have such experience and did not see the need for such activities (see Table 3). At the same time, the observed distribution of answers between different variants in the case of questions about experience and readiness for teaching IL might show that in Poland and Hungary the process of including IL into schools' curricula was advanced (probably more than in Lithuania) but still far away from that state when teachers feel comfortable as IL mentors.

In this context, there are apparent differences in the attitude of Lithuanian teachers. They gained their skills mainly based on additional courses (see Table 2), but a large part of them still felt the need to expand their skills, and a much larger group than in other countries does not feel able to teach IL yet (see Table 4). Lack of knowledge confirms, for example, the quite common equating of IL skills with library skills. Interestingly, it was Lithuanians who most often included elements of IL in their classes and least often considered that IL teaching was not the topic they should be concerned about (see Table 3). Such results may indicate that in Lithuania there was intense pressure on teachers to include these elements in the curricula and teaching, but still, there was no adequate support for the development of teachers' own competences.

Interestingly, Lithuanians were also the least willing to cooperate with librarians (see Table 1, 3 and 4). In this regard, it is worth looking at the results of cooperation included in Tables 1 and 4. Also, in Poland and Hungary, where more than half of teachers initially declared sharing responsibility for teaching IL (Table 1), there was very little willingness to cooperate in this area (11.5% PL, 5.8% HU Table 4).

These are important observations that allow us to formulate some recommendations regarding the activities needed on the part of librarians. IL was not included in schools' curricula systematically in any of the countries, which is a severe problem when IL is indicated as the main weapon in the fight against the scourge of our time – fake news. There is a clear need to support teachers in this topic, but they are not ready at the moment to invite librarians to cooperate. It is librarians who should take the initiative and prepare materials and aids adapted to include in teachers' courses, on their side is also the initiative to propose cooperation in such a way as to share tasks effectively. As our study shows, it is a real opportunity for librarians to prove their value by supporting the education process with their actions.

Acknowledgments. This paper is one of the outcomes of the research project EFOP-3.6.1-16-2016-00001 “Complex Development of Research Capacities and Services at Eszterházy Károly University”.

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**Information Literacy and Democracy,
Citizenship, Active Participation**



Fostering Critical Thinking in an English Communication Class: A Plan for a Master in Tourism

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Abstract. To face digital disinformation individuals must be educated to acquire, use and communicate information in a critical way. Kuhlthau et al. (2015) suggest educating people from a young age through the joint efforts of teachers, librarians and subject experts. Motivation is triggered by activating the *Third Space*, which connects curriculum to real life. The first part of the paper moves from a literature review to answer some questions based on these assumptions. Subsequently, two experiences focused on tourism communication are related: embedding information and media literacy in a Communication in English class in a Master's degree course at the Université Gustave Eiffel, and organising a workshop at BOBCATSSS2020 Conference in Paris. Moving from Fake News in information about tourism on social media, the Third Space is easily activated by an everyday experience of being a tourist. Building on the two cases, the authors reflect from their different viewpoints of librarian and teacher on increasing critical awareness of learners as global citizens while teaching English for Special Purposes.

Keywords: Critical thinking · English for tourism · Misinformation · Fake news · Information and media literacy · Third Space

1 Introduction

2016 is considered the “post-truth” year [1], a cornerstone in the study of the spread of any kind of inaccurate information in the digital context. Fostering global citizens' right to “Seek, receive and impart information and ideas in any media and regardless of frontiers” [2] is a prerequisite to the making of active citizens, information-literate individuals with “the ability to identify, locate, evaluate, organize and create, use and communicate information” [3] and, supposedly, to use their critical attitude to detect fake news.

Since that year, the occurrences of “fake news” have grown exponentially both in the news, and in academic literature: a Scopus search for “fake news” returns 42 hits years 1959–2015 and 1673 for the years 2016–2019. Web of Science yields similar

results, and naturally they come from multiple disciplines. In 2017 Wardle and Derakshan rightly objected to its use, it had become a buzzword, “woefully inadequate to describe the complex phenomena of information pollution” [4] which includes a constellation of phenomena, including disinformation, misinformation and malinformation. Delving into definitions would not fit in the scope of the present paper, and references abound [4–8]. The occurrences show the perception of a critical issue driving international bodies to action. The EU dedicated a High Level Expert Group in 2018 and the World Economic Forum Global Risks report highlighted the danger it posed in 2013, 2018 and again in 2021. The scholarly community suggests interdisciplinary solutions [9], via a combination of machine-driven methods and education-induced attitudes [10] like increasing citizens’ digital literacy. According to EU Digcomp 2.1 framework, 21st century citizens are able to “evaluate data, information and digital content” [11]. UNESCO has a media and information literacy [12] strategy, and IFLA emphasizes the role libraries can play in fostering a critical attitude to information [13].

This influenced the theme for BOBCATSSS2020 conference in Paris, “Information management, fake news and disinformation”. It happened – though nobody knew at the time - on the eve of the pandemic, which would have bitterly demonstrated the effects of disinformation on people’s lives. It was also the place where the idea for the present paper germinated: the authors, a librarian and a teacher, met at that conference and began a reflection on the benefits of a subject-expert teacher and a librarian teaching together critical attitudes to information, be it curriculum-related or not. As Sullivan [14] underlines, the success of fake news is determined by psychological reasons, since confirmation bias is an “unconscious process whereby we also understand, interpret, favor, and remember information” [14]. In other words, people stick to their biases as long as the latter allow them to feel part of a community [10], so the presentation of contrarian information – no matter how accurate – will simply cause them to retain what confirms their bias and disregard the rest.

Since the beginning of her research, Carol C. Kuhlthau [15] has valued the role of emotions. The guided inquiry design process she developed with Leslie Maniotes and Ann Caspari [16] is sensitive to what happens in the soul and mind of the learner: emotions are at stake when the research begins, when motivation is stimulated through the activation of the Third Space, the area where curriculum meets the learners’ real world, where their real interests and needs lay.

The eight stages in the process guide the learners to the formulation of a research question which is personally meaningful and support them in the difficult task of looking for an answer, thus entering Vygotsky’s zone of proximal development, thanks to the support from seniors or peers. This is what Bruner developed into the concept of scaffolding and Kuhlthau translated into the zone of intervention, “that area in which an information user can do with advice and assistance what he or she cannot do alone or can do only with difficulty. [...] Intervention outside this zone is inefficient and unnecessary, experienced by users as intrusive on the one hand and overwhelming on the other” [33].

In other words, the model uses emotions to enhance learning of information literacy skills, therefore it might be the key to counter the psychological side-effects of disinformation when offering notions of information and document organisation: a motivated, involved learner might be willing to listen deeply.

The issue is how to enhance participation. Kuhlthau et al. recommend beginning the inquiry process, the “Open” phase, by drawing learners into the topic in a way that makes them see the connection between the work they are set in class and their interests outside class.

The topic of fake news in tourism – which was the object of the workshop one of the authors presented at BOBCATSSS2020 - is extremely promising: practically everyone has been a tourist at some time, and it is easy to imagine how a holiday could be disrupted by inaccurate information. Moreover, the idea of looking at fake news circulating on social media has the advantage of bringing students into an environment that is familiar to them even outside class, therefore stimulating activation of the Third Space.

The prospective cooperation among the two authors to test their ideas was greatly disrupted by the onset of the pandemic, but the reflection was carried on and is here presented, with the hope that further experiences will be built on that in the future.

2 Research

2.1 Research Questions

Kuhlthau et al. (2015), recommend that the goal of teaching information literacy and critical thinking should be that learners develop their own research question. The process requires a joint effort of different professionals and that learners be motivated by activating the Third Space [17]; in other words, they must realize that what they are learning is connected to their real life, outside class. The first research question (RQ1) is if there is evidence of course experiences at higher education level taking into account the Third Space approach, and whether they actively involve librarians or not. To answer this, a literature review was conducted and the emerging trends were compared with Kuhlthau’s principles.

The second question (RQ2) builds on the results of the first: if learning is enhanced when the Third Space is activated, that is when students see the connection between curriculum and real life, could the workshop presented at BOBCATSSS2020 represent the opening for an effective learning experience? To answer this, the workshop is described, observed from the viewpoint of both the language teacher and the librarian. It was planned moving from a topic – fake tourist offers – and communication tools – social media – that are close to the students’ experience in the real world: being tourists and using social media. Observations on the experience will be shared.

2.2 Methodology

As regards RQ1, a literature review was carried out, looking for experiences in higher education from 2016 to March 2020 at global level. The authors have a common background in languages, but their further experience diverges: education and teaching and library and information science. The two selected databases – ERIC and LISTA - cover both areas.

ERIC (Education Resources Information Center), produced by the Institute of Education sciences at the U.S. Department of Education, has made funded research publicly

available on open access since 1998. The selection policy is English-language biased, but its full description allows clarity of judgement. Most documents listed are available on open access.

LISTA (Library, Information Science & Technology Abstracts) was selected because of its wide coverage in the LIS area and long history – since the 1960s. It is a proprietary but free database, in English, though about a quarter of content is from non-English countries.

Both being English-centered is a drawback as it undoubtedly tends to obscure other experiences [18], and this is to be borne in mind when considering the results. Nevertheless, the articles selected describe worldwide experiences as well, though the majority is US-based.

Searches were led to extract different datasets which were afterwards combined. The following search strings were used, for all of them the limit date set was 2016–2020 (Table 1):

Table 1. Search strings and total hits/relevant hits per database

Search string	#hits in ERIC/#relevant hits*	#hits in LISTA/#relevant hits
“critical thinking” AND (“information literacy” OR “information and media literacy”)	54/51	61/24
“critical thinking” AND (“information literacy” OR “media literacy”)	72/19	<i>Same results as the above</i>
“critical thinking” AND “digital literacy”	11/3	6/2
“kuhlthau”	12/6	12/0
“fake news” AND (“information literacy” or “media and information literacy” or “media literacy”)	17/15	51/36
“fake news” AND “digital literacy”	1/1	3/1
“fake news” AND “Third Space”	0	0
“Third Space” AND “information literacy”	0	0
“Third Space” and “critical thinking”	1/0	0

*ERIC records were filtered by HE (Higher education).

**LISTA records were filtered by kw “higher education or college or university or post secondary or postsecondary”

The initial results (#hits) were exported to Zotero to be organised and deduplicated. The lists of unique results were refined, after examining title and keywords, and records not describing course experiences were discarded. Dubious cases were included, and the figures of the remaining ones were tagged as relevant in the tab.

Only for this unified set of records, which was limited, an analysis of the abstracts helped single out those containing reports of structured learning experiences - courses, workshops, debates - whose learning goals could be ascribed to the area of critical thinking and information literacy. Since the aim was to analyse experiences motivating learners, interaction among instructor and learners and among peers was another opt-in. Self-learning activities, tutorials, communication events were left out.

The resulting set amounted to 62 records. The articles were browsed for further details, and the set narrowed to 44 records (see Table 2 for details) relevant to our purposes, excluding articles referring to wider initiatives at campus level or to surveys on literacy competencies.

The answer to RQ2 relies on empirical experiences of in-class teaching to observe patterns and trends. Some conclusions and ideas for further experiences are shared.

2.3 Outcomes/Results of Our Research

RQ1: The articles from ERIC and LISTA describe courses taught in an academic context with the goal of improving information and digital literacy skills, or critical thinking in the face of fake news. They show that teacher-librarian cooperation is not the rule, in fact sometimes libraries are not involved at all. Moreover, few experiences are semester-long or part of an institutional plan. Kuhlthau's lesson and Third Space are not explicitly referred to, but constructivist theories, awareness of the importance of critical thinking and information literacy as skills to counter the spread of disinformation are generally present.

Table 2. Results of the literature review – Final set (44 records)

	Published	Mentioning Fake news	Country (# of pub)
2016	10	0	USA (31)
2017	10	1	Canada (5)
2018	12	6	Australia (2)
2019	11	9	Germany (1)
2020	1	0	Qatar (1)
Total	44	16	
<i>involving librarians</i>	27	9	

Out of 44 experiences, only 27 articles mention librarians directly, and most of them come from the LIS-based database, only 9 from ERIC. It looks like librarians are not perceived as natural allies by academic staff. Of the 16 articles mentioning Fake News, only nine also refer to librarians.

Most information literacy courses are taught within a specific discipline or course. 16 are in the STEMM area (science, technology, engineering, maths and medicine), some intersecting another area as well, for example journalism and STEMM, and references in that case are found under the prevailing area. No article reports experiences in the field of communication in English for tourism, though three refer to communication, and seven to English academic writing, sometimes specific to a discipline, such as medicine (Table 3).

Table 3. Disciplines involved, when mentioned.

Discipline	# records	Selected references
STEMM	16	[19–30]
English academic writing	7	[31–34]
Journalism	6	[35–40]
Social science & education	5	[20, 41–44]
Communication studies	3	[41, 45, 46]
Psychology	2	[20, 33, 47]
Business	2	[34, 48]
Gender & LGBT	1	[49]
Physical education	1	[50]
Tribal culture	1	[51]

Some highlights and statements from the thorough reading of the 44 articles are summarized below.

2.4 Definitions

The concepts chosen for exploration were critical thinking, fake news and information literacy. The analysis is led with a focus on the intersection of the concepts in the activity of information literacy, therefore a thorough definition of the concepts would be beyond the scope of the present work, which tries instead and draw some tendencies and facts from the experiences reported in the selected articles, from which some interesting points emerge on the three concepts.

Critical thinking is often defined as a prerequisite to active citizenship: more specific notions are civic online reasoning, civic engagement, defined as “people’s participation in individual or collective action to develop solutions to social, economic, and political challenges in their communities, states, nations, and world” [52]. Civic online reasoning is distinguished from both media literacy and digital citizenship [53]. It is based on *lateral reading*, that is learning about the context before actually using any online content, a skill better taught through active learning.

As regards *fake news*, almost all the articles date the phrase to 2016, mentioning the Oxford dictionary, Brexit and the US election. Auberry [52], quoting Mihailidis and

Viotty [54], says “It may seem reasonable to believe the opposite of fake news would be facts; however, [... the cognitive bias] has made facts a “rhetorical weapon” rather than a solution to fight fake news.” Relevant from a semiotic point of view the translation of the phrase into the Navajo word “Jini”, meaning both “they say” and “gossip” [51], which mirrors the development of the phrase in English.

The concept of information literacy “in Higher Education [...] contributes to academic competencies, research methodologies and an understanding of plagiarism” [55]. Yet, information literacy and critical thinking are skills on their own and their learning needs to be made explicit to assess their level. Information literacy is rarely a core topic [29, 33], but it has much to do with teaching how to learn and assess scientific analysis, asking epistemological questions, and deconstructing “the definition to the roots of ideological bias” [40].

2.5 Critical Thinking: Issues Peculiar to the Academic Environment

Probably, at academic level, the germ of critical thinking is the formulation of a research question [23], a skill which is sometimes taken for granted and which instead requires to be nurtured. In the early stages, students tend not to think critically of the sources recommended by teachers [56] and understand little the nature of academic information. Awareness must be taught [57]: they will learn how to “unravel their perspectives from ideas encountered within the works of established scholars”, when they enter into the discourse of their discipline, before they find their own scholarly voices, which also implies awareness of plagiarism [26].

2.6 Librarians and Libraries are Not Necessarily Involved

13 articles report on courses on fake news or critical thinking without much detail. Of these, some highlight a collaboration with faculty and one [51] puts critical thinking in the context of tribal culture. Tang & Tseng [58] make the point that one-shot sessions have little impact on learning. Some of the courses simply teach how to use library information resources, often as a means to promoting critical evaluation of information and news sources at large.

Librarians are not always mentioned, but they often are the authors. When this is the case, they generally refer to tools which are best known to them (e.g. the ACRL Framework, CRAAP, RADAR). Teachers have different, discipline-related tools. The presence of resources unknown to each other and often overlapping is a sign that communication between the two groups should be improved.

The topic of fake news is seen as a tool for library advocacy, drawing students and faculty to the library but also as a goal in itself. Teaching news literacy and creating opportunities outside class is an option when libraries work alone, yet a close interaction with faculty makes critical thinking instruction meaningful. “Incorporating faculty views with student views is imperative” [33].

Librarians may integrate disciplinary course goals with source evaluation and analysis of text and information formats. An analysis in an Earth science course showed that “students do not always discern the difference between opinion, or op-ed, columns and investigative pieces” [21]. Also, when teaching data literacy – strictly connected to

information literacy - librarians [44] could play a meaningful role, since they are often involved in their curation.

2.7 Proposing Examples of Collaboration Teacher-Librarian

The examples of close cooperation between faculty and librarian are not the majority, not even in such a focused sample, though it is recommended at various levels. Badia [25] shows that sharing the feedback with the teacher helps motivating students by tailoring learning activities to the needs of specific research fields and courses [23]. As external observers to the course, librarians are positioned to spark students' curiosity and help them become more creative about writing essays [31].

The best results come from collaboration over a long period with clear goals: the State College of Florida [32] supported scaffolded learning throughout one whole semester blending online activity with face-to-face sessions; the Hunter Library at the Western Carolina University used an iterative peer-to-peer process to deepen students' competence in designing and conducting an experiment in a chemistry class [26]. At Temple University Lewis Katz School of Medicine [28] librarians and faculty together managed to increase students' competence in finding answers to clinical case questions, and another experience relates on the benefits of editing Wikipedia *stubs* with physical education and kinesiology students [50].

Cooperation with the community is beneficial as well [36]: students from disadvantaged background "may lack formal training to assess information, [yet] they are no strangers to complexity" [35], and tribal librarians "are important in helping undo centuries worth of mistrust of the institution of education" [51].

Musgrove et al. [59] offer any librarian thinking of starting a program on fake news from scratch a state-of-the art analysis along with a rich overview of tools and methods.

2.8 Proposing Experiences that Build on Competences and Experiences of Participants, Through Emotional Involvement

A learning-by-doing approach is beneficial, especially with Millennials [40]. Example activities include writing a piece of fake news [52], being asked to teach their peers [36], interviewing professors on how to seek truth [45], interviewing peers to reflect on the research process [26] or blogging with them [40]; discovering how science is communicated in the media so as to be able to rebuke disinformation [21]. A special place has the human library [49]: after "reading" the human book on gender, sexuality, violence, equal opportunities, students are invited to retrieve articles from the library databases on the same topic and to compare them.

According to Smith [60], the point is not the students' accumulation of knowledge, but helping them use the competencies that in some cases they already apply in real life to the academic environment. Teachers build on the decision-making skills that learners demonstrate in real life, and help them transfer those skills into the academic environment [61]. Gaming [62] seems beneficial to learn to cope with failure. Themes that are close to participants' feelings and experiences may be beneficial in involving them and motivating them to learn: building on local cases of fake news [38], body image

and media representations of gender and race [46], or appreciating the impact on their future career of what they are learning [25, 28, 44].

Unlike the accumulation of information and facts, a learning process based on previous experiences and involving emotions penetrate deeply. The goal of academic education should be to create scientists who are able to interact with the world, even more so in STEMM [30].

2.9 Constructivist Theories are Advocated

Kuhlthau et al. [16] base their Guided Inquiry Design on learners building personalized research questions. The process has multiple stages, in the “Open” phase curiosity is stimulated to increase motivation. It is not about setting a task, but about having learners willing to ask deep research questions and looking for the answers. Joint efforts of teachers, librarians and experts stimulate motivation, if they aim at connecting the inquiry to the learners’ experience. Some examples in the articles show a similar approach: working jointly with faculty and the community students are motivated [36]; prospective doctors [28] and social workers [44] analyse individual cases to develop critical thinking skills; science and engineering students are taught to face historical disaster thus raising their sense of responsibility as to the consequences of their research on the world [30]. Collaboration between students of journalism and STEM raised the science and news literacy of both groups [39], which is productive to the communication of science, a goal in line with universities’ third mission.

Kuhlthau et al. are rarely mentioned, but similar considerations enter the stage. Apart from Smith [57], mentioned above, articles focus on the shaping of the research question [23], or Vygotsky’s zone of proximal development [57]. Kirkwood & Dejoie [48] build a course around life-based skills and experiences at Purdue and, in drawing from Fink’s [63] lesson, motivate students to become information literate as they look for the information they need for business purposes. Also Cooper [43] underlines the importance of basing critical thinking and information discernment courses on the students’ personal experience,” an important means to challenge hegemony in academic research”, since “Open discussion of the relationship between research and experience can help students to integrate life experiences with academic study in ways that develop reflexive criticality between the academic world and the life-world, and this potentially strengthens their understanding, their sensitivity, and their approach to professional practice.” This echoes the concept behind the Third Space approach, though reference to Kuhlthau or Maniotes is not to be found.

2.10 Conclusion to RQ1: Is There Evidence of Course Experiences at Higher Education Levels Taking into Account the Third Space Approach? Do These Experiences Actively Involve Librarians?

After the analysis, the conclusion is that teaching critical thinking in a fake news age is felt as a need in higher education institutions. Multiple examples of courses are related where the topic is embedded. As regards the methodology, the ideas to involve students emotionally, to scaffold their learning, to foster deep research questions, which are

behind Kuhlthau et al.'s work, represent principles that are actually highlighted in many examples. Yet, Kuhlthau's work and the Third Space concept are hardly mentioned.

The other strong pillar of Kuhlthau's work, though, is that the research process should teach students to cope with documentation, and this dimension is generally lacking in the examples. Language or literature courses might emphasize the written text, or the concept of sources, but the reflection on their content leaves little space for the reflection on structure that a librarian would do: when subject specialists teach critical search skills, they naturally rely on the sources and formats within their learning field – for example, novels for literature, archival materials for historians, newspapers and media for journalists. On the contrary, Kuhlthau et al.'s process involves looking at all sorts of sources, leading a meta-reflection on their formats as well as on their content, to develop objective evaluation skills.

As regards the librarians' involvement, they are not necessarily felt as allies. Many experiences are led without their contribution, especially those from ERIC database, focusing on education. Results from LISTA often are directly written by librarians, but they do not necessarily report on teacher-librarian collaboration. Anyway, in the examples where librarians are involved, their contribution is perceived as relevant.

2.11 RQ2: If Learning is Enhanced When the Third Space is Activated, Could the Workshop Presented at BOBCATSSS2020 Represent the Opening for an Effective Learning Experience on Fake News?

The answer to this question would have implied leading a workshop collaboratively, between teacher and librarian, exchanging views on evaluation of learning experiences and on how to blend their expertise. Unfortunately, the pandemic made this unfeasible, therefore the answer to this question cannot be given. Yet, a report of what was done and some preliminary considerations for a future experience can be shared.

In the months before the BOBCATSSS 2020 conference, the teacher organized a couple of lessons on Fake News and Information Literacy in her two Business English classes for Year 1 and 2 of the Master in Competitive Intelligence at IFIS (Université Gustave Eiffel). She chose the two classes of students who were involved in organizing the event, because they were deeply into the subject.

Some of the material used for the lessons comes from the Information Literacy sections of various university library websites (especially from <https://tinyurl.com/54d2fzpn>) and from IFLA. These sources turned out to be very useful, as they provide definitions, teaching materials and organize huge amounts of links into easy-traceable sections.

The teacher introduced the topic through a warm-up activity. At the center of the board, she wrote “fake news” and the students had to draw a word cloud of associated terms or phrases (Fig. 1).

After completing the word cloud, students had to find the definitions for all the words and expressions, using online dictionaries or other reputed online sources.

The following activity was to reflect on the way fake news spread. The students started by commenting on a quote (often attributed to Mark Twain): “A lie can travel half way around the world while the truth is putting on its shoes”. After a short discussion, the class watched the short TED-Ed animation lesson “How false news can spread”

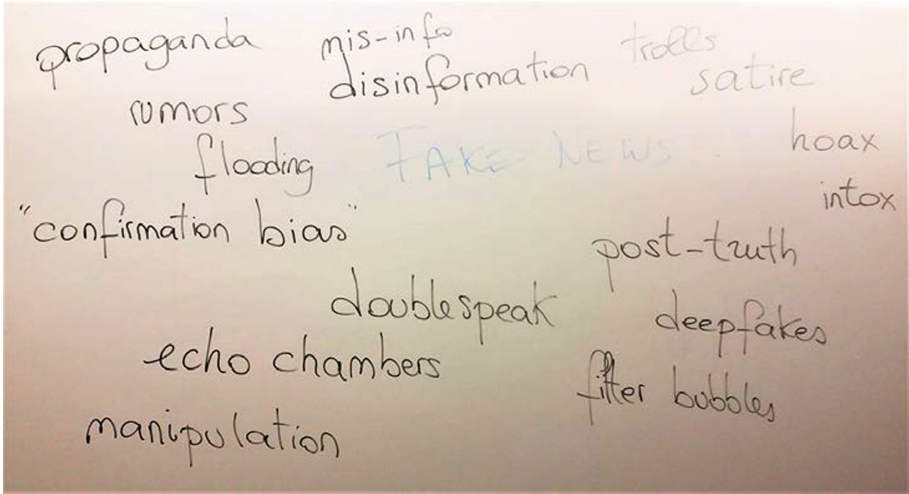


Fig. 1. Fake News word cloud developed in class

(<https://tinyurl.com/9wz698cs>), which focuses on the concept of “circular reporting”. The class discussed the information on the video and had to answer questions about circular reporting, offer some examples and explain how to avoid it. Questions then became more personal about their experiences in finding, sharing or fact-checking news and posts on their social media feeds.

One further activity, that students loved, was *FakeOut* (<https://tinyurl.com/3kva56>). It is an interactive course on fact-checking literacy. It starts with a quiz where respondents have to decide whether 10 news items are real or fake, and whether they would repost them. Once the quiz is finished, the module shows three short videos illustrating some effective validation skills, like how to quickly check and reflect on the source, the headlines and the images. After that, students take a new quiz, this time accompanied by a tutorial that explains all the elements to pay attention to.

After this class, the students worked on two home assignments. For the first, in groups, they had to prepare a presentation on a different article on the history of fake news and present it to the rest of the class. As for the second assignment, the author took inspiration from a reflective writing assignment in a course on fake news by PhD Andrew Asher [64]. Each student had to identify a claim from a current news story or news commentary (this might be from any news source they used regularly, such as one of their social media feeds or a blog or other website). Then check the claim using the strategies discussed in class (check for previous fact-checking work; go upstream to the source; check headlines language; and search for the image source).

The librarian’s proposals for this lesson would be that it could be useful to work on students’ awareness of fake news. For example, the *FakeOut* activity could be followed by a workshop where they collaboratively set up a list of tips to check news reliability, asking them how they could explain it to students with less expertise. Their results could be compared with IFLA infographic ‘How to spot fake news’, to see the differences.

Another follow-up could be enhancing the analysis of sources by asking them to focus on a topic, and have them ask questions for an argumentative text or talk. This could be a good way to introduce an induction session on information resources at academic level, in fact what they produce should be structured as an academic essay, and therefore they would be able to use the information resources of their institutional library and to apply the evaluation principles they have developed.

The teacher and librarian would have worked on these proposals/ideas, developing ways to assess participation and results, had the pandemic not changed their plans.

2.12 BOBCATSSS Workshop

For the Bobcatss Conference, the corresponding author designed a workshop where the audience had more “hands-on” fake news, at the same time applying information literacy teaching. This time, though, the audience was composed mostly of people in the Library and Information Science field: students, teachers and professionals.

In recent years, social media influence on choices of tourist destination, accommodations and restaurants has greatly increased with social media feeds, glossy Instagram pictures and customers’ reviews. Therefore, information literacy and critical thinking in these fields are essential skills to develop. Furthermore, business decision making is more and more based on consumers’ reviews, resulting in huge economic interests that are at stake when dealing with false reviews created by fraudulent businesses.

The author decided to focus her workshop on the impact of online social media promotion and reviews. She was interested in investigating and showing how online fake reviews shape offline popular perceptions and narratives in this sector of activity.

The BOBCATSSS workshop revolved around a group discussion, a case study analysis and a plenary discussion, meant to be food for thought for further reflection on fake news in the field of tourism.

The warm-up session was about the concept of ‘Blue Monday’, to make the audience reflect on the concept and question its truthfulness: the 3rd Monday in January is considered to be the “saddest day of the year”, every year. The Canary Islands tourist office turned this concept into a promotional slogan, making it their brand. For several years now, their marketing strategy has been *#StopBlueMonday*. The idea is very simple: the saddest day of the year does not exist in the Canary Islands or anywhere else. It is in fact *fake news*! Central to the campaign is a video - the most highly used format on mobile device - a new one every year to reformulate this idea (<https://tinyurl.com/8r2rsxs>, <https://tinyurl.com/xae5z9b9>). The author drew the audience’s attention to the last sentence of this short film: “Don’t let any comment, any news, any invented formula manipulate how you feel”. It could be added “and how and what you think”. Manipulation is the keyword here, as in any piece of fake news. This leads to the question of why fake news is created and what its aim is.

The author went on by asking the audience to what extent they read and trusted reviews for restaurants, hotels, and tourist activities in general. Then she proposed a group activity, where each group had to set up a fake restaurant, café or tourist resort, and devise a social media strategy for it. They had to use all the marketing techniques, social media tools and oratory skills that they knew to convince their prospective customers. Participants were provided a worksheet with useful points to reflect and work on for their

project: name, place, short description, means of promotion and on which social media, slogan, pictures, videos, how to get reviews and who was going to write the reviews.

The groups reflected and discussed for one hour, then each group presented their project and social media strategy. The purpose was to have them reflect on creating a fake business and collect their comments. While designing this activity, which the audience found funny and enjoyable, the author had in mind the social experiment led by Oobah Butler in 2017: in an 18-min video, Butler explains how he brought a totally made-up restaurant to No1 in London on TripAdvisor. A few extracts from the video (<https://tinyurl.com/u9kww7bz>) were shown, especially those describing how Butler duped his followers, created charming images, fake reviews and even received a PR offer to represent his business. Showing this documentary after the activity was extremely effective, as the groups, more than being amused, could compare their experience. As a conclusion, the author asked the audience to discuss and come up with a check-list of how to avoid to be fooled by fake reviews.

The LIS participants' feedback, which was collected via an open discussion, was that it had been extremely entertaining and involving to step outside their usual area of interest and discuss the effect of critical thinking on real world situations. It was also agreed upon that proposing such an activity in class would create a positive attitude to be built on: with the awareness students may gain, they should be led to reflect on other topics, using also sources different from social media, and leading to a shift in attitude when confronting other course-related issues. Moreover, such an activity could build the basis for a trans-curricular activity to build critical thinking attitude in students relating to different subjects. In fact, it is not to be taken for granted that critical thinking in a field will be transferred to another [61], those who are competent in medicine may be fooled by unreliable tourist offers when they decide to go on holiday.

3 Conclusions

In summary, some conclusions can be drawn.

As to RQ1, the literature review demonstrates that, though the founding principles of Kuhlthau's work are shared, her process finds little space in the practice as well as the attention to documental organization. Another finding is that librarians are not often involved in the design and development of courses on critical thinking and information literacy, even though they could draw students' attention on more structured documental aspects which may contribute to a fuller perception of the topic. Cooperation between librarians and subject-experts would be beneficial to the learners, as they take advantage from professionals with different but complementary expertise. After all, materials produced by libraries, freely available on the Internet, were deemed useful by the language teacher in her lessons on fake news and information literacy. On the other hand, the English teacher brought a totally fresh vision to teaching, linked to everyday life and social media, an approach likely to increase attendants' involvement.

As to RQ2, it will have to be put on hold until the situation will make a closer collaboration between teacher and librarian feasible. For the time being, only the impressions from the experiences can be related, but their value is simply to be considered as an example and a starting point for a deeper reflection.

The BOBCATSSS workshop allowed participants to interact and counter fake news in a ‘protected’ learning environment. This enhanced their involvement without activating the self-reinforcement trap of echo chambers, where members of a group seek individual recognition, continuously share the few ideas they have in common, and eventually reinforce their initial opinion [65]. In a learning environment, instead, working with peers, participants counter-balance the effects of disinformation on a psychological level and might raise awareness of its traps. The involvement and participation of the attendees (around 30) that participated at the workshop demonstrate their eagerness to a learning-by-doing approach when they played “spotting the fake” or became smarter in detecting fakes in the tourist and restaurant industry. Having to create their own fake business gave them the chance to successfully activate the *Third Space* and to appreciate the strategies and techniques that could lie behind an attractive slogan and glossy images. At the same time, attendees realized the strict link between tourism and their life as citizens and users of Web 2.0, with all its pitfalls, especially due to user-generated content, and the value of such experience.

The teacher applied techniques that are proper to language learning and the constructivist approach, starting from warm-up sessions, or “Open” phase in Kuhlthau’s term, to raise curiosity and increase motivation, and moving on to hands-on activities, cooperation and group communication, which activate the attention.

Yet, to draw conclusions on how effective this is in the light of information literacy and critical thinking, further activity is needed in the future. This would imply embedding a librarian in the course to start a reflection on documental resources, to deepen students’ knowledge on document formats and the structure of information sources. A more thorough understanding of the power of text analysis and lateral reading could be stimulated by the different points of view of the teacher and the librarian. Moreover, since we live in an image-oriented society, image-literacy skills (like the way images are produced and what they can hide) represents a fundamental part of wider critical thinking competences. The future collaboration would also involve devising a critical thinking assessment strategy.

Nevertheless, the cooperation and reflection on the topic will continue, as fake news, disinformation and critical thinking in the sector of tourism in its different aspects will still be up to date.

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Digital Participation, Surveillance, and Agency: Insights into the Role of Digital Literacy to Manage Risk

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Abstract. This paper contributes to our understanding of digital inequalities, and the empowering role of digital literacy. We report on a study examining the social media related information behaviours of Muslim women within a Muslim nation that provides insights into the role of digital literacy to circumvent sociocultural boundaries and manage risk. Social media provides our participants with an important source of everyday information, and important medium for social connection and personal expression; however, our participants' use of social media is closely monitored and controlled by family, and in particular, by husbands and/or male relatives. Carefully managed privacy settings and pseudonym accounts are used to circumvent boundaries and move between social and information worlds, but not without risk of social transgression. Findings contribute to our conceptual understanding of digital literacy including social, moral, and intellectual aspects.

Keywords: Information behaviour · Digital literacy · Digital citizenship

1 Introduction

Digital literacy is widely acknowledged as fundamental to everyday life, but digital literacy is also a multifaceted concept often simplistically reduced to a set of functional technical skills, with calls for broader understanding encompassing functional, cognitive, and sociocultural aspects [1, 2].

We report on a study examining the social media related information behaviours of Muslim women within a Muslim nation that provides insights into the role of digital literacy for circumventing sociocultural boundaries and managing risk of social transgression. Findings contribute to our understanding of digital inequalities, and our broader conceptual understanding of digital literacy.

2 Background

The findings reported here are part of a research study exploring the social media related information behaviours of Muslim women within a Muslim nation. We reserve reporting the full findings of this research for future publication and focus here on digital literacy aspects.

2.1 Muslim Women as a Study Group

It is beyond the scope of this paper to comprehensively discuss Muslim women as a study group, and to reflect all groups (Muslim women not being a homogenous group, and Arabian Peninsula nations variously more conservative or liberal than others), but it is nonetheless important to succinctly contextualise this study.

In broad terms, Arab society is authoritarian, collectivist, and patriarchal. Privacy, reputation, and honour are important values governing social norms and behaviours, and can be particularly conservative for women including strict gender segregation and dress codes. Various constitutional reforms have advanced the economic, political, and social rights of women across the Arabian Peninsula; but employment rates of women remain low relative to men [3], and personal status laws (family law) in several nations continue to discriminate against women [4, 5].

2.2 Previous Studies

There are limited previous studies providing insight into the use of social media by Muslim women within Muslim nations, and few focused solely on women. To date, no studies have been undertaken from an information behaviour perspective; and whilst insights can be drawn from other disciplines (e.g. Media and Middle Eastern studies), some studies involving both male and female participants provide no breakdowns by gender [6–8].

Previous relevant studies report social media as providing Muslim women in Muslim nations with important access to information and social networks that overcome societal restrictions, and in relation, provide an important medium for self-expression. Some report empowered users and new found freedoms [9–11], but the majority also report participants as routinely engaging in self-censorship in adherence with social norms, and whilst described in some studies as acts of agency within sociocultural boundaries [9–11], such behaviours are nonetheless restrictive. Issues of surveillance are also reported [9, 11–13], as are the use of pseudonym accounts [9, 10, 14]. A complex world is thus evident, and one not without risk. However, depth of insight is limited, in several cases due to low participant numbers and/or limited empirical data [10–12, 14], and in other cases due to the limitations of the survey instrument employed [9, 15, 16]. There is limited exploration of restrictions beyond personal image and gender boundaries, and issues of surveillance, whilst reported in four studies [9, 11–13], are evidenced in only two studies [9, 13]; and use of pseudonyms, whilst reported in three studies [9, 10, 14], are evidenced in only two studies [9, 14]. Further, in each case evidence is limited to either summary statistical count or selective quote. It is thus difficult to determine the nature, extent, and impact of social media restrictions experienced by Muslim women, and their responses to any restrictions. This raised two key research questions:

1. Do Muslim women in Arab society feel that their social media use is restricted, and if so, in what ways, and to what affect?
2. How do Muslim women respond to any restrictions in social media use?

3 Methodology

Our theoretical framework was provided by Chatman's (1996) theory of information poverty [17], which provided a framework for exploring issues of stratification and social justice alluded to in previous studies discussed above (for further discussion of concepts of information poverty in library and information science, see [18]; and in the context of social justice, see [19]). Chatman describes an impoverished information state as one in which people (to various degrees) perceive themselves to be devoid of sources of help, are influenced by outsiders who withhold privileged access to information, adopt self-protective behaviours in response to social norms, are mistrustful of the ability of others to provide useful information, withhold their true problems in the belief that negative consequences outweigh benefits, and selectively receive new information in response to their everyday needs (including a failure to see external information sources as of direct and immediate value to lived experiences). Chatman reports that in impoverished circumstances (though not exclusively, for example see [19, 20]), a stratification of information access and use will be evident in a "world on which [social] norms and mores define what is important and what is not" [17, p. 205]. Whilst guided by Chatman's (1996) theory of information poverty, our overall approach also incorporated an inductive element (see data analysis).

A purposive approach to sampling defined participant inclusion criteria as being a Muslim woman with one or more active social media accounts, and resident within the study zone. The study zone (redacted for participant anonymity) was the capital city of a majority Muslim nation within the Arabian Peninsula. The study zone was within a nation with high wealth and low unemployment relative to many other Arab State nations, and with a high rate of population Internet use in comparison to many other Arab State nations (and high in global terms). Almost the entire population within the study zone is online with similar proportions of women and men [21–23].

Our data collection method was semi-structured interviews, designed to explore the role social media played in the everyday lives of Muslim women within Arab society, and the factors influencing their associated online information behaviours. One author of this study is a Muslim woman and citizen of the study zone, and conducted the interviews. Participants were invited to participate via a public post on Instagram. Interviews took place in public urban settings and were conducted in Arabic and recorded (subject to consent). Interview questions explored the role of social media in our participants lives, whether or not they felt that their use of social media was restricted in any way, and their responses to any restrictions that they experienced. Participants were also asked whether or not they used their real identities online (note prior informed consent protocols included making clear to participants that they were not required to answer all questions, and this was repeated prior to interviews beginning). Interviews were transcribed and translated into English for team analysis.

Data analysis incorporated both deductive and inductive elements, with data disaggregated into meaningful categories via identification of patterns and regularities through iterative pattern coding and thematic analysis as per Braun and Clarke's (2006) recommended steps of [24]: data transcription and familiarisation; initial code generation; collating codes into themes; reviewing themes; refining themes; and producing themes. Initial start-list codes were based on Chatman's [17] concepts of information poverty

(e.g. self-protective acts of secrecy or deception). Further codes were emergent including those relating to the sources and nature of any restrictions, responses to restrictions, and the role of digital literacies.

Ethical approval was obtained via Institutional Ethics Committee, with the study run in strict accordance with institutional guidelines for investigations involving people. All participation was voluntary. Given the nature and sensitivity of the topics explored, all findings (and background information including specific nation within the Arabian Peninsula region) that might act as participant identifiers have been redacted.

4 Findings

Our fourteen Muslim women participants were aged 25–35, with an average age of 30. Twelve of our participants were in employment, one was unemployed, and one was a university student. Twelve of our participants possessed university graduate qualifications, one was currently completing university, and one had completed high school. Seven of our participants were married, three were divorced, and four were single. Of the ten married or divorced participants, eight were variously mothers of between one and five children.

4.1 Social Media Use

All our participants confirmed that they were active everyday users of social media. The most popular applications (see Table 1) were universally identified as Snapchat, Instagram, Twitter, and WhatsApp. Some also mentioned the use of Facebook, and one the use of LinkedIn.

Participants discussed a variety of reasons for using social media, categorised as: communicating with friends and family including platonic male friends difficult to communicate with elsewhere; following the latest trends and lives of others including popular celebrities and bloggers; an important source of news, health, and travel information; and an important medium for the expression of personal thoughts and feelings. In relation, several described social media as extremely important. For example, one participant described social media as their “main education source” and felt that “Without social media we would be living in darkness.”; and another described social media as “as important as our daily needs” as it provided “...new ways to think, new friends, new opportunities, information and beyond”.

4.2 Restrictions

When asked if they felt that their use of social media was restricted in any way, several participants discussed restrictive sociocultural norms and boundaries, and in relation, all discussed surveillance by husbands and/or male relatives (see Table 1).

For example, one participant commented “I feel that I am being watched by my husband, my brothers, or even my cousins”, another that, “I am watched by every man in my life”. Monitoring by husbands and male relatives could also include control regarding what could and could not be accessed and shared by our participants. For example, one

Table 1. Participant social media use and surveillance.

ID (adopted name)	Age	Marital status	Social media use*	Social media use monitored	Monitored by husband	Monitored by brother(s)	Monitored by male cousin(s)	Monitored by father	Monitored by female relative(s)	Accounts: real name	Accounts: pseudonym
Makh	25	Single	SWIT	*		*		*			*
Lada	27	Single	SWITL	*		*				*	*
Saka	27	Single	SWIT	*			*	*		*	*
Faal	28	Single	SWIT	*		*				*	
Saab	29	Married	SWI	*	*	*	*			*	
Ghbu	30	Married	SW	*	*					*	
Wabe	30	Married	SIT	*	*					*	*
Maal 1	31	Married	SWI	*	*					*	
Sial	34	Married	SWI	*		*				*	
Anbu	35	Married	SWIF	*	*					*	
Alsa	35	Married	WIFT	*	*	*	*			*	*
Emal	26	Divorced	SITF	*	*				*	*	
Maal 2	30	Divorced	SWIFT	*	*					*	
Yaal	31	Divorced	SIT	*	*	*				*	

* Key: Snapchat (S); WhatsApp (W); Instagram (I); Facebook (F); Twitter (T); LinkedIn (L).

participant described themselves as, “afraid of posting any personal pictures without my husband’s permission”, and another that, “I cannot share my thoughts with anyone”. Unmarried participants discussed similar issues with male relatives. For example, one participant commented, “My brothers do not allow me to download any kind of social media applications”, and another that they had promised their brother, “not to speak about politics, religion, and feminism”. Participants conveyed their frustrations with such monitoring and control, variously described as “pathetic”, “annoying”, and “stupid”.

4.3 Responses to Restrictions

Two participants described their online information behaviours as in accordance with social norms and boundaries, but the majority discussed acts of agency to circumvent restrictions and surveillance. Several of our participants discussed carefully managing the privacy settings and content of their social media accounts in order to control who views what. For example, one participant commented “I do feel that I am under risk, especially if I leave the notifications on. Therefore, I turn them off so no one can know with who I am in contact with”; and another that, “I don’t save my pictures and videos to my Snapchat memory. I only save them to my phone so that I can avoid any unexpected circumstances”. Another participant commented:

For my Snapchat account, I don’t post anything to my story because I have added my cousins, my male friends, father, and my siblings. Since I don’t want to be judged if I decided to post a picture, I just observe my friends accounts and watch others snaps. On the other side I send private messages to whom I want instead of letting everyone see my story. One day if I decide to post my story, I would block

all the male followers, and just allow females who must be my close friends and family.

And another:

I would never post anything under any post on Instagram because I know that my brother is watching me, so I must be very careful what to like and what to follow. That is why I am not really into posting anything on my Instagram account.

And another, completely forbidden to use social media by her father and brothers, commented:

I go to the University with [name redacted]. When [I arrive] at 09:00 AM, I download each one of them [social media applications] and at the end of the day, on the way to home I delete them all. I repeat this five day a week.

Five of our fourteen participants (36%) also disclosed possessing pseudonym accounts (see Table 1). They described pseudonym accounts as providing an important source of everyday information and an important outlet for personal thoughts and feelings, and as a means of maintaining contact with platonic male friends difficult to communicate with in public due to gender segregation conventions. For example, one participant commented:

I use Twitter occasionally because it's not under my real name... I follow hundreds of people because I like to know what's happening around me, in the world or even out there in the space. In this account, I don't have any of my relatives or close friends because no one needs to know about it. I like to keep it as it is so I can write whatever comes to my mind without any judgments.

The majority of our participants with pseudonym accounts also discussed maintaining real-name accounts in parallel to their pseudonym accounts (see Table 1), with some describing their real-name accounts as artificial. For example, one participant with both real-name and pseudonym accounts, discussed using her real-name account to maintain a public persona and commented, "I don't believe that this [real name] account is the real me".

4.4 Risks

Risk of social transgression and stigma was a recurrent theme discussed by participants. One participant who disclosed using social media to discuss political topics with male friends from college commented, "I feel that I am under great risks", and another participant under close surveillance by her brother commented, "I must be very careful what to like and what to follow". Another participant closely monitored by her husband commented:

I cannot write or post anything under a public post. This means that I cannot share my thoughts with anyone. I'm too afraid to do that otherwise my husband will be so frustrated and angry. He might even divorce me for doing that.

Another participant commented:

As a married woman, I am so careful of the people's accounts I follow on Instagram. In the end, we are living in a society dominated by traditions and men, and because I use my real identity for all my social media accounts, I have to respect our society. As such I have to be on the safe side of everything I do, especially when posting, or following anyone on social media.

Risk was also discussed not just in relation to themselves, but also in relation to important others. For example, one participant commented:

Since I am still single, liking inappropriate pictures will make people talk about me and judge our family. This was the main reason behind me hiding my real identity and not adding my last name: because my family is still afraid of society and its traditions.

5 Discussion

Social media provides our participants with an important source of everyday information, and an important medium for social connection and personal expression not possible elsewhere due to sociocultural boundaries and inequalities. Such findings are largely consistent with previous studies reporting the social media use of Muslim women within Muslim nations (discussed in Sect. 2), and more notably, provide further insight into the important role of social media for personal expression. However, all of our participants discussed their use of social media as monitored and controlled to various degrees by family, and in particular, by husbands and/or male relatives. Findings provide new insights into the nature and extent of surveillance experienced by Muslim women in Arab society, and have important implications for our understanding of themes of online empowerment and personal freedom reported in several previous studies [9–11], providing new insights into the extent and impact of social media restrictions, and issues of affect.

We also provide insights into acts of agency to circumvent restrictions. The majority of our participants carefully managed their social media account settings to control who views what; and by audience group, carefully managed their profiles and account content, and/or links to content. Such behaviours are consistent with general strategies to protect social privacy reported globally and across population groups [for example, see 25]. In relation, we provide new insights into the use of pseudonym accounts to live parallel online lives, and appearing more widely used by Muslim women than previously reported [9, 12, 14]. Such behaviours provide evidence of self-protective acts of secrecy and deception, two of Chatman's (1996) core concepts of information poverty that define the basis of an impoverished information world [17]; and variously utilised by our participants to cope with small world life, and/or to circumvent sociocultural boundaries and move between social and information worlds, but not without risk of social transgression, and appearing dependent on a broad set of digital literacies beyond functional technical skills.

Our findings contribute to our understanding of the scope of digital literacy, a topic of ongoing debate and interpretation. Described as “ambiguous from the outset” [26,

p. 444], digital literacy has over time been variously conceptualized and applied as a set of functional skills, social values and practices, or both. Whilst often operationalized from a functional and largely technical perspective [26, 27], scholars [26–29] have argued for a broader perspective of digital literacy that encompasses functional, cognitive, and sociocultural aspects. In consideration, Bawden identifies four “generally agreed” components of such a broader perspective, that it is suggested might form a framework of digital literacies. These four components are defined as [29, p. 29]:

1. “Underpinnings” including literacy *per se* and ICT literacies, described as “the basic skill sets without which little can be achieved” [p. 30].
2. “Background knowledge” of sources and forms of information, described as “an essential start in being digitally literate” [p. 29].
3. “Central competencies” to be able to access, process, and use information, encompassing media and information literacies, and described as “the basic skills and competences, without which any claim to digital literacy has to be regarded sceptically” [p. 29].
4. “Attitudes and perspectives” that encompass independent learning capabilities and moral frameworks, and described as reflecting the idea that “the ultimate purpose of digital literacy is to help each person learn what is necessary for their particular situation” including an “understanding of sensible and correct behaviour in the digital environment and may include issues of privacy and security” [p. 30].

However, whilst several scholars (as discussed above) continue to argue for a broader perspective of digital literacy variously encompassing the above four components, a recent review by Pangrazio et al. [26] reports that in practice, digital literacy continues to be largely discussed and applied from a functional technical perspective, with social approaches to digital literacy described by the authors as “on the sideline” [26, p. 455]. Our findings provide an important empirical contribution to the ongoing argument for a broader perspective of digital literacy, evidencing, amongst our participants, a broad range of competencies and capabilities at play beyond functional technical skills, including evidence of the important role of Bawden’s [29] fourth component discussed above (i.e., attitudes and perspectives). We evidence the importance of moral understandings of online behaviours for agency and the management of risk in the problematic socio-cultural context, including awareness of the risks associated with the use of particular information sources and information content societally disapproved of, yet fundamental to our participants’ everyday lives. In relation, we evidence online privacy as complex and variable by audience group and topic of communication, requiring both technical and sociocultural understanding grounded in moral understanding. Without such broad understanding and competencies, our participants social and information worlds would arguably be much smaller. How such competencies and capabilities are fostered in society remains an open question discussed further below.

6 Limitations and Further Research

Our findings should not be considered representative of Muslim women as a whole as Muslim women are not a homogenous group, and Arabian Peninsula nations are variously more conservative or liberal. Our participants were majority university educated, in employment, and urban residents of a capital city within a high wealth Arab nation with a high rate of population Internet use. Further, all presented as competent users of social media. We thus provide insight into the social media use of a particular group within a particular socioeconomic environment. We encourage further studies with further population groups including socioeconomically disadvantaged groups and marginal Internet users who are often reported as less proficient and confident online, and who may not possess sufficient digital literacies to practice the same degree of agency online as our participants exhibited. Such women are potentially further marginalised.

Our findings raise important questions regarding how we foster more advanced competencies and intellectual traits for digital citizenship and personal growth within education programmes (and society more broadly). As Pangrazio et al. [26, p. 455] asks, “Is the goal of digital literacy education to create productive workers in the ‘knowledge economy’, or is it to help individuals realise personal and social liberation?”. Similar to Pangrazio et al. [26] we would argue that it is both, but the extent of current attention to social, moral, and intellectual aspects of digital literacy within education programmes appears an ongoing question warranting further research attention. Variously described as “the most complex of all the types of digital literacy” [30, p. 102], and as “arguably the most difficult to teach or inculcate” [29, p. 30], pedagogical insights appear limited. Some insights are provided in a recent study by McMenemy and Buchanan [31], who explored attention to intellectual character development in two widely cited information literacy models (the Big6 and the ACRL framework). McMenemy and Buchanan concluded that, “we have identified limited presence of concepts of intellectual character in our sample of information literacy models, with none explicit, and all subject to interpretation” [31, p. 81], and called for further research attention including how to operationalise the development of intellectual character within information literacy educational programmes. For our purposes, further research would also consider social and moral aspects. In addition, we would also draw further attention to the importance of online privacy literacy, described as a “comparatively new concept in online research” [26], and again warranting further research attention.

7 Conclusion

Our Muslim women participants are all active social media users, and describe social media as an important source of everyday information, and important medium for social connection and personal expression. However, their use of social media is closely monitored and controlled by family, and in particular, by husbands and/or male relatives. Pseudonym accounts, and carefully managed privacy settings and content management, are used to circumvent sociocultural boundaries and move between social and information worlds, but not without risk of social transgression, and appearing dependent on a broad set of digital literacies.

Findings contribute to our understanding of digital inequalities and sociocultural influencing factors; and the role of digital literacy to circumvent societal boundaries and manage risk. Findings also contribute to our conceptual understanding of the scope of digital literacy, evidencing important social, moral, and intellectual aspects; and contributing to calls for research attention to further advance our understanding of how such aspects of digital literacy are fostered in society.


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Beyond Cultural Literacy: Building Introspective Information Professionals

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Abstract. Self-reflection is a vital tool that can be used in preparing introspective information professionals who would thrive in multicultural workplace settings. A qualitative analysis of students' identity exploration papers demonstrates how information professionals discover and understand the meaning of race, privilege, and intersectionality between them by navigating their own cultural identity. Findings reveal the importance of self-awareness in cultivating a culturally responsive mindset. This study demonstrates how cultural literacy approaches can be applied to develop introspective information professionals who would be critical agents of change in efforts to increase inclusivity and help patrons become active participants in their community.

Keywords: Cultural literacy · Self-reflection · Cultural competence · Intercultural communication · Diversity · Cultural identity

1 Introduction

Globalization, multicultural populations, and changing workforces increase expectations for employees to have intercultural skills to serve patrons from diverse backgrounds and communities. This means that information professionals need to be culturally sensitive and skilled in imparting information literacy when working with multicultural patrons.

Information professionals utilize their information literacy skills in educating patrons on a variety of topics relevant to their everyday life. Frequent topics include citizenship, immigration, technology skills, and civic engagement conversation. Patrons come to libraries seeking help with everyday life information literacy skills, which often revolve around leisure and community activities, citizenship and the fulfilment of social roles, public health, and critical life situations [1]. Information literacy is necessary to help patrons become self-advocates within healthcare, citizenship, education, everyday life, and the workplace [2]. However, when dealing with such topics, an information professional must be culturally aware of the patron's background.

Possessing information literacy skills is not enough. According to the "2017 ALA Demographic Study," the LIS profession remains predominately white and female [3]. Consequently, some information professionals lack a deeper understanding of effective intercultural approaches and strategies in spite of their excellent information literacy skills. This is why cultural literacy is necessary for information professionals in addition

to information literacy skills. Cultural literacy has many definitions but can generally be defined as “the knowledge of history, contributions, and perspectives of different cultural groups, including one’s own group, necessary for an understand of reading, writing, and other media” [4, p. 231]. Developing self-awareness through critical self-reflection is considered a crucial component in facilitating cultural literacy. While scholarly activity on developing cultural competence has increased significantly in recent years, the LIS scholarship remains limited in addressing cultural literacy approaches that incorporate experiential and introspective learning activities [5, 6]. This study examines students’ Identity Exploration papers to understand if asking students to navigate their own cultural identity through self-exploration helped them become more culturally sensitive. The primary objective of this learning activity was to raise critical awareness of racial identity, privilege, oppression, and intersectionality through a critical social justice framework [7]. Findings demonstrate the effectiveness of the cultural literacy approach in engaging students in a process of self-exploration, discovery, and introspection in cultivating a culturally responsive mindset [8, 9].

2 Background

2.1 Understanding Cultural Literacy

Information organizations attract the needs of information users from diverse populations. The ACRL (2006) defines information literacy as “the set of skills needed to find, retrieve, analyze, and use information” [10]. Information literacy involves both digital literacy and media literacy. One aspect of information literacy is that multicultural patrons often turn to libraries for is computer technology help. In order to provide for the information needs of non-English speakers, libraries have begun adapting their technology to be useful for the population seeking information and have tried to hire more multi-lingual speaking staff members [11]. It has been found that “structural barriers such as language or learning how systems work affect immigrant information practices” [12, p. 25]. The internet is more geared toward English patrons, rather than non-native speakers. This causes difficulty for patrons in trying to obtain information. By recognizing these difficulties and making the necessary changes, the library is able to impart information literacy skills onto diverse populations that may be seeking help.

Collaboration between community and information organizations, as well as knowing the social, political, and cultural characteristics of the community, is imperative to properly performing information literacy skills [13]. By knowing community demographics and needs, the information professional will be able to tailor their information literacy skills toward topics of interest in the community, such as technology, immigration, citizenship, politics, and healthcare. Information professionals would be more effective in their information literacy skills if they have a better understanding of their patrons’ cultural backgrounds and their preferences, wishes, and needs. This means they need to be equipped with cultural literacy skills in addition to their information literacy skills.

Discussions on diversity, equity, and inclusion (DEI) have been popular in LIS academic discourse. Prior studies have discussed the importance of increasing diversity in

collections and services [14], increasing inclusivity in the LIS workforce [15], and cultural competence education for LIS professionals [16]. The ACRL “Diversity Standard: Cultural Competency for Academic Libraries” (2012) reinforces the ideas all of these studies [17]. It lists 11 standards that information professionals should uphold to achieve and promote diversity within different areas of their information organization. The 11 standards are cultural awareness of self and others, cross-cultural knowledge and skills, organizational and professional values, development of collections, programs, and services, service delivery, language diversity, workforce diversity, organizational dynamics, cross-cultural leadership, professional education and continuous learning, and research [17]. Despite all of this research done on the topic of DEI in LIS, the concept of cultural literacy has not been explored in-depth in the LIS profession.

Shliakhovchuk (2021) has done extensive research on the concept of cultural literacy [4]. He asserts that an information professional must be able to recognize and handle cultural change and cultural differences if they are to effectively deal with the needs of multicultural patrons [4]. Polistana (2009) and Anning (2010) have two compelling conceptualizations of cultural literacy that are worth exploring more in-depth [18, 19]. According to Polistana (2009), “cultural literacy includes cultural competence but adds to it the ability to critically reflect on, and if necessary, bring about change in, one’s own culture” as well as the ability to analyze the behaviors of dominant cultures in relation to other cultures [4, 18, p. 235–236]. Polistana (2009) identifies four key cultural literacy skills: cross-cultural awareness, local cultural awareness, critical reflection and thinking, and personal skills for coping with being a change agent [19]. Anning (2010) identifies four key competencies one must achieve to become culturally literate. These four competencies are “appreciation and comprehension of cultural diversity, effective communication with people from other cultures, treating everyone with no pre-expectations or stereotypes, assessment of each situation and adjusting one’s behaviour” [4, 19, p. 236]. It is important that, at the graduate education level, aspiring information professionals are taught these skills and competencies that Polistana (2009) and Anning (2010) outline in their research. More importantly, both of these studies emphasize the importance of critical reflection and thinking in increasing cultural sensitivity and cultivating intercultural skills [18, 19].

2.2 Cultural Literacy Approaches in Enhancing Self-awareness and Intercultural Skills

Discussions, reflections, learning diaries, and experiential learning approaches are all appropriate measures that can be taken to enhance self-awareness when it comes to intercultural skills, cultural literacy, and cultural competence. It is not enough for an individual to recognize that there is cultural diversity in the world. This is because it “absolves individuals from learning and understanding the impact of their own sociopolitical and ethnocentric biases on their work with clients who are racially/ethnically or culturally different from themselves” [9, p. 224]. It is important that one understands their own culture, obtains knowledge of other cultures, and recognizes “diversity as normative” [9, p. 224]. It is the recognition of one’s own culture and the biases that they have as a result of their culture that is key to self-awareness. Without reflecting on

one's own experiences, they will not be able to successfully cultivate self-awareness and intercultural skills.

Self-awareness and self-reflection are not new ideas within the LIS field, especially in terms of MLIS programs, intercultural skills, and cultural competency. Abdullahi (2007) asserts that, although some LIS students have a sense of who they are socially and culturally, “most need to engage in autobiographical exploration, reflection, and critical self-analysis to develop that sense” [20, p. 454]. In a similar vein, diversity audits, family histories, journaling, reflections, and self-evaluations have also been considered to facilitate cultural self-awareness in classrooms [5, 6, 21]. This requires LIS educators to be cognizant of their own social position, pedagogy, course content, and practices in order to impart self-reflection and intercultural skills upon their students. However, despite an influx in work on cultural competency in the last 20 years, a knowledge and skills gap in LIS graduate programs is immediately visible [22] and the emphasis on cultural self-awareness is basically non-existent. This paper seeks to demonstrate that self-reflection and continuous learning are two key values that information professionals must uphold if they are to become culturally literate and aware of biases that may exist within themselves and their information organization.

3 Methods

This study presents a qualitative analysis of 43 students' reflections in the “Identity Exploration” assignments they completed in the “Cultural Competence for Information Professionals” courses offered between 2019–2021 at St. John's University in the United States. With the exception of three male students, the course participants were all female and belonged to different races/ethnicities, including White ($n = 34$), Black/African Americans ($n = 2$), Latino ($n = 2$), Asian ($n = 2$), and Multiracial ($n = 3$).

3.1 Context of the Assignment

The cultural competence course focused on preparing students to work effectively at the individual and organizational level by learning and applying the cultural competence knowledge, skills and practices required in a culturally diverse environment. The course readings were social justice oriented and explored a wide range of topics including an understanding of cultural competence framework including race, implicit, bias, privilege, intersectionality, microaggressions, cultural intelligence, and multicultural communication. Alongside these course topics and related readings, students also participated in activities that aimed to increase their critical consciousness and cultural competence skills. At the beginning of the course, students were asked to take the Cultural Compass test that helped them understand their own cultural value preferences and blind spots in dealing with people from diverse cultural background [23]. As the course progressed, students were provided opportunities to analyze their own privileges by participating in an online privilege walk as well as completing a privilege quiz to determine how their identities privilege or impede their experiences and their implications for their lives and professional practice [23]. In a similar view, students were encouraged to take the Implicit Association Test in order to understand their unconscious biases in dealing with

people from diverse cultural backgrounds [24]. Students were also exposed to the developmental model of intercultural sensitivity that them understand how people experience and engage cultural difference [25].

The primary objective of the identity exploration assignment was to raise awareness of identity, privilege, oppression, and intersectionality issues through a critical social justice framework that “recognizes inequality as deeply embedded in the fabric of society (i.e., as structural) and actively seeks to change this” [7, p. xvii]. In keeping with this background, students were required to reflect on five of the ten types of identities: race, ethnicity, gender, gender identity, religion, ability, language, nationality, sexual orientation and class. The teacher provided a set of discussion prompts to help students navigate their personal identity narratives. Furthermore, the students were asked to articulate their learning reflections from this assignment and if the identity exploration exercise helped them gain better insights into their cultural identity. Finally, the students were asked how this cultural awareness made them more sensitive towards people of other cultures (if applicable).

3.2 Analysis Approach

This study utilized a phenomenological approach to gain a deeper understanding of the experiences of new information professionals as they embarked on critical self-reflection in their Identity Exploration papers. Reflections were analyzed by utilizing a thematic analysis approach adopted in prior studies [8, 26]. The phenomenological research suggests that “themes may be understood as the structures of experience” [27, p.79]. By utilizing this approach, effort was made to uncover experiences informing something “telling,” “meaningful,” and “thematic” expressions in the Identity Exploration papers [27, p. 86]. Furthermore, reflections were examined by taking into consideration the various types of resistance that could be exhibited through distancing or intense emotions through guilt, anger, frustration or fear [28]. While students reflected on various identities, this study focused only on understanding their viewpoints and perspectives on race, privilege, oppression, power, and intersectionality among them.

4 Findings

4.1 Navigating the Conundrum of Race

Findings suggest that the foundation of racial identity is laid in the experiences of childhood through a complex process of all interactions within family, school, communities, and society at large. This sentiment was reflected by quite a few White students who stated that, “Identifiers like race and sexuality were not really a part of the conversation growing up” (S20.3). They also reported tacit or explicit discouragement from their parents when intermingling with their friends of color. A student remarked, “My parents never stayed to talk with my black friends’ parents like they would with my white friends’ parents. They were uncomfortable driving me to my friends’ homes on the other side of town and would encourage me to make friends with the kids in our neighborhood instead” (S20.4). Similarly, another student remarked, “race was a strange topic in my

family. My parents and uncles always made stereotypical jokes about other minorities but always had friends and welcomed people of other races” (S21.5). Their reflections demonstrate how racial prejudice is expressed through both unspoken and overt social signals and their influence in hampering meaningful relationships and interactions with people from diverse cultural backgrounds. Additionally, their upbringing in homogeneous “cultural bubble” (S21.3) characterized by the primacy of Whiteness highlighted their “little exposure to different cultures for a large chunk of time” and how their “privileged background” kept them insulated from learning about people from diverse cultural backgrounds and their “struggle” for equality (S20.11). Some White students also reflected how their mistaken beliefs in equality contributed to the development of colorblind ideology. A student commented, “I mistakenly believed that all cultures are basically the same, but I have learned to recognize my privilege” (S20.14). Another student remarked that, “by not acknowledging the cultures that are around me, are most likely interpreted as blindness” (S19.3). Quite a few White students also highlighted their struggles, awareness, and efforts to overcome the challenges of implicit bias. A student remarked, “I feel as though these days I am much more aware of what it means to have implicit bias and I am working to not only be aware but consciously eradicate it as much as possible from myself.”

A majority of the White students did not have any personal experiences of racial discrimination or oppression. They typically stated, “I have never been discriminated against because of the color of my skin, my sexuality or income level” (S19.8). They also noted that “there is still defensiveness when it comes to past interactions and most white people are uncomfortable being told that an action or comment they never realized was racist is unacceptable” (S20.6). In contrast, students of color experienced racial discrimination, oppression, microaggressions and stereotyping as a part of their development. An Asian student commented, “Many of my American friends have racial stereotypes because they believe Asian women prefer staying home, doing housework, and taking care of kids” (S20.9). Similarly, a Black student noted, “I was constantly told that I “talk like a white girl,” and that I am “pretty for a Black girl” (S19.7). Findings also suggest that a majority of White students were aware of racial differences through movies and readings. However, higher education helped expand their cultural awareness by providing them opportunities to interact with more diverse communities of learners. A student reflected, “I really only began to experience diverse cultures in college where I learned about biases and racism. I am now aware of the ways in which I lack experiences with diversity and new cultures” (S20.13).

Overall, findings demonstrate that this introspective exercise helped students navigate the conundrum of race through exploring many nebulous social nuances that influenced their identity development.

4.2 Grappling with White Privilege

The findings revealed that a majority of White students were aware of the pros and cons of their race, ethnicity and background and the implications of those qualities for their professional careers. A majority of them acknowledged their “privilege” and related benefits for their careers and lives. Typical comments included, “I have learned this semester, with everything that has happened within society, that my whiteness came

with a certain level of privilege that I was blind to. That it was not just my willingness to work and do hard work that have gotten me to my station in life. While my life was not necessarily easy, it was not made harder because of the color of my skin, or my religion, or my sexuality” (S19.5). A small number of White students also acknowledged that they are still “grappling with realizing the privilege, being aware of it, and at the same time feeling so grateful for it” (S20.6). Some of them also indicated that they chose to “downplay” (S20.7) and “deflect” (S21.7) their privileges or “feigned” ignorance on some occasions when it was “convenient or helpful” (S20.7). Similarly, many students also exhibited strong emotions and feelings of White guilt as they navigated their cultural identity. A student reflected that, “I do not believe white guilt is a productive way to deal with white privilege. While it is a visceral way to identify my own privilege, it does not lead to productive change. White guilt prevents me from having uncomfortable conversations that might transform my understanding of other races and cultures. Once I begin to feel that guilt, I deflect” (S21.7). At the same, a small number of White students also acknowledged their blissful ignorance of their privileges before working on this assignment. Interestingly, almost every white student emphasized that their lives have not been without struggles and they have worked hard to accomplish everything. They typically remarked that their “life is not without struggles but overall it is easier than most” (S19.6). Paradoxically speaking, while on one hand they grappled with acknowledging their privileges and reflected their empathy for students of color, they also implied the notion of meritocracy behind their accomplishments at the same time.

Overall, findings indicated that race and privilege are two sides of the same coin and play a critical role in determining an individual’s social power, oppression and opportunities throughout their careers and lives. Findings also highlighted that students had not engaged in in-depth analysis of their privileges, and their implications for their lives and professional practice prior to working on this assignment.

4.3 Exploring Intersectionality in Identities

Findings highlight that students made efforts to navigate through their own cultural identities while looking through the lenses of race, gender, religion, ethnicity, language, and more, and discovered an intersectionality between them. The findings reveal that Latino and Black students expressed feelings of inadequacy, self-doubt, and a constant pressure to prove themselves due to their position as outsiders in a White dominated society. A Black student commented, “I am constantly concerned about my work not being good enough due to what many call imposter syndrome. Imposter syndrome, which can be described as feelings of inadequacy that persist despite one’s success, is especially prevalent among people of color” (S19.7). Similarly, Asian students highlighted their struggles in navigating their intersectionalities and dealing with the typical stereotype perceptions of being quiet and introverted. A student remarked, “I admit that I struggle with my intersectionality—being a female, an Asian, and a Chinese-American. Many of my American friends have racial stereotypes because they believe Asian women prefer staying home, doing housework, and taking care of kids” (S20.9). In particular, biracial students grappled with identity crises. If they have more Asian or Latino features than White, it made their lives challenging. Consequently, despite their mixed racial identity, people identified them as Asian or Latino. In contrast, if their features and complexion

were predominantly White, their predominant White features benefitted them. Furthermore, in spite of their biracial identity, they were perceived as White. A student from mixed racial background stated, “It wasn’t until I was much older that I learned more about intra-community prejudices. As someone with light skin and “good” hair, I didn’t face the explicit antiblackness and colorism rampant in my family. It didn’t matter that my father was a biracial Black man, because there were no physical markers of Blackness on me” (S20.8). In contrast, a desire to grow, learn, and evolve was a consistent theme in the reflections of White students’ identity exploration papers. Their reflections highlighted their evolving worldviews as they navigated their intersectionalities among various identities through self-exploration. A student stated, “Learning about my intersectionality has not only taught me more about myself, but also how I view others and how I need to be more willing to learn about their culture and them as an individual” (S21.4). Similarly, another student reflected that, “My ethnicity, gender identity and expression, religion, ability, and class have affected my life and shaped me into the person I am today. I am aware of the advantages I do have, and I try to work to help others who do not have them and will continue to do so professionally as well as personally” (S19.2). Overall, students perceived learning about intersectionality its implications to be one of the most profound and enlightening experiences of the Cultural Competence course.

4.4 Insights Gained

As developing cultural competence is a lifelong journey, students were asked to reflect on three action steps to further develop their cultural competence skills in their identity exploration narratives. Their comments suggest that reflecting on ones’ own beliefs and prejudices is a necessary precursor to empathizing and understanding those of different backgrounds, an imperative skill for any information professional. A student remarked, “I believe this new [cultural] awareness will help me become more culturally competent because I have a better understanding of how my identity has been shaped by my culture. Understanding my own identity is the first step to understanding how others are different from me and how to accept those differences and understand those individuals” (S21.4). Furthermore, across the board, students emphasized the importance of continuing education and professional development as a part of their desire to become culturally competent information professionals. Their typical comments included, “To become a better librarian, I [they] must keep reading, learning, and informing others of the inequalities in our society as well as in our own field and workplace” (S20.15).

The analysis revealed that all of the participants acknowledged inherent structural inequities and barriers that contribute to promote homogeneity in the LIS profession. In particular, their reflections indicated a willingness and desire to help correct structural inequities in libraries for marginalized patrons. Their reflections emphasized the need to practice cultural humility at both the individual and organizational level. Students’ discussions also recognized the importance of continuing self-reflection in order to hone their cultural competence toolkit. A student remarked, “After reflecting on my experiences observing different forms of discrimination and intersectionality, I am pleased to say that I am more aware of my advantages/privilege than ever before and I will do my

best to support others who are less privileged than I and fight back against discrimination” (S19.6). Overall, students emphasized the importance of respectful listening and pushing their thinking as useful approaches to gaining deeper insights into the nature of their blind spots or as remedial strategies that could lead to growth.

5 Discussion and Implications

Students’ reflections revealed how the Identity Exploration assignment helped them gain better insights into their cultural identity by examining many nuanced and uncomfortable social justice topics. Their reflections also revealed how this introspective exercise helped them examine their own beliefs, identities, positionalities and privileges within the sociocultural context of LIS education. Although all students made connections between their identities and its implications for their personal lives and professional practice, a handful number of students exhibited resistance in the form of distancing by avoiding discussion on their racial identity. Furthermore, quite a few students expressed intense emotions through the expression of White guilt, anger, and frustration. Nevertheless, students questioned and contended with their own values and beliefs and their implications in serving ethnically marginalized patrons. Regardless of their discomfort, students were upfront in reflecting on issues of race, privilege, and intersectionality and how this reflective exercise assisted them to become culturally literate information professionals. Many students explicitly described the insights they gained by engaging in self exploration of their cultural identity. They recognized the importance of continuing self-reflection in order to practice cultural humility and hone their cultural competence skills.

The findings also highlight implications for incorporating antiracist pedagogical approach in teaching diversity and multicultural education courses in LIS programs. Bringing antiracist pedagogy in classroom begins with faculty becoming aware of their social position, its impact on their teaching, and their role and responsibilities in a race-conscious society [29]. Consequently, this approach requires teachers to develop self-reflexive exercises to engage students in uncomfortable and meaningful explorations of social construct of race and its implications for professional practice. This would ensure that the conversation about race is not wrapped-up behind euphemistic phrases of multiculturalism. Additionally, cultivating a safe and supportive learning environment would go a long way promoting self-disclosure among students. This study demonstrates how cultural literacy approach can be applied in improving critical self-awareness, appreciating the advantages of self-reflection in practicing cultural humility, and facilitating uncomfortable conversations around race in teaching DEI courses. Finally, this study emphasizes that culturally literate introspective information professionals would be critical agents of change in efforts to increase inclusivity and help patrons become active participants in an ever-changing global society.

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Literacy for Democracy: What Can Information Literacy Learn from Legal Literacy, and Vice Versa?

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Abstract. This paper builds on two previously published contributions to ECIL (2014 and 2016) and develops the relationship between information literacy and legal literacy, this time focusing on legal literacy. The paper investigates whether or not information literacy and legal literacy can influence one another in the context of human rights and active citizenship in the Czech Republic, and is based on a comprehensive survey of both legal literacy and information literacy research.

Keywords: Information literacy · Legal literacy · Human rights

1 Introduction

The paper “Information Literacy as a Right and a Duty: the Experience of the Czech Republic” [1], presented at ECIL 2014, outlined the brief history of implementing various literacies into Czech educational curricula (in the context of developments in other countries), and uncovered the three major public policy-making stages underpinning such an implementation. One of the three stages relates specifically to the legal system. The paper “The end of information literacy (?)” [2], presented at ECIL 2016, followed up on this, among other issues, with an analysis of the legal system and its relationship to information literacy. The current paper aims to go further in its analysis of legal literacy and the relationship between information literacy and legal literacy. Legal literacy is presented with respect to the development of the concept of law awareness in the theory of law and sociology of law.

Substantial research [3–7] has argued that information literacy should be considered a basic human right in pursuit of active citizenship. The Czech constitution gives all people specific rights, including: (1) everyone is free to do whatever is not forbidden by law, and (2) nobody can be forced to do whatever is not dictated by law. The same constitution gives the public sector specific responsibilities, including: (3) the public sector must act within the law, and (4) as a consequence of (3), the public sector must respect (1) and (2) above [8]. This has significant constitutional implications for information literacy. In particular, citizens cannot be assumed to have a higher level of education than is required and guaranteed by law. The public sector, then, is in fact obliged by the constitution to provide information targeted only at this required and guaranteed educational level.

In practice, few, if any, in the public sector appear to be aware of this constitutional obligation. The question arising from this constitutional obligation then becomes whether or not the Czech education system adequately prepares citizens to understand public information made available to them and whether or not that information is presented to citizens by the public sector in a form they can comprehend.

Legal literacy then extends the question of whether the area of law and the legal system are comprehensible to citizens. The relationship between information literacy and legal literacy is also determined by the extent to which laws are regarded as information. Legal literacy also extends the question of whether or not, and to what extent, promoting information literacy as a human right should imply that the public has a right to a comprehensible legal system and laws, followed by a reasonable expectation to be aware of them. The paper relates the concepts of legal awareness and legal literacy as currently addressed by theories of law and legal sociology. Three levels of legal literacy are highlighted: legal awareness; professional legal literacy; and academic legal literacy.

The above three questions remain open and, for the purposes of this article, act as a reminder that there is a link between information and legal literacy. This paper investigates whether or not information literacy and legal literacy can influence one another in the context of human rights and active citizenship (in the Czech Republic). This paper is based on a comprehensive study following desk research and document analysis [9] of both legal literacy and information literacy research.

2 Literacy for Democracy

Information literacy can be understood in different ways from different perspectives, for example as knowledge about the world of information, as a set of competencies, as a way of learning, or learning in context [10]. However, it is usually viewed as a set of competencies [11].

In Europe, active engagement with information is considered essential for participation in democracy: “access [to information] is a prerequisite for developing information literacy” [5, p. 23]. The relationship between information literacy and active citizenship dates back to 1976, when it was observed that, although people are considered equal, those who have ready access to information resources can make more intelligent decisions than those who are information illiterate [3, p. 310].

The organisations that are actively involved in the field of information literacy include UNESCO and IFLA. UNESCO advocates that information literacy is a necessary condition for active and responsible citizenship and should be a fundamental right in the light of the Universal Declaration of Human Rights, in particular Article 19 of the Universal Declaration of Human Rights [12]. The author of the term information literacy himself, Paul Zurkowski, directly suggests the creation of a Coalition for Human Rights and Responsibilities (in the context of the movement for direct democracy), at the level of national initiatives and later on a transnational platform [13]. This should, among other things, ensure that citizens have access to the information needed to actively participate in the development of a democratic community.

3 Legal Literacy

Initially, (general) literacy was defined as the ability to read, write, and count. Then professionals began to talk about functional literacy, which emphasizes the social context of the individual and their literacy and numeracy skills. Later, there was a discussion of specific literacies, this time defined by a specific area to which a particular professional or interest group paid particular attention [14]. Thus, for example, we are aware of information literacy and financial literacy, but we also speak of visual literacy, dance literacy, and, more recently, digital literacy. “There is not one literacy that people either have or do not have, but many different literacies” [12]. The prevailing view of literacy in information science is that each literacy encompasses specific and clearly defined competencies [11, p. 218–259].

Competences themselves include not only knowledge but also skills and attitudes. Legal literacy, then, “presupposes not only knowledge of rights, but also the ability to exercise those rights and the conviction that it makes sense to enforce them” [15]. This presupposes both certain knowledge and skills (the ability to apply laws) and attitudes (to believe that to apply laws makes sense).

From this point of view, legal literacy is also primarily a set of specific competences and overlaps with some other literacies, especially information literacy, but it is also a separately defined field of research. Law belongs to the practice-oriented fields, where there is a clear distinction between the layperson and the professional (contingent upon, for example, relevant education and experience). Accordingly, and on the basis of the above, it is therefore appropriate to distinguish between different levels of legal literacy [9], namely:

- legal awareness – the lowest (mostly layperson) general level, that does not preclude the attainment of a higher level within particular branches of law,
- professional legal literacy – a higher (mostly professional) level, that includes reading and writing *within* the law (for example, understanding the text of the law or drafting opinions or submissions),
- academic legal literacy – the highest (mostly academic) level, which also includes reading and writing *about* the law (for example, technical texts or drafting new standards).

Clearly, without a sufficient level of information literacy, understanding legal information would not be possible. Moreover, it is often libraries, and other information institutions, and professionals working in them who can provide legal texts to lay people. The competences for both literacies, information literacy and legal literacy, will overlap to a large extent, but not completely. The difference is even more evident for the higher levels of legal literacy which mainly concern lawyers but information literacy is essential irrespective of the level of legal literacy. At the highest level, there will be further overlap between legal literacy and, for example, academic literacy, which is primarily focused on science and research. And just as a higher level of legal literacy may be achieved by a layman in a particular field of law, legal literacy may be lower in the case of legal professionals outside their own area of expertise, which means that these levels are also fluid.

3.1 Legal Awareness

According to Michal Urban, “it is crucial that (people) know the rights guaranteed by the rule of law, have the ability to exercise them, and are convinced that it makes sense to enforce (their) rights. Otherwise, they do not actually have these rights, no matter how much the law grants them. Lower awareness of one’s own rights and the importance of those rights will logically lead to their diminishing importance” [15]. Research on legal awareness flourished especially in the 1960s and 1970s [16]. In the Czech Republic, legal consciousness received special attention during the communist regime; Michal Urban provides a basic overview in his book [17].

According to published research, legal awareness may have the following components: (1) cognitive, (2) evaluative, and (3) volitional. Or a distinction is made between (1) legal awareness *de lege lata* and (2) legal awareness *de lege ferenda*, or ultimately it may be (1) knowledge of the law (cognitive elements), and (2) opinion about the law (that in addition contains elements of evaluation and attitude) [16; p. 24–25]. The vast majority of authors agree on the second division [15]. Thus, if we fully agree with the above, that legal awareness will have two basic components: (1) knowledge of law, legal awareness *de lege lata*, and (2) opinion on law, legal awareness *de lege ferenda*, we can add another dimension.

Danish legal sociology distinguishes between two layers of knowledge of the law: (1) legal awareness, where the legal subject is aware of the existence of the law, and (2) knowledge of the law, that includes a certain degree of legal knowledge [15]. The literature also distinguishes three areas of information related to legal literacy: (1) basic knowledge, which is necessary for participation in society (including the ability to cope in the absence of specific knowledge, for example, where to seek help etc.), (2) “role-minimum” knowledge, that relates to a specific role or specialisation, and (3) *ad hoc* knowledge, that is related to a specific (life) situation [16, p. 24–25]. However, the authors differ in their opinion on whether a higher level of legal knowledge also increases the level of legal awareness.

In addition to knowledge of the law, Jiří Boguszak and Jiří Čapek include the degree of acceptance of the law among the factors that influence the implementation of the law [18]. Michal Urban argues that “people often comply with the law even if they do not know it, but they do so precisely because this behaviour is part of their opinion of the law”, adding: “Given the extent of the legal system and its complexity, it is not at all surprising that the average citizen is far more ignorant of the law than he or she is aware, but the system works, which is perhaps even more surprising” [1, p. 15&25]. Determining the desirable list of competencies at this level of legal literacy is a matter of concern for the professional community, which seeks to cultivate not only legal awareness but also information literacy in general¹. This includes both sufficient teaching in compulsory schooling, but also, for example, initiatives to simplify legal language².

¹ See e.g. http://www.rozhlas.cz/plus/interviewplus/_zprava/v-soucasnem-ceskem-pravu-selne-lze-vyznat-chyby-resime-novelami-tvrdi-hana-marvanova-1710062.

² See e.g. <http://udvis.law.muni.cz/streetlaw.html>.

3.2 Professional Legal Literacy

If we consider professional legal literacy to be a higher, mostly professional, level, we can certainly agree that every graduate of any law school should achieve satisfactory results at this level of legal literacy. However, it is not necessary to excel in all areas all the time; on the contrary, some specialization is typically expected at some point in a legal career. Let us look again at how the research distinguishes three areas of information that relate to legal literacy: (1) basic knowledge that is necessary for participation in society; (2) “role-minimum” knowledge that relates to a specific role or specialisation; and (3) *ad hoc* knowledge for a specific (life) situation. It is clear that, for example, a lawyer specializing in copyright law may excel in role-minimum knowledge but only perform satisfactorily in basic knowledge of other legal disciplines, while their *ad hoc* knowledge of, for example, criminal law may not be at all sufficient. Conversely, it is entirely possible that a layperson may achieve this higher level of legal literacy in specific areas of law³. The list of competences at this level of legal literacy basically reflects the curricula of law schools, but it may also be broader.

3.3 Academic Legal Literacy

A stumbling block where even lawyers themselves may feel lacking is the highest, mostly academic, level of legal literacy, that includes “reading and writing about the law”, for example, technical texts or drafts of new rules. “Increasingly, lawyers are engaging in research topics that go beyond the narrow field of law, which is gratifying and commendable, and asking social science questions, but not always having the social science methodological training to answer them, [then] often drawing unreasonably bold, even unsupported, conclusions based on their data” [19].

Michal Bobek refers to those who do not consider law to be a science, but a craft, and believe that it is possible “to write as much as possible about law, to describe law, but not actually to do legal science, with the sometimes whispered exception of legal sociology, which is supposedly not law.” At the other extreme, according to him, is the idea that research can only be empirical. He himself is of the opinion that research in law is characterized by a certain leeway [20; p. 3] that is, however, characteristic of the social sciences as such. He concludes that law “is not a science, of course; law is a system of social regulation (...) [however] the study of the subject can be scientific” [20; p. 6]. In any case, the suitability of different theories for application in legal research is an interesting subject of research and requires a deeper understanding of the methodology of science as such, here especially in the context of the social sciences. The list of competences that this highest level of legal literacy entails may therefore be much broader. As a result, however, it can cultivate and develop a scientific understanding of law, the lack of which is still missed by many authors.

4 Literacy for Citizens

Law is one of those fields where, unlike information science, for example, there is a clear distinction between professional and layperson. Information literacy still has the same

³ See e.g. <https://www.fliightright.com/>.

set of competencies for both laypeople and professionals, regardless of ongoing debates about what exactly those competences are. It is only a question of what level should be achieved in each competence according to some criterion, such as the level of education. The explanation about the universality of information literacy does not hold up; the argument that a certain level of information literacy is necessary for everyone, while legal literacy is not can be readily refuted. Interestingly, the overlap of competences within each literacy in itself only supports the need to develop a list of key competences within each literacy, especially so that some are not left out, whether or not they are addressed within the same curriculum or strategy.

As noted above, there are important constitutional implications that affect information literacy, namely the need to impose responsibilities on citizens (and to some extent others) only on the basis of valid rules of law [21]. Law is information in every sense, even information that has the power to reshape social context [22]. It remains an open question (1) to what extent the legal system and laws are currently comprehensible to citizens; and (2) whether promoting information literacy as a human right also means that the public has a right to a comprehensible legal system and laws, followed by a reasonable expectation [from the state] that citizens be aware of them.

According to Mirja Rynnänen, information literacy should be a fundamental right because “other rights cannot be exercised without it” [23]. Active, effective and responsible citizenship today means that people must also be able to exercise their rights (and fulfil their responsibilities) [24]. Finding the link between rights, such as a citizen’s right to free access to information, and responsibilities, in other words, the public administration’s obligation to inform in a manner adequate to compulsory schooling or other levels of education, the attainment of which it guarantees, is crucial. The relationship between rights and responsibilities will always be reciprocal, so it will be also both the citizen’s duty to achieve the guaranteed level of education (which includes a basic level of legal literacy) and to actively maintain it, and the public administration’s right to expect that level. In Europe, information literacy is considered essential for participation in democracy [5]; the link between information literacy and legal literacy is therefore clear. The way in which legal literacy is researched and defined, especially with regard to the distinction between different levels, can be an inspiration for information literacy.

5 Conclusions

A more detailed definition of the different levels of legal literacy shows that the set of competences may differ between laypeople and professionals and between practitioners and researchers. Therefore, it makes sense to distinguish between these levels and the composition of the set of competences required for different groups of people and even for individuals. The intent is to highlight for librarians, information specialists and other information professionals that not only may the level of information literacy of themselves and those they educate differ, but also the set of information literacy competencies of various groups may also differ.

This is in line both with the latest trends in information education, that is, focusing on the individual not the group, their specific needs within the community, current life situations and personal goals, and with changes in the very nature of information literacy

due to the development of digital technologies and artificial intelligence. Christine Bruce sees working with the community as the future trend in information literacy. In her view, the development of a group's information literacy needs to reflect their experiences and social context, and we "must always be prepared to challenge all our assumptions" about what information literacy should entail and what it should be for [10; p. 18]. Finally, legal literacy research inspires a new perspective on competencies and their development for those who are professionally involved in information literacy and information education [25], who often need to understand people and their particular needs more than, for example, documents or information literacy theories.

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