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Information Experience and Information Literacy

8th European Conference on Information Literacy, ECIL 2023
Kraków, Poland, October 9–12, 2023
Revised Selected Papers, Part II

Part 2

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Preface

The Eighth European Conference on Information Literacy (ECIL) 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 2023 was hosted by Jagiellonian University in Krakow, Poland and 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.

The main theme of the eighth conference was *Experiencing Information and Information Literacy*. Contributions came from 26 different countries (Australia, Bulgaria, Canada, Croatia, Czech Republic, Estonia, Finland, France, Germany, Greece, Iceland, Kazakhstan, Norway, Philippines, Poland, Portugal, Romania, Slovak Republic, Slovenia, South Africa, Sweden, Switzerland, Turkey, Ukraine, UK, USA). All submissions were subjected to a double-blind review process. This book consists of a total of 47 selected papers out of 182 submissions (acceptance ratio is approximately 26 percent) which address a range of issues around the main theme.

Starting with the host organization, the Institute of Information Studies of Jagiellonian University, we are grateful to many organizations for their support. We would like to express our deep gratitude to all sponsors for their generous support. Our special thanks go to UNESCO for providing their patronage.

We would like to take this opportunity to thank conference keynote speakers Tim Gorichanaz, Alison Hicks, Jenna Hartel, Sabina Cisek and Monika Krakowska; authors and presenters of papers, best practices, PechaKuchas, posters, workshops; and session chairs. With thanks we acknowledge the hard work of the members of the Standing and Programme Committees who invested their time generously to make this event happen.

Our editorial team Sonja Špiranec, Joumana Boustany, Yurdagül Ünal, İpek Şencan, Denis Kos, Esther Grassian, Diane Mizrachi and Loriene Roy should also be acknowledged here. Special thanks for their hard work and valuable editorial contributions.

Last but not least we would like to thank the Local Organizing Committee.

December 2023

Serap Kurbanoglu

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Contents – Part II

Policy, Strategies, Frameworks, Research and Different Approaches

The Delphi Method in Information Literacy Research	3
<i>Dijana Šobota</i>	
Information Literacy Impact Framework	15
<i>Bruce Ryan, Peter Cruickshank, and Marina Milosheva</i>	
Introducing and Verifying the Model of Quality School Library	28
<i>Polona Vilar</i>	
Alarming Literacy Rates in One of America’s Largest Cities: What Can Be Done in the City of Detroit?	44
<i>Hermina G. B. Anghelescu</i>	
Media and Information Literacy in Portuguese School Libraries: A Longitudinal Study with Elementary School Students	59
<i>Glória Bastos and Ana Novo</i>	
Information Literacy in the Design Thinking Process - A Preliminary Research	71
<i>Dorota Rak</i>	
A Bibliographic Mapping Study: Concepts and Their Relationships in Information Literacy before and after COVID 19 Pandemic	83
<i>Buket Akkoyunlu and Nihal Menzi Çetin</i>	
Perceptions of LIS Professionals on ACRL Framework: Understanding and Fostering Concepts, Skills and Attitudes in Academic Students	92
<i>Tatiana Sanches, Maria Luz Antunes, and Carlos Lopes</i>	

Credibility, Ethics, Challenges and New Paths

What Shapes Our Trust in Scientific Information? A Review of Factors Influencing Perceived Scientificness and Credibility	107
<i>Maria Henkel, Armin Jacob, and Lennart Perrey</i>	
Information Literacy as an Ethical Experience	119
<i>Jela Steinerová</i>	

To Find the “Rotten Apple” – Information Ethical Requirements for the Information Literacy of Autonomous Writing Engines	129
<i>Matthias O. Rath</i>	
Information Literacy as a Key Challenge to Improve Social Protection in France Through New Uses of Collaborative Information	140
<i>Christian Bourret</i>	
Public Libraries Fighting Disinformation: An Analysis of Knowledge, Resources, and Actions of Portuguese Librarians	150
<i>Tatiana Sanches, Carlos Lopes, and Maria Luz Antunes</i>	
Information Overload as a Burden and a Challenge. What Can We Learn for Information Literacy?	161
<i>Małgorzata Kisilowska-Szurmińska</i>	
Copyright Awareness Among Future Media Specialists: Survey Results in Bulgaria	173
<i>Tereza Trencheva, Evelina Zdravkova, and Ivan Trenchev</i>	
Project Management Literacy. New Challenges for Librarians and Information Professionals in the European Union and Beyond	185
<i>Zuza Wiorogórska</i>	
Information Literacy Instruction and Education	
Research and Conclusions Regarding Using Problem-Based Learning -PBL- in Teaching	199
<i>Angela Repanovici and Manolis Koukourakis</i>	
Teaching Healthcare Students to Deal with Information Sources: Implementing the HUMAN Framework	210
<i>Pavla Vizváry, Kristýna Kalmárová, and Beatrice Baldarelli</i>	
Teaching Students to Navigate Externalist and Internalist Approaches in the History of Science	219
<i>Jean-Pierre V. M. Hérubel and Clarence Maybee</i>	
Challenges to Information Literacy Online Learning in Higher Education: Libraries, Archives, and Museums Digital Strategic Convergence	227
<i>Ana Novo and Paula Ochôa</i>	
Information Literacy of Polish Ph.D. Students: The Learning Outcomes Approach	239
<i>Magdalena Paul, Marek Deja, Ewa Głowacka, Małgorzata Kisilowska-Szurmińska, Marzena Świgoń, and Maja Wojciechowska</i>	

Fostering Development of Information Literacy Skills in Early School-Age Children	254
<i>Mihaela Grgić and Ivana Martinović</i>	
Developing Online Research Skills in a Lower Secondary School: The Viewpoint of Students	267
<i>Tuulikki Alamettälä</i>	
Visualizing Online Search Processes for Information Literacy Education	277
<i>Luca Botturi, Martin Hermida, Loredana Addimando, and Chiara Beretta</i>	
Undergraduate Students' Information Literacy in Relation to Their ICT Proficiency and Psychological Characteristics	290
<i>Danica Dolničar and Bojana Boh Podgornik</i>	
Instructors' Perceptions of an Information Literacy-Centered Professional Development Workshop	304
<i>Amanda L. Folk, Jane Hammons, Katie Blocksidge, and Hanna Primeau</i>	
Social Project of Media and Information Literacy Knowledge Improvement Among Academic and School Librarians in Kazakhstan	316
<i>Yelizaveta Kamilova and Zhuldyz Orazymbetova</i>	
Author Index	327

Contents – Part I

Algorithms, Artificial Intelligence and Information Literacy

Algorithms, Digital Literacies and Democratic Practices: Perceptions of University Librarians	3
<i>Maureen Henninger and Hilary Yerbury</i>	
Using Early Responses to Wikipedia and Google to Consider ChatGPT	15
<i>David A. Hurley</i>	
Trust, but Verify: Students' Reflections on Using Artificial Intelligence in Written Assignments	27
<i>Krista Lepik</i>	
Improving STEM Competences by Using Artificial Intelligence to Generate Video Games Based on Student Written Stories	39
<i>Ivana Ogrizek Biškupić, Mario Konecki, and Mladen Konecki</i>	
Artificial Intelligence and Information Literacy: Hazards and Opportunities	52
<i>Michael Flierl</i>	

Data literacy and Digital Literacy

Telling Data Stories, the Way Averroes Wrote His Commentaries – A Three-Level Approach to Facilitate Data-Driven Decision Making	67
<i>Vincent de Vevey, Marielle Guirlet, Javier Lloret Pardo, Laetizia Sabatini Choquard, and René Schneider</i>	
Data Literacy in Public Libraries in Croatia: An Empirical Study	77
<i>Radovan Vrana</i>	
Who are Physicians Talking to on Social Media? Needed Data Literacy and Visual Literacy of the Assumed Audience(s) of COVID-19 Vaccination Posts	88
<i>Karolina Brylska</i>	
A Picture Paints a Thousand Words: A Case Study on the Use of Digital Media and Digital Storytelling in Three South African Universities	101
<i>Brenda van Wyk</i>	

Supporting Students’ Digital Literacy	111
<i>Ane Landøy, Henry Langseth, and Mariann Cecilie Løkse</i>	
‘New Clicks’: Developing User-Led Digital Literacies in Older Adults Within Scottish Public Libraries	121
<i>Andrew J. Feeney</i>	
Maturity Model as the Tool for Information/Data Literacy Assessment	130
<i>Marek Nahotko</i>	
Information Experience and Information Behaviour	
“My Personal Doctor Will not Be Replaced with Any Robot Service!”: Older Adults’ Experiences with Personal Health Information and eHealth Services	145
<i>Heidi Enwald, Kristina Eriksson-Backa, Noora Hirvonen, and Isto Huvila</i>	
How Students Seek Information in the Context of Fitness and Physical Exercise	158
<i>José Teixeira</i>	
Changes in Older Adults’ Attitudes and Use of Health Information and Communication Technology from 2019 to 2022	168
<i>Ágústa Pálsdóttir</i>	
Approaches to Exploring the Information Worlds of Women Engineering Students	178
<i>Laura Woods</i>	
Clicks, Queries, and Searches: Uncovering User Behavior Through Transaction Log Analysis	186
<i>Janice Peñaflor</i>	
Early-Career School Librarians’ Use of Information Literacy Skills to Master Their Information Needs	199
<i>Heather F. Adair, Ashley B. Crane, and Elizabeth A. Gross</i>	
Correlation Between Film Criticism, Social Issues and Student Audience Reception	211
<i>Zlatko Vidačković and Nikša Sviličić</i>	
Information Literacy Practices of Hospital Librarians in an Era of Evidence-Based Medicine	223
<i>Sara Ahlryd and Fredrik Hanell</i>	
Author Index	237

**Policy, Strategies, Frameworks,
Research and Different Approaches**



The Delphi Method in Information Literacy Research

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Abstract. The purpose of this research was to develop an understanding of how information literacy (IL) research is operationalized by means of the Delphi method, the current state of the method's usage in IL research and its key features. A systematic review of IL research studies utilizing Delphi was undertaken in April and December 2022, using studies retrieved from five databases. The main findings of the analysis are that Delphi was not a common method for IL studies; nevertheless, it was used to study various issues, including digital and health (information) literacy, and in various contexts, mainly those of education, health care, and librarianship, leading to a variety of findings, most often relating to IL competence or skill framework. Delphi was used highly flexibly, utilizing diverse groups of experts with various signifiers of expertise. If applied rigorously, with other methods, Delphi may contribute to IL theory and practice.

Keywords: Delphi · Delphi method · information literacy · information literacy research · research methods

1 Introduction

Information literacy (IL) has been one of the most extensively researched concepts within Library and Information Science (LIS), understood and interrogated as a skill, competence, social practice, and phenomenon. IL has been investigated through a range of research methods; nevertheless, these have not themselves figured prominently as a research focus of IL studies. On the other hand, the numerous bibliometric studies that have been conducted to map the field indicate the overwhelming use of quantitative research methods [1, 2]. However, these mapping studies, especially until more recently, have not focused on the content of IL research but on publication or citation characteristics and patterns, and have restricted analysis to a brief time span and a narrow range of LIS databases [3].

A relatively popular research method, introduced in IL research by Christina Doyle [4] to develop a comprehensive IL definition and competence outcomes, is the Delphi method. The Delphi method was developed in the United States in the early 1950s by Norman Dalkey, Olaf Helmer, Ted Gordon and associates in “Project Delphi,” an Air Force-sponsored RAND Corporation study to elicit expert opinions to predict the effect

of technology on warfare and prepare for national security threats in the context of the Cold War. Since this was classified defence research, it was released only a decade later when Gordon and Helmer introduced Delphi to the research community as a new method [5]. Since then, the Delphi method has evolved and been used in a variety of fields and disciplines, and today a number of its types and variants exist [6].

The Delphi method has grown in popularity especially since the publication of a seminal methodological work by Linstone and Turoff in 1975 [7]. They defined it as “a method for structuring a group communication process, so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem.” [5, p. 3] Applied in quantitative or a mixed-method approach, but predominantly in a qualitative fashion, Delphi is inductive and data-driven, often used in exploratory studies on specific research topics or questions for which limited or no empirical evidence exists [8]. It is especially useful when the analysed problem can benefit from subjective judgments on a collective basis [5], to aggregate varied individual opinions [9], and to reach consensus among experts on a topic where information sought is subjective [10].

A key factor in the success of the Delphi method is the selection of experts for the Delphi panel(s). Delphi requires qualified specialists, who either have deep understanding of the problem at hand [8], or who represent the key aspects of the relevant issue [11], and who are not necessarily ‘experts’ but who have an insider’s perspective and the most intimate knowledge of and experience with the issue [12]. Although Linstone and Turoff recommended a minimum of 10 and a maximum of 50 experts [5, p. 86], there is no strict rule on this; indeed, Delphi can be successfully executed with higher and lower numbers of experts provided they are carefully selected.

Delphi typically works through a series of ‘rounds’ or ‘iterations’ of mostly asynchronous, anonymous surveys (questionnaires) with controlled feedback which allow forecasting, issue identification, prioritization, problem solving, and decision making. The number of rounds also varies, with two considered the minimum and three the most effective, although neither is there a strict rule on this aspect [5, 13].

This flexibility and versatility make Delphi “particularly well suited to new research areas and exploratory studies” [8, p. 27] and, if carefully designed and properly and rigorously executed, requiring also a justification of the responses provided by the experts, Delphi can contribute to both theory and practice [8]. Therefore, it is well suited to IL research, including potentially to information (literacy) experience, especially if complemented with other methods, since it allows a qualitative exploration of subjective judgments and individual experiences (cf. [14, 15]). This is in line with its underlying philosophy that “truth may be experiential and not just based upon prior assumption.” [16, p. 69].

Recently, several studies have explored the use of Delphi in LIS [17–19] and the key features of the method as applied to LIS research [15]; however, they have not focused on its application to IL research. Therefore, this research aims to develop a critical understanding of how IL research is shaped, operationalized and executed by means of the Delphi method and its current state of usage in IL research. It is hoped the research may serve as a useful base for IL theory and practice, providing guidance for future IL research, both content and methodology-wise, but also for encouraging expansion in the use of the Delphi method.

2 Research

2.1 Research Questions

This research is exploratory in nature and seeks to provide a descriptive insight into the key features of IL research which has utilized the Delphi method as well as the key features of the method itself as used in IL research. Specifically, it is guided by the following research questions:

- What IL issues and which research contexts are studied using the Delphi method?
- Which types of the Delphi method have been utilized in IL research?
- What is the number of rounds and of experts in each round of IL Delphi studies?
- What is the main population of IL Delphi studies and how have experts been selected?
- What are the most common types of findings of IL Delphi studies?

These research questions, treated as analytical categories, have been formulated mainly on the basis of methodological literature on the Delphi method and a previous study of a similar kind [15], but extending the scope to more than one database and focusing on the usage of Delphi in IL research.

2.2 Method

A systematic literature review with elements of a critical literature review [20] was the principal research method. A review of IL research studies utilizing Delphi was undertaken in April and December 2022, using studies retrieved from five databases: Web of Science; Scopus; Library and Information Science Source; ProQuest Library and Information Science Collection; and Library, Information Science and Technology Abstracts. The databases were queried for: “information literacy” AND research AND (Delphi OR “Delphi method” OR “Delphi study” OR “Delphi technique”).

A literature search performed on the basis of pre-defined inclusion criteria (peer-reviewed academic journal articles written in English, indexed in the above databases in the field of LIS, and the search terms appearing in the title, abstract and/or keywords), with a non-defined temporal span, retrieved a total of 799 articles. The final number of articles for analysis was determined with reference to clear exclusion criteria; that is, after the elimination of duplicates, articles whose full text could not be accessed, or those wrongly categorized or indexed. Articles were also vetted for relevance: articles were excluded which only mention Delphi but do not actually use it as a research method or those which report the usage of Delphi but not in the field of LIS and not in IL research. This resulted in a total of 38 individual articles identified as relevant for analysis and this research. A critical literature review with elements of qualitative content analysis and descriptive statistical analysis was used in relation to the research questions (analytical categories).

3 Findings and Discussion

The literature review of IL research utilizing the Delphi method indicated that Delphi was not a common research method for IL studies: only about two studies per year have been published on average since the first use of the method in IL research, with a few peaks of increased use since 2010, as shown in Fig. 1.

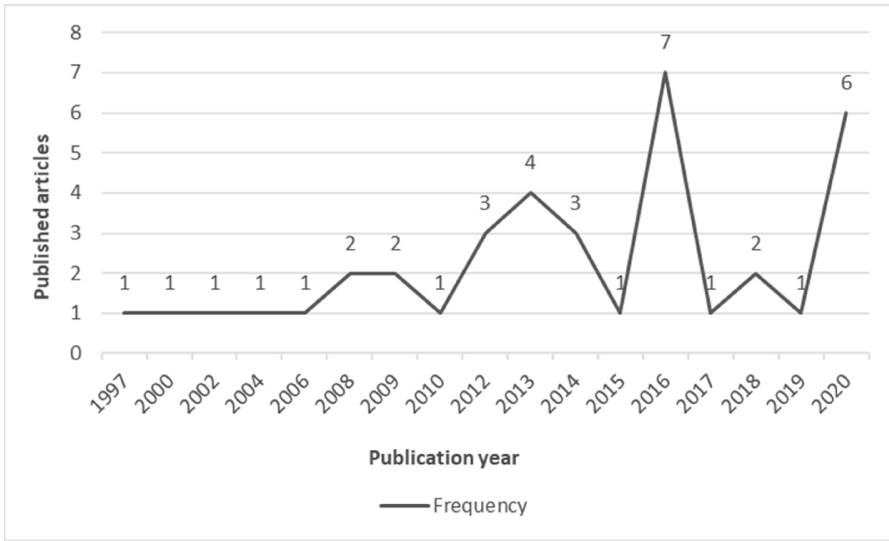


Fig. 1. Trend in the publication of IL research articles utilizing the Delphi method

This is consistent with the prior research of LIS Delphi studies [15] which showed a significant increase of studies since 2000 (when electronic and online variants of Delphi emerged and eased the application of the method), also averaging two studies per year since the inception of the method.

3.1 IL Issues and Research Contexts Studied Using the Delphi Method

While it was found that Delphi was not a common method for IL research, it was used to study various research issues and in a variety of research contexts (Table 1).

IL research which used Delphi most commonly investigated the issues of digital and computer literacy and digital competences ($N = 9$; 23.7%). This includes, for instance, research by Louise Hamilton et al. [21] who examined the role of digital and information literacy in the context of information management knowledge transfer activities in the occupational therapy profession. The other most frequent research question was health (information) literacy and the related issues of competences and practices ($N = 8$; 21%), for example Lukenbill et al.'s [22] research on the role of school and public librarians in improving health IL in their communities and increasing the dissemination of health information. Other frequently studied issues were IL (competence) standards, models and threshold concepts ($N = 5$; 13%); this was the case in the research carried out by Pinto et al. [23] who explored the application of IL standards and models in an Ibero-American context. Delphi was also used to study the issue of information behaviour ($N = 4$; 10.5%), including Poirier and Robinson's [18] research into the application of "Slow principles" in information behaviour research and practices which also introduced the unique "Slow Delphi" variant.

Table 1. Main research issues in IL Delphi studies

Research issue	N	%
Digital/computer/data literacy/competence	9	23.68
Health IL/education	8	21.05
IL standards/models/threshold concepts	5	13.16
Library and information skills/roles	4	10.53
Information behaviour	4	10.53
IL curriculum/education	3	7.89
IL future/evolution	2	5.26
Library instruction	2	5.26
Professional ethics	1	2.63

Table 2 shows that research was predominantly conducted in the context of education (N = 13; 34.2%); an example is a study by Secker and Coonan [24] to design a new curriculum for teaching IL in higher education. An equal number of studies was conducted in the context of higher education (N = 6; 15.8%) and primary or secondary education (N = 6; 15.8%), while one study pertained to the context of vocational education (2.6%). The second most investigated context was that of health care (N = 11; 28.9%); for instance, the above-mentioned study by Louise Hamilton et al. [21]. Librarianship represents the third-largest context/cluster of studies (N = 9; 23.7%). Here, research was conducted mostly in academic libraries (N = 5; 13%), but also school and public (N = 3; 7.9%) and special (medical) libraries (N = 1; 2.6%). For example, Saunders [25] conducted a study forecasting a possible evolution of IL in academic libraries.

Table 2. Main research contexts in IL Delphi studies

Research context	N	%
Education	13	34.21
Health care	11	28.95
Librarianship	9	23.68
GLAM sector	2	5.26
Business (SMEs)	2	5.26
Meteorology	1	2.63

3.2 The Types of the Delphi Method Utilized in IL Research

Although not all the examined articles explicitly declared the type of Delphi utilized in the reported IL studies, and many did not provide sufficient quantity and quality

of evidence on the research design, a variety of types can be identified, as shown in Table 3. The most common type of Delphi used in IL research was modified Delphi, a variant which employs two rounds and/or a unique form of analysis or distribution of surveys/questionnaires (N = 14; 36.8%). One example is the study by Connolly et al. [26] on a new approach to IL development in Ireland focusing on community of practice and enhanced advocacy. Modified Delphi was followed by classical Delphi, a type employing three full rounds and usually used for forecasting or opinion-gathering (N = 7; 18.4%), including the above-mentioned studies by Pinto et al. [23] and Saunders [25]; online Delphi (N = 5; 13%) (e.g., [21]) and modified e-Delphi (N = 5; 13%), for instance, Frank and Pharo’s [27] research on the perceptions of data IL and attitudes towards IL instruction for meteorology graduate students. The other types represented were classical e-Delphi, including Townsend et al.’s [28] study identifying threshold concepts for IL, policy e-Delphi [29], critical Delphi [11] and grounded Delphi [30].

Table 3. Types of Delphi method, number of Delphi rounds and of experts used per rounds

Main Delphi types	N	%	Number of rounds	N	%
Modified Delphi	14	36.84	2	17	44.74
Classical Delphi	7	18.42	3	13	34.21
Online Delphi	5	13.16	4	4	10.53
Modified e-Delphi	5	13.16	NA/not stated	4	10.53
Classical e-Delphi	2	5.26			
Policy e-Delphi	1	2.63			
Critical Delphi	1	2.63			
Grounded Delphi	1	2.63			
NA/not stated	2	5.26			

Number of experts for IL Delphi studies per round						
Round	Mean	Median	1st quartile	3rd quartile	Min	Max
1	21	17	11	27	7	79
2	20	17	11	25	7	70
3	20	18	16	22	7	65
4	20	18	15	20	12	22

When compared to similar prior research of Delphi types in LIS, a slightly different order of popularity was observed: classical Delphi was the most common type, followed by modified Delphi [15]. On the other hand, Ju and Jin’s [17] review did not report the Delphi types used in the 87 studies they examined, while Poirier and Robinson, as part of a larger Delphi study, provided only a short review of the different variants of Delphi [18] without examining their popularity and frequency of use.

3.3 The Number of Rounds and of Experts in Each Round in IL Delphi Studies

As shown in Table 3, most of the IL Delphi studies used only two rounds of iteration ($N = 17$; 44.7%), for instance [27, 31], followed by studies with three rounds ($N = 13$; 34.2%) found in, for example [22, 30]. The least frequent ($N = 4$; 10.5%) were studies with four rounds (e.g., [28]). The methodology in four studies (10.5%) did not provide descriptions of the study design in terms of the number of rounds used [24, 26, 32, 33].

These findings are consistent with the Delphi methodological literature which indicates that no rigid rules dictate the number of rounds that should be undertaken but that most Delphi studies run over two to three rounds, with two considered to be the minimum and three the most effective number [5, 13]. The findings are also consistent with prior research on the Delphi method in LIS which also found that the majority of studies used two or three rounds of iteration, and only rarely four, to obtain information [17]. Although the most comprehensive to date, Lund's review of Delphi in LIS [15] did not examine this aspect of the method, despite this being considered its critical aspect and its most distinguished feature [17]; instead, it analysed the amount of attrition (panellist drop-out) over the course of the Delphi studies.

In the present study (similar to the findings of the review of LIS Delphi studies [15]), virtually no attrition was observed (Table 3), although that was considered one of the weaknesses of the method. IL Delphi studies used a minimum of 7 and a maximum of 79 experts, averaging 17. This is in contrast with the recommended, but not prescribed, minimum of 10 and a maximum of 50 [5], which is also the most common range found in research [17] as well as the average number in LIS Delphi studies [15]. Indeed, like other qualitative approaches, Delphi does not depend on or seek to ensure a representative statistical sample [8, 34]; rather it is the profile of experts (their expertise), and not their number, that is the key factor in the success of the method. Therefore, as stated in the Introduction, Delphi can be successfully executed with both a higher and a lower number of experts provided they are carefully selected.

3.4 The Main Population for IL Delphi Studies and the Expert Selection Method

The main population for IL Delphi studies were librarians (in $N = 15$ studies), as shown in Table 4. This broad category comprised librarians from a variety of library types, mostly academic, but also general, school, special (medical) and public libraries. This population was often selected when researchers were examining IL competences and outcomes and the current or future roles and skills required by librarians for IL instruction, for instance [25, 27], or to meet changing users' needs in the modern library landscape [31]. Behind librarians were information professionals ($N = 9$), who contributed in similar research into the required skills and knowledge of information professionals, such as Howard et al.'s study in the converged gallery, library, archive and museum (GLAM) sector in Australia [30]. The third main population were information science researchers ($N = 8$), whose opinion was elicited in, for instance, research exploring information behaviour [18], and medical professionals ($N = 8$), including in research into the health literacy curriculum [35].

In line with the Delphi method and its benefit in allowing the efficient bringing together of diverse groups of experts with different areas and levels of expertise, these

populations were often empanelled within the same Delphi study, or together with other groups of experts, such as schoolteachers or academic researchers (therefore, the frequency/number of studies in which they participated is shown in Table 4, not the percentage/share). The same populations – librarians (general and academic) and information science researchers – were found to be the most common also in broader LIS studies [14].

Table 4. Main populations for IL Delphi studies and main expert selection methods

Population	N studies	Selection method	N studies
Librarians	15	Employment	17
Information professionals	9	Scholarly publication	13
Information science researchers	8	Professional organization	9
Medical professionals	8	Education	4
Information tech. professionals	7	Network/snowballing	4
LIS educators	5	Conference/research participation	3
(Public) schoolteachers	5	Proximity	1
Academic educators/researchers	5	ListServ/Mailing list	1
Medical university educators	4	NA/not stated	8
SME leaders/managers	2		
Students	2		
Officials	2		

In terms of geographical coverage and the representation of experts from different continents and regions, most studies used experts from (or were conducted in) Asia ($N = 8$; 21%), followed by those conducted at global level (or with international experts) ($N = 6$; 15.8%) and in the Americas ($N = 6$; 15.8%), of which four were conducted in the United States. Europe accounted for four studies (10.5%) and Oceania three (7.9%), all in Australia, while only one study was conducted in Africa (2.6%). As many as ten studies (26.3%) did not state where the experts came from or where the study was conducted.

As regards the selection and identification of experts for IL Delphi studies (Table 4), the most frequent method was through employment ($N = 17$) in a specific occupation and/or in an institution (for instance, an academic librarian or a clinician in a university library or hospital) (e.g., [35]). The second most frequent signifier of expertise was scholarly publication ($N = 13$), for instance in [18], while the third was position in/membership of a professional organization ($N = 8$) such as the American Library Association and the Association of College and Research Libraries, as in Saunders' research [25]. The same top three participant selection methods were found in LIS Delphi studies [15].

Other less frequent methods included education, researchers' professional network (and snowballing), posting on ListServes/ mailing lists, and selection and identification based on proximity. Multifaceted sampling strategies were often used, meaning that

the methods of selection and identification of experts were used jointly, especially when diverse groups of experts were sought, or when a sufficient number could not be recruited by only one method; in such cases, the initial more scrupulous methods were usually complemented with snowballing and/or posting on Listservs/ mailing lists.

It should also be noted that a number of studies ($N = 8$; 21%) did not specify the selection and identification method. This is problematic since one of the objections and core limitations of the Delphi method (or, more precisely, of the studies utilizing it), apart from the lack of an elementary statistical analysis of the data, is the vagueness of the concept of “expert”/“expertise” and the lack of a sampling procedure and objective criteria to select experts and assess their expertise (for instance, a procedure detailed in [8, 36]). This has an impact on the validity of a given study [17, 37–39].

3.5 The Most Common Types of Findings of IL Studies Using the Delphi Method

IL Delphi studies retrieved a variety of findings and were used for various purposes, producing a number of different outcomes, often more than one in a study. By far the most common type of finding retrieved was a framework, frequently a skills and competence framework ($N = 17$), for example in studies that aimed to develop a framework to guide health curriculum design [29], or to inform the development of an integrated IL framework for paramedic science students [40]. This type of finding was also the most common in LIS Delphi studies [15].

This result is somewhat surprising given that IL is today increasingly understood and investigated, by researchers and practitioners alike, as a socially enacted practice rather than a skill and/or competence framework even though much IL research in the educational setting (the main research setting in the reviewed studies here, see Sect. 3.1) has focused on developing skills and competences. On the other hand, this finding speaks to the changing role of librarians – the main expert population in IL Delphi studies (see Sect. 3.4) – from service providers to active educators working with researchers, teachers and other educators to integrate IL into the curriculum.

The second most frequent type of finding in IL Delphi studies was opinion on a topic or an issue ($N = 9$), for example to gather views on “IL life cycle” [23], followed by a tool for development/validation/refinement ($N = 7$), for instance, a questionnaire about digital competences [41]. Other findings retrieved included a curriculum ($N = 5$) [24], forecast ($N = 5$) [25], and the identification of themes ($N = 4$), concerns ($N = 2$), a taxonomy ($N = 2$), or the development of a policy ($N = 1$). These were also the most common findings/purposes of studies that emerged in Ju and Jin’s review [17].

Finally, it should be noted that, in IL Delphi studies, the Delphi method was often used in conjunction with other methods (usually literature reviews, interviews, focus groups, or surveys) as part of larger, multi-phase mixed-method studies, for instance, to inform the next phases (including to select the topic and define the research questions), or to refine and validate the results of the preceding ones (cf. [6]).

4 Conclusion

This research aimed to develop an understanding of how IL research was operationalized by means of the Delphi method as well as an understanding of the key features of the method itself used in IL research. A systematic review of IL Delphi studies retrieved from five databases indicated that Delphi was not a common research method for IL studies, averaging only about two studies per year. Nevertheless, it was used to study various research issues, including digital and health (information) literacy, and in various research contexts, mainly those of education, health care and librarianship, and leading to a variety of findings, most often in connection with IL competence or skill framework. Delphi was used highly flexibly, its design being situational, accommodating to and guided by different research needs and problems, and utilized diverse groups of experts, mostly librarians and information professionals but also experts from other disciplines and fields with various signifiers of expertise.

The review provided here is undoubtedly not complete, and not without limitations. It should be replicated with a team of coders to carry out an intercoder reliability test, not performed in this study since it was conducted by one researcher. Directions for future work may also include extension to other analytical categories (for instance, theoretical frameworks, disciplinary contributions, bases for the number of rounds, consistency of views, and configuration of instruments). The research may be extended by employing additional sources, such as Google Scholar, and combining article search with snowballing and secondary literature searches to encompass other scholarly publications such as proceedings, books and research reports, or doctoral dissertations where Delphi is fairly common, and to cover literature in languages beyond English.

Notwithstanding, it is hoped this review may provide guidance for future research, both content- and methodology-wise, as well as to encourage an expansion in the use of the Delphi method. As the review indicated, the flexibility and versatility of the design and application of the method, and the use of experts from various fields and disciplines, may be beneficial to IL research and development. It has the potential to bridge the theory-practice gap and overcome the current silos and narrow locus in IL research, especially if complemented with other methods, as it can help widen research outside LIS and provide insight into how the concept of IL is understood and operationalized in other disciplines or fields. However, more attention should be devoted to establishing the methodological rigour of the Delphi method to address the flaws in its application (and reporting) and thus enhance its development and utilization in IL research in future.

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Information Literacy Impact Framework

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Abstract. This paper presents findings from a scoping review of academic literature reporting on information literacy (IL) impact. It is intended to deliver considerations towards a framework for impactful IL interventions, including development of parameters to guide impact assessments. The study employed a systematic review methodology. From an initial set of 6177 candidates, a longlist for possible inclusion in the detailed review was developed and classified in three dimensions: geography, context and method of study. From this, a final sample of 26 items was evaluated, resulting in the identification of eight key components of impactful IL interventions, ranging from obtaining buy-in and collaboration, via using frameworks, to repetition to reinforce IL learning. A dominance of research in the education context carried out in Europe is noted.

Keywords: Information literacy · impact · evaluation framework · success factors

1 Introduction

Information literacy (IL) is essential for living and working in the modern age [1]. IL interventions aim to enhance IL capabilities, and it is believed that they have significant impact on society as they enable meaningful engagements with information across various settings [2, 3].

There has been much research into IL interventions in higher education [4, 5]. However, the impact of IL interventions across non-educational settings is not well understood.

There is a gap between the assumed and symbolic societal values of IL, and its proven value as an essential component of life in the Information Age. One source of this gap is uncertainty as to whether assessment of IL interventions' impacts should include both negative and positive effects; unintended and intended consequences; social, economic, cultural, environmental, or technological dynamics; and long-term and short-term processes [6–9]. Hence a clearer definition of IL impact is needed, as is a coherent review of the existing and potential benefits of developing IL competencies in various aspects of daily life. The study reported here aimed to address these needs, using the following research questions:

1. How is impact defined in IL interventions?
2. What are the success factors behind impactful IL interventions?

In the study described here, 3816 papers published between 2005 and 2022 which self-identified as being relevant to IL, and which covered eight IL contexts across the world, were found. This list was narrowed down to 26 items for rigorous detailed review. From these, eight potential success factors for impactful IL interventions have been identified and evaluated. This is the first presentation of these factors to the academic IL research community, and will provide a framework for further research. This work is significant because of the potential to increase the practical impact of IL interventions by planning around these success factors.

2 Methodology

A scoping review was chosen to enable clarification of the concepts in the research questions, following the method of Tricco et al. [10] and three initial assumptions:

1. IL impact can be understood to be the outcome(s) of an IL intervention. This includes attitudinal and behavioural markers of impact, but does not include the development of IL skills. The formulation of IL impact used here pertains to observable phenomena.
2. While it is likely – and desirable – that learning will take place in interventions aimed at developing IL, IL interventions do not take place exclusively in formal education. Hence the searches described below were open to IL interventions in any context, including health, everyday life, and professional development.
3. Currently, there is no agreed way to measure of IL impact, so IL interventions' outcomes may not always be presented or assessed as 'impact'. Therefore, flexibility has to be used when exploring the meanings of IL impact in practice.

The LISTA and Web of Science databases, which are known to cover this study's topics, were searched using keywords developed from the study aims and the initial assumptions. English-language outputs (including books and conference papers) published from 2005 onwards were considered for inclusion in the scoping review. Several filtering stages, shown in Table 1, were used to generate a 170-item longlist. The keywords were designed to find items describing the impact/outcomes of IL work. Hence the results contain items that self-identify as being in the IL domain. No attempt could be made during the process to evaluate the consistency of the results' IL definitions.

Papers in the longlist were then categorized using three dimensions: **Geography**, **Context**, and **Methodology** (Table 2). The reviewers then independently assessed the longlist papers for significance, quality and rigor (SQR), each using a 3-point scale. (One point was awarded if a paper was assessed as reporting significant new findings; one point was awarded if a paper showed a high degree of research quality, such that research decisions were justified, and sufficient information on studies' objectives, conceptual frameworks, and interpretations was provided; one point was awarded if a paper was assessed as having used rigorous methods to gather and analyse data.) Those with the highest joint SQR scores became the final sample for the review.

Table 1. Filtering stages

Stage	Description
Development of keywords	Keywords were ‘information literacy’ AND any of ‘assess’, ‘benefit’, ‘effect’, ‘evaluat*’, ‘impact’, ‘indicator*’, ‘measur*’, ‘monitor*’, ‘outcome’, ‘output’, ‘result’
Database searches and deduplication (N = 6177)	Two databases were searched: LISTA and Web of Science. Duplicate results were removed
Focus on IL (N = 3816)	Results which did not have <i>information literac</i> in their title and/or abstract were removed
Focus on relatively recent results (N = 3707)	Results from before 2005 were removed
Drawing up longlist (N = 170)	<p>Two reviewers independently reviewed the remaining items’ titles and abstracts, looking for items that focused on impact. In this stage, a further 26 duplicates were removed</p> <ul style="list-style-type: none"> • If the reviewers agreed that an item focused on impact, it was included in the longlist. There were 135 such items • If a reviewer found that an item was ‘definitely’ impact-focused, but the other found it was ‘maybe’ impact-focused, the reviewers discussed this item. Hence of 74 ‘definitely-maybe’ items, 35 were added to the longlist • If both reviewers found that an item was ‘maybe’ impact-focused, this item was not put in the longlist. There were 363 such items • If either reviewer found an item was not impact-focused, it was excluded from the longlist regardless of the other assessment. There were 3109 such items

Method of study: Three final-sample papers had no method of study but were kept because they contributed practicalities about IL interventions tackling fake news [11] and methods to evaluate IL impact [12, 13].

Geography: During generation of the final sample, the fraction of papers focusing on Europe increased (from 22% in the longlist to 46% in the final sample), and all ‘global’ papers were eliminated. The bias towards Europe over the Americas was somewhat surprising, as was a lack of research reporting on Asian and African contexts. This bias may have happened because good research may have been presented in ways that reduced the assessed SQR values.

Table 2. Longlist and final sample items' geographies, contexts and methods of study

Geography	Long-list	Final sample	Context	Long-list	Final sample	Method of study	Long-list	Final sample
Europe	38	12	Education	91	15	Quantitative	64	11
Americas	56	7	Library	22	3	Mixed	18	8
Africa	14	2	Workplace	11	3	Qualitative	20	4
Asia	18	4	Everyday	5	2	Literature review	9	0
Oceania	11	1	Health	10	2	NA/none	59	3
Global	4	0	Citizenship	3	1	--	--	--
NA/not stated	29	0	Conceptual	1	0	--	--	--
--	--	--	NA/not stated	27	0	--	--	--
Totals	170	26	Totals	170	26	Totals	170	26

3 Impact Assessment, Impact Contexts and Methodologies

Examination of the final sample showed that impact is reported, but formal and purposeful assessment of impact is rarely performed. Such impact assessment that is reported is most often found in institutions, in education [14–17] and to a lesser extent in the library domain [18]. However, **long-term** impact is measured rarely [19, 20].

The only final-sample items that strongly consider how to assess the impact(s) of IL interventions are Crawford's chapter on this topic [21], and a critical review of IL assessment in higher education by Markless and Streatfield [12]. Therefore, the first key finding in this study is the general lack of evaluation and measurement of IL impact, despite the presence of much excellent IL work.

Differences between contexts were also observed. *Firstly*, the impact of educational IL interventions was demonstrated mostly as student learning and achievement indicators, such as greater use of suitable sources, improved recall and understanding, heightened critical thinking skills, and enhanced self-confidence associated with information use [15, 18, 19]. However, impact on student learning does not always lead to increased marks [22]. *Secondly*, in library-focused studies, IL impact is seen in increased use of library facilities, and more positive perceptions of libraries [14]. Thus, the most immediate impact of IL interventions is on behaviours associated with using information. *Thirdly*, in workplaces, IL interventions have been seen to lead to improvements to organisational innovation [23]. IL also adds business value through increased information use and cultural changes [24]. IL also impacts the degree to which organisations adopt ethical practices [25]. *Finally*, in health/everyday applications of IL, impact is seen in increased readiness for self-directed learning and positive health outcomes [26, 27].

Concerning research methods, IL impact is most frequently assessed using quantitative and mixed methods. Qualitative methods are less frequently seen, yet appear in all IL context classifications. That is, they are not reserved for the assessment of specific types of impact. The most frequently used methods to assess impact are surveys, observation, group discussion, interviewing, and phenomenographic methods [21, p.211].

The following section develops these findings to identify the factors are likely to underpin effective IL interventions.

4 Towards an Information Literacy Impact Framework

This section responds to the project's two main research questions, identifying the key final-sample papers in each area.

4.1 Defining Successful Impact in IL Interventions (RQ1)

In general, the final-sample shows that impact is evaluated, and hence defined not in terms of outcomes/effectiveness but by considering outputs/efficiency/'busyness'. For example, Daugherty and Russo [16] evaluated their project by assessing whether students used new skills but not whether this led to with higher grades. Doney [18] evaluated increases in numbers of IL-education sessions, requests for literature searches, and books being issued to the nurses her service supports, rather than showing that healthcare outcomes had improved as a result of her IL intervention. Similarly, Howard and Gill [28] assessed whether their intervention led to increased use of their library, improvements in writing, increased use of document supply, heightened understanding of search, and greater use of IL tutorials [28]. Clearly some of these are not outcomes but merely outputs. The paper by Petrak et al. [29] is based on self-reported inputs: how useful course content was felt to be by attendees, how well-prepared lecturers were seen to be, lecturers' styles of presentation. While these may well be important precursors, they do not evaluate tangible impact in the form of, for example, improved healthcare outcomes.

4.2 The Success Factors Behind Impactful IL Interventions (RQ2)

It had been assumed that all final sample items would report how impacts were generated and evaluated; this would have led to a simple set of success factors for IL interventions. In practice, this was not fully achieved because several papers omitted some or all of these details. However, it is possible to draw lessons from the results of the review. This was undertaken by performing a thematic analysis of the final sample items, in which *firstly* each paper was reduced to a few bullet points stating the paper's core meanings and any success factors for IL impact the paper conveyed. *Secondly*, if several papers covered a similar or identical success factor, these were brought together in drafts of the subsections below. *Finally*, rigorous re-reading of the relevant papers and the draft subsections enabled editing of the subsections into the findings presented below. Hence the following components of a proposed information literacy impact framework are evaluated in of the first seven subsections below, in relation to relevant papers from the final sample. Only one final sample item [26] clearly covered the interaction of IL with an external factor (physical health) – see the final subsection. However, we do not believe that such factors should be ignored. The final list of success factors is:

- evaluation should be around effectiveness and outcomes
- choice of clear frameworks and structures to measure impact

- ensuring integration and relevance of the intervention
- collaboration between stakeholders
- design of content and delivery methods
- repetition and follow-up
- management buy-in and budget.

Evaluation Should Be Around Effectiveness and Outcomes. Clearly it is necessary to understand the nature and extent of interventions' impacts. Markless and Streatfield [12, p.113] strongly suggest that people running IL interventions do not simply collect 'busyness statistics' (i.e. outputs). These authors' final-sample items, and their book [30], provide clear suggestions about how to undertake impact evaluation. Streatfield and Markless [13] report an example of stimulating impact evaluation in university libraries. The 2017 paper notes the support for evaluation needed from stakeholders [12, p.106], and can be read as a set of questions to aid planning of evaluation of IL interventions. The question-set covers three main areas: (1) the levels of expertise required; (2) inclusive approaches to impact evaluation; (3) the need for strong Theories of Change.

The other papers related to this aspect of evaluation illustrate these principles. Craig and Corral [15] state that 10% of IL literature is concerned with assessment (assessment of learning) and evaluation (how effective interventions are). They state that while perceptible measures (e.g. self-efficacy) are often used, these measures do not objectively evaluate 'actual' IL. Kennedy and Gruber [31] reinforce this statement, as do Maranda et al. [20], who note that confidence is not related to knowledge. Crawford [21] also points out the paucity of assessment of IL interventions. He agrees that outcomes should be measured, using substantiated tools. Such outcomes include improvements to knowledge, and changes to perceptions and actions. Crawford further suggests collecting both positive examples of information-use and failures that might have been avoided. He recommends the books by Streatfield and Markless [30] and by Lipu et al. [32]. Seifi et al. [27] write about an example of measuring outcomes using an IL scale developed for a specific geography. This scale, from Jamali Mahmuei and Alizadeh [33] uses measures focusing on participants' post-intervention readiness for learning. Uzegbu [34] provides a topical instance of 'IL instruction': simply informing rural villagers about sustainable development goals, but not taking concrete steps that would enable the villagers to work with such information. However, he notes that such instruction can stick in peoples' minds, leading to concrete actions to deal with non-biodegradable waste.

There are three warnings in the final sample papers' comments on evaluation. *Firstly*, Forster [25] states that it may not always be provable that interventions are effective. *Secondly*, Lee et al. [35] note that learners may be heterogenous; this implies a need for nuance in evaluation. *Finally*, in Squibb and Mikkelsen's project [22], IL teaching did not significantly affect grade averages.

Choice of Clear Frameworks and Structures to Measure Impact. Several final-sample items promoted the use of frameworks and structures to bolster IL interventions. Markless and Streatfield [12, p.113] state that strong Theories of Change are needed. They should link to clear, evaluable objectives that focus on changes to participants. Markless and Streatfield found that it was valuable to focus on single aspects. The intervention by Seifi et al. [27] was based on models by SCOUNL [36] and Kuhlthau

[37]. Seifi and colleagues used a scale devised by Kungu [38] to assess lifelong learning readiness, as well as the scale by Jamali Mahmuei and Alizadeh [33]. SCONUL's model [36] was also used in research by Craig and Corral [15]. L. C. Chen and colleagues [19, 39] recommend requiring students to investigate and deliberate, using frameworks such as Big 6 and super3, and integrating such IL interventions into the curriculum. They state that such actions improve both recall and understanding of subject matter. These authors also call for ongoing interventions, and evaluation of their impact throughout school careers. Chen and colleagues' papers are the only longitudinal studies in the final sample. Kennedy and Gruber [31] work from the ACRL IL framework, using a protocol by Steinke and Buresh [40].

Ensuring Integration and Relevance of the Intervention. IL is context-dependent [e.g. 41, 42], so IL interventions must be integrated into their contexts. This is seen in the following final-sample items. Ahmad et al. [23] recommend twice-yearly 'practice-based' workplace IL interventions. Craig and Corral [15] recommend building IL training into work, while Cheuk [24] uses a workplace IL intervention to recommend integration with knowledge worlds. For Cheuk, interventions should be made useful, by enabling participants to learn. Crawford [21] calls for focus on specific matters such as health, finance, employability. Cullen et al. [43] state that IL education should be embedded into the curriculum. Hopkins and Julian [17] report on an intervention that went on through undergraduates' degree programmes, varying according to the students' study topics. It was found that IL intervention should take into account what students already know. Such interventions need time for both delivery and for learning to take root. Squibb and Mikkelsen [22] also state that IL instruction should be embedded in courses.

Collaboration Between Stakeholders. The following papers provide a little detail of how collaboration between IL intervention workers and others can be undertaken to integrate IL interventions into workplaces and teaching. Crawford [21] recommends collaboration around national policies. Lee et al. [35] state that interventions around use of government websites requires collaboration with data scientists, civil society organizations, local libraries and information agencies, and that such interventions should be domain-specific. Middleton's project [44] included collaboration between lecturers and library staff.

Design of Content and Delivery Methods. Few of the papers describing interventions gave clear detail of their content and delivery to enable others to reproduce them. Auberry [11] advocates use of frameworks such as RADAR [45] but does not report any impact data to back this up. In contrast, Daugherty and Russo [16] thoroughly detail their intervention in an annex. Howard and Gill [28] advocate 'well-designed tutorials'. Kennedy and Gruber [31] call for service learning, in which 'students participate in an organized service activity that meets identified community needs and reflect on the service activity in such a way as to gain further understanding of course content, a broader appreciation of the discipline, and an enhanced sense of civic responsibility'. Maranda et al. [20] report on IL instruction for first-year medical students that comprises three online modules, three in-person learning sessions and a therapeutics project. This is followed up with a second-year literature review project. Olaopa [46] shows that visually impaired learners

suffer from low IL if they lack access to appropriate material (braille, audio-books etc.). A further consideration is learning styles. For example, Seifi et al. [27] note that older Iranians are accustomed to rote-learning rather than understanding, hence it is implicit that delivery of IL outcomes will take time. Seifi and colleagues' training on use of public libraries has a curriculum of basic skills; recognition of the need for such skills; learning about information sources; learning to search the Internet and knowledge of resources; use of databases and library searches; learning about evaluating information and sources; learning about referencing and ethics.

Repetition and Follow-up. Several papers advocate repeating or reinforcing IL interventions, because IL learning soon fades without such support. For example, Kennedy and Gruber [31] call for delayed post-testing as well as testing before and immediately after an intervention. Ahmad et al. [23] state that workplace IL training programmes should be conducted at least twice yearly. Y. H. Chen [14] built on models of technology acceptance [47] and successful information systems [48] to research training in use of a library portal. In this study, certain perceptions (ease of use, usefulness, information quality, system quality, service quality, satisfaction) and actual use of the portal were all increased by the end of the training, However, 3 months later only portal-use remained at a heightened level. Similar losses of learning were also found by Cullen et al. [43], and by Daugherty and Russo [16].

Management Buy-in and Budget. Another factor is the need for support from management, including budget. Ahmad et al. [23] showed that developing an innovation mindset needs investment in information-processing capabilities. SME executives 'should critically evaluate their awareness of the organizational information landscape', while enhancing their information capabilities. Markless and Streatfield [12] also consider the role of library leaders in delivering impact evaluation: they are concerned that leaders may concentrate on providing services and activities rather than assessing impact. In Cheuk's study of the introduction of an information system into a large environmental consultancy [24], the key step was obtaining senior management buy-in, in the form of funding to enable integration of the intervention throughout the consultancy's practices. Craig and Corral [15] also demonstrate the need for buy-in, not least in supporting relevant testing. Doney [18] states that her intervention would not have taken place had her manager not asked for it, and provided funding. Hopkins and Julian [17] also report on the need for buy-in from management and others. Seifi et al. [27] state that development of IL needs societal change, which might be seen as 'societal buy-in', and budget/infrastructure.

Uzuegbu [34, p.92] writes about a form of senior buy-in in that a village chief banned certain environmentally damaging activities three months after Uzuegbu's intervention. The chief learnt of the implications from one of his staff who took part in the intervention.

Interaction with External Factors. Hirvonen et al. [26] show that for young Finnish men called up for national service, lower everyday health IL (EHIL) scores are more frequent among those over 18 years old, undertaking or having completed compulsory or vocational education, not in higher/further education, or having a father who works or worked in a manual labour occupation. Similarly, those who had unhealthy lifestyles had lower EHIL scores. The converse was also found, i.e. those with low EHIL scores

were less likely to behave in health-promoting ways. Hence it is possible that IL and external factors interact with each other.

5 Conclusion and Next Steps

This study of self-described IL literature has shown that there is inconsistent impact assessment, along with poor use of evidence. This is despite several authors having undertaken thorough work towards a roadmap for assessment of IL impact.

Overall, there is a dearth of IL impact assessment in educational and library contexts. Hence, more research is needed into the impacts of workplace, everyday, health, and citizenship IL interventions. Another significant literature gap is the world away from Europe and the Americas. This may reflect a weakness in this study's methods, so there may be a range of publications in other languages. However, given the wide scope of the study's searches, it is also likely to reflect real research gaps.

The future of IL impact evaluation is open, and is likely to be shaped by external demands and recent developments [12]. The findings presented here support Markless and Streatfield's call [12, p.106] for systematic, theory-based approaches to impact evaluation, and show that there is much to do to improve such studies.

There are some limitations to this review, leading to options for further work. *Firstly*, reliance on the review items' definitions of IL (often not explicitly stated by their authors) means that inconsistency is possible. Hence there is scope to research how publications in this domain define IL, and to consider how the IL definitions in the final sample items may have affected this review's findings. *Secondly*, further research may find evidence of other forms of impact, such as through collaboration. *Thirdly*, there may be structural barriers that prevent IL interventions being successful, but no items covering this possibility came up in the searches. *Fourthly*, only English-language publications were considered, presumably contributing to the geographical biases noted above. *Finally*, this study was a literature review. Empirical work is needed to test and evaluate the potential success factors listed above.

In summary, this study has shown that more could be done to assess the impact of IL interventions globally. It is suggested that the above IL impact framework should be developed, building on the contextual and methodological differences found, and moving beyond Europe and the Anglosphere. This work should be flexible and inclusive enough to be applied across a variety of contexts, and should establish methodological and conceptual standards for IL impact assessment that draw upon a wide range of resources (for example, LIS literature; impact assessment standards and models from other disciplines). The resulting improved framework should then be validated, using suitable case studies, and reference to well-known works on development of impact, such as Meyer et al.'s Toolkit for the Impact of Digitised Scholarly Resources [49], Verwayen et al.'s Impact Playbook [50] and Tanner's Balanced Value Impact model [51]. The authors of this study look forward to collaborating with others to undertake such work.

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Introducing and Verifying the Model of Quality School Library

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Abstract. The paper presents the content and the process of creating the *Model of Quality School Library* that was a result of multiphase applicative research. It started with a previously formed theoretical draft model that was empirically verified. Both models, and the process of pilot verification, are presented. According to a number of authors, quality school libraries play a crucial role in supporting teaching and learning within educational institutions and are one of the fundamental prerequisites for systematic development of information literacy skills that are essential in our information society. With this model, Slovenian school librarianship aims to get an empirically verified theoretical base that will be useful in preparing strategic foundations and in practice.

Keywords: School libraries · quality · Model of Quality School Library

1 Introduction and Literature Review

The purpose of this paper is to present the content and the process of creating the *Model of Quality School Library* (Fig. 2) that is a result of multiphase applicative research [1–3] and has not yet been presented internationally and will add initial information on the empirical verification and validation of this model.

According to many authors (e.g., [1–11]), quality school libraries play a crucial role in supporting teaching and learning within educational institutions. They are one of the fundamental prerequisites for systematic development of information literacy (IL) skills that are essential in our information society. School libraries have important tasks in formal education and are the only libraries with the potential to be visited by everyone. In Slovenia basic education is mandatory for all children. According to the legislation [12, 13], school libraries, are a compulsory part of formal education at the pre-school, primary and secondary levels. This gives all children the possibility to come into contact with the library and a librarian.

As the information landscape continues to evolve rapidly, the competences required by school librarians have also transformed. The competences encompass a wide range of skills including information access, instructional partnerships, program administration, digital literacy, and information technology management, and these skills are reflected in many competence models [14–19].

Several studies examined the correlation between school librarians' competences and student learning outcomes, including studies of digital literacy, information technology management, and digital citizenship. Some researchers [15, 20] argued that school librarians must be adept at navigating the digital landscape, guiding students in evaluating online information, and promoting ethical and responsible use of digital resources. Furthermore, research suggested that highly competent school librarians positively impacted student learning outcomes. Smith and Johnson [21] found that school librarians' expertise in IL instruction positively influenced students' academic achievement. Additionally, research by Todd [22–25] demonstrated that school libraries with highly qualified librarians positively impacted students' reading motivation, skills, and academic performance. Purcell [26] highlighted the evolving role of school librarians as information specialists who supported students in developing digital literacy and IL skills. They discussed the integration of technology into school library programs to enhance IL instruction.

School libraries serve as essential learning spaces that play a vital role in promoting IL among students. Many studies demonstrated the significant impact of school libraries on IL development among students. Research studies and scholarly articles emphasized the role of well-funded and well-staffed school libraries, collaboration with teachers, and the integration of technology in promoting IL skills. By fostering a culture of inquiry, providing access to diverse resources, and offering targeted instruction, school libraries contributed to students' IL competencies, empowering them as lifelong learners. Researchers [6, 24, 26] discussed the relationship between well-staffed and well-funded school libraries and academic achievement, including IL skills. They highlighted the positive impact of school libraries on student achievement and the development of IL competencies and emphasized the importance of school libraries in promoting IL development and empowering students as critical thinkers. Lance and Loertscher [27] also stressed the importance of effective school library programs, including collaboration between librarians and teachers, to enhance students' IL development.

Many authors and institutions such as the International Association of School Librarianship (IASL) and the International Federation of Library Associations and Institutions (IFLA) discussed measuring the quality of school libraries. Several sets of performance measures and approaches have been suggested (as shown for example by [28, 29]), including those that addressed various aspects of the work of school librarians such as collection development, information access, instructional support, technology integration, and collaboration with teachers. Most measures take into account evidence-based practice [18, 30, 31], and the impact of libraries on their environment and users [32–34]. Also, quite a number of models of quality school libraries have been developed, most notably by Todd and colleagues [4, 25, 35]. We have consulted these other models in the process of formation of a new model [8].

School libraries have a unique opportunity and a responsible mission to become and act as an example of a library that develops the learning competencies of its users. Experience and available data and analysis have shown that school librarians do not always make sufficient use of this unique position and opportunity and so they need foundations for professional development and work. Our model is thus an attempt to offer an opportunity to test and recognize stronger and weaker areas of Slovenian school

libraries, and to find the means to build on the strengths, improve the weaknesses, and thus ensure the possibilities for their systematic and strategic development.

2 Formation of the Model

The formation of the *Model of Quality School Library* (Fig. 2) started with a previously formed draft theoretical model (Fig. 1) and followed an extensive consultation of literature, personal discussions with various authors, as well as consulting practitioners. It was thus based primarily on theoretical foundations, but also took into account our findings [36] during the initial phases of a national project on encouraging reading literacy (OBJEM¹), and some empirical data on the state of the school libraries in Slovenia. OBJEM was a project in which selected kindergartens (n = 14), primary (n = 23) and secondary schools (n = 22) participated voluntarily. The foundation for the model was the official curricular requirement that the school library and school librarian needed to be intertwined with the work and life in the school. That meant that teaching professionals (librarians among them) should have actively sought opportunities for collaboration, thus constantly developing quality teaching of IL and related literacies. In a team of professionals, the librarian plays the role of coordinator [6]. The role of the school library was not only in its direct connection with students but also with its connections with other participants in the educational process. We were also talking about, for example, providing teachers with high-quality, curriculum-related materials and resources, providing information, helping them prepare for classes, preparing teaching materials, and so forth. Areas in need of constant attention are thus:

- Better and constant collaboration between the library/librarian and other teachers;
- Increased internal and external promotion of the library;
- Increased advocacy of the library profession and its role;
- Clear legislative framework and available professional standards and guidelines for school libraries;
- More frequent opportunities for professional training and development of librarians;
- Improved working conditions in libraries;
- Improved and more frequent collecting of quality data on the state of libraries;
- National strategy of development of school libraries, and guidelines for strategic planning for individual libraries.

This theoretical draft model (Fig. 1) included seven segments, each consisting of the following elements:

1. **Good conditions:** In order to produce and support quality work, the library must have available basic working conditions, starting with reliable financing, high-quality, up-to-date, relevant library materials in sufficient quantities, appropriate location and accessibility, appropriate premises, modern equipment and technology.
2. **Competent librarian:** A competent school librarian possesses LIS, pedagogical (PED) and general competences and values. These are noticed and appreciated by the teachers, management, students, and external users. The librarian is also responsible

¹ <https://www.zrss.si/projekti/projekt-objem/>

for establishing their own image in the eyes of users. This, in turn, is also influenced by factors such as the organization of work at the school, the attitude of the management, and work norms. Taken together, these factors would determine the content and scope of the librarian's work.



Fig. 1. Draft *Model of Quality School Library* (Source: [2], p. 289)

3. **Development strategy:** Slovenian librarianship law requires each library to prepare a strategic plan for its development and that this plan must be included in the school's strategic development plan. It is a strategic view of the future, based on the current situation, important for the development of every library. A quality school library must have such a plan.
4. **Importance, indispensability, popularity:** A quality school library is actively and dynamically involved in the life and the work of the school. All actors are aware of the school library's importance; it is popular with them and they perceive it as indispensable. Among other things, this is important because it creates positive expectations of users towards the library. It is important to remember that the responsibility for creating these expectations cannot be transferred entirely to users – the librarian also has an important role.
5. **Activity and Availability:** A quality school library is active and accessible – this shows in its openness during, before and after classes, its physical accessibility, including both the location of the library as well as library space, and in its activities

inside and outside library (including virtual types of accessibility). Active internal and external promotion of the library is connected to all this.

6. **Inclusion, integration:** A quality school library is closely and regularly included and integrated into the entire life and work of the school. This is shown by the use of its materials and resources, space, technology and inclusion of the librarian in every activity that takes place at the school at all levels. The library is included in all departments and classes, in teaching preparations, and planning of teaching. As part of teaching teams, the school librarian is present at professional meetings and gatherings such as pedagogical conferences. In this way, the library becomes indispensable in the minds of all actors.
7. **Contribution to knowledge, literacy, values, atmosphere:** A quality school library contributes to knowledge, literacies, values, and, through creating a supportive atmosphere it is unequivocally recognized. Such contribution is measurable. For this, clear criteria and approaches must be established, that, similarly to the creation of a development strategy, are again linked to the knowledge and competences of librarians in areas such as user research, quality measurement, and promotion of services. Visibility and an unequivocal contribution make it possible to establish the library as an important stakeholder in teaching. Of course, these are soft areas where determining the influence of just one actor is undoubtedly very challenging.

As emphasized especially by the third segment of this model, a quality library needs to prove it is positive in all segments, although in some cases, a well qualified and engaged librarian can to some extent make up for other potential gaps.

Once this theoretical model was formed, we started its validation. With this we followed two goals. First was a research-oriented goal to acquire and analyze data to form a more verified version of the model that would comply to professional recommendations and respond to practitioners' needs. At the same time we would construct the model in such a way to enable preparation for nation-wide verification of the model. The second goal was a more hands-on-oriented goal: to demonstrate to the practitioners how to approach analysis in the first place.

Each segment and element of the draft model was tested using various quantitative and/or qualitative methods, using the approaches to the analysis, data sources used, and samples, as summarized in Table 1. These data, and data sources included:

- 1) Quantitative statistical data of the national library center CeZAR²;
- 2) Quantitative and qualitative data from the surveys within the OBJEM project (collected by ourselves or other stakeholders);
- 3) Quantitative and qualitative data from surveys and other documents (Doodle polls, Padlet documents) from the participant trainings that we performed within the OBJEM project;
- 4) Qualitative data from the strategic and yearly plans and yearly reports of the schools and libraries in the OBJEM project.

It must be noted that we could only partially analyze many elements or not at all, either due to lack of data or due to their complexity. This led us to require qualitative

² Center ZA Razvoj knjižnic (in English: Center for Development of Libraries).

Table 1. Data sources and analyses of Draft model

Draft model segment	Elements	Data source	Analysis	Notes on sample
good conditions	financing library materials premises equipment technology	/ 1 (partially) 1 (partially) 1 (partially) 1 (partially)	/ quant quant quant quant	national data, only statistical
competent librarian	LIS comp PED comp GEN comp values	1 (partially) 1 (partially) / /	quant quant / /	national data, only on formal edu
development strategy	of school of library	4 4	qual qual	only OBJEM participants
important, indispensable, popular	with pupils with parents with teachers with management	2, 3 (partially) 2, 3 (partially) 2, 3 (partially) 2, 3 (partially)	quant./qual quant./qual quant./qual quant./qual	only OBJEM participants
active, accessible	open active phys. Accessible promoted	1 (partially) 2, 3 (partially) 2, 3 (partially) 2, 3 (partially)	quant qual qual qual	only OBJEM participants
included, integrated	regularly everywhere all levels all meetings all teaching plans	2, 3 (partially) 2, 3 (partially) 2, 3 (partially) 2, 3 (partially) 2, 3 (partially)	qual qual qual qual qual	only OBJEM participants
contributes	to knowledge to literacies to values to atmosphere	2, 3 (partially) 2, 3 (partially) 2, 3 (partially) 2, 3 (partially)	qual qual qual qual	only OBJEM participants

(Source: [3]).

data and analyses. Even where national statistics existed, it only allowed partial analyses. We collected all qualitative data ourselves during the five years of the OBJEM project. We only included the project participants (fourteen kindergartens, twenty-three primary, and twenty-two secondary schools), since we did not have access to wider samples. We provided detailed explanations of samples, methodologies, analyses, approaches, and solutions for each segment of the model, as well as the results and discussions in a separate publication [3]. In summary, we can say that, besides discovering areas with a serious lack of data, we were also not satisfied with the findings for most segments and elements, indicating that there is still a lot of work to be done in the area of quality of school libraries in Slovenia.

As explained earlier, our analyses were also examples of how to approach the analysis of each element. We also suggested possibilities for improvement with a goal to empower the librarians wanting to attempt this at their school.

These analyses, following our research-oriented goal, also helped us form the *Model of Quality School Library* ([3]; Fig. 2). According to the findings, we can say that the segments and elements of the draft model were *basically* appropriate. We found that, while the draft model included seven seemingly equivalent segments, a closer look and analyses revealed two things:

- 1) In certain segments of the model, some additional elements as well as changes to existing ones were needed in terms of distribution into areas, naming, and content (Table 2).
- 2) In the model there are actually three different types of elements that are also interdependent of each other. Therefore, a different display is needed.

The *Model of quality school library* (Fig. 2) thus consists of three levels, i.e. layers on top of each other:

- Three elements comprise the *Basic conditions* that must be ensured as a foundation for quality work: “Work conditions”, “Librarian” and “Development strategy”.
- Three elements compose the *Quality traits*, as they deal with the way librarians and libraries work, and represent the ways in which a quality library is involved in the life and work of its institution: “Interactive”, “Accessible” and “Integrated”.
- Two more elements reflect the *Outcomes* of the librarian and the library; they are therefore about where and in what ways the work of a quality library can be perceived: “Important and popular” and “Effective”.

We also defined the content of individual elements within each layer more precisely:

- Basic conditions for library work:
 - Work conditions: Good working conditions must be guaranteed. These conditions include high-quality, sufficient, and appropriate materials; a sufficiently large and suitable space with appropriate equipment; and technology in a central location in the school. This also includes adequate financial resources; in this context, we can also place the urgently needed dedicated or systemic funds for the school library, because it is high time that the operation of school libraries ceased to be financed as part of school material resources.
 - Librarian: The pillar of a quality school library is a competent, active and committed school librarian, who is characterized by librarian, pedagogical and general competences and values. A librarian’s lifelong education is urgently needed.
 - Development strategy: Educational institutions must have a prepared strategic document in which they define the vision and direction of their development in the next three to five years; its essential component is the school library development strategy. The annual work plan of the institution is placed in the context of this document in which its library must also be represented with its annual plan of both professional and bibliopedagogical work.

Table 2. The changes in the names of the elements

Draft model	Final model
good conditions	work conditions
competent librarian	librarian
development strategy	development strategy
important, indispensable, popular	important and popular
active, accessible	interactive
included, integrated	integrated
contributes	effective

(Source: [3, p. 250]).

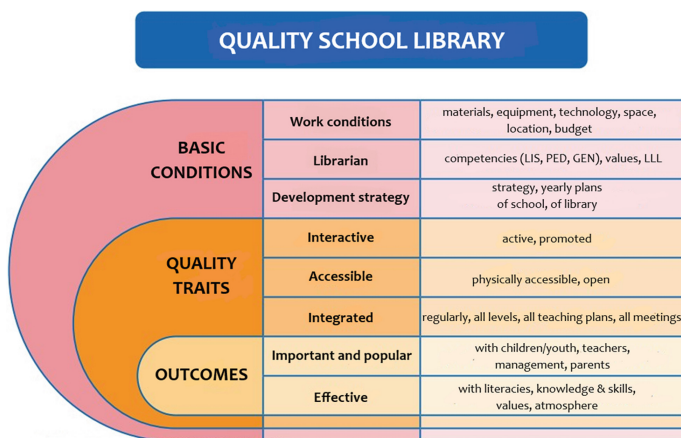


Fig. 2. Model of Quality School Library (Source: [3, p. 233])

– Quality traits of the librarian and the library:

- **Interactive:** The library’s interactivity can be perceived through its direct activity inside and outside the library. This is seen in terms of direct involvement in educational work, as well as in all other activities where it is present in the life and work of the institution. Of course, the main element of such a library is an active and committed librarian, who is also involved in its internal and external promotion and advocacy.
- **Accessible:** The element is designed simply: the library must be physically and digitally accessible to users. The library must also follow recommendations regarding accessibility for people with disabilities. In addition to physical accessibility, adequate openness of the library must also be ensured.
- **Integrated:** The integrated operation of the library is ensured when it is regularly present or integrated in all levels of educational work with its operations and

materials This can be seen in teaching preparations and in the implementation and evaluation of educational work and is realized through collaborative teaching by the librarian and teachers. The librarian is also present at all meetings in the institution (activities, pedagogical conferences, and meetings with parents).

– Outcomes of the librarian and library activities:

- Important and popular: Due to all the preceding elements, a high-quality school library has a high reputation and importance in its institution, it is indispensable for professional work, and it is also popular and appreciated by all users: students, teachers and other professionals, the management of the institution, and, also, parents. There is nothing wrong if the library is also used by non-teaching staff.
- Efficient: A library that meets all the previous conditions is also efficient, as it participates in its institution and has an influence on the development of literacy, knowledge, and values. As a result, it contributes to the establishment of a positive atmosphere in the institute.

So, how can we describe a high-quality school library in the Slovenian environment? The most direct description is that it is a school library with good basic conditions, due to which it can plan, implement, and evaluate its operation in appropriate ways. It is interactive, accessible, and integrated. It is visible in the results of its work as viewed by its importance, popularity, and efficiency. This is a library where, by monitoring and evaluating each of the elements within the layers, we can check and identify positive values or trends, and a library that is constantly developing in all fields and elements. The ways of fulfilling the conditions are, of course, very different and depend on the specifics of the individual library, its institution and environment. We are, therefore, not talking about equal libraries, but comparable ones in terms of quality, as each library is specific according to its environment, type of institution, and target user groups.

We can also discuss the evaluation options, since this offers opportunities for analysis that leads to quality planning and, consequently, to the quality of the library work. As we have shown in our analyses, some elements, especially those in the areas of **work conditions, the librarian, and development strategy**, were rather unambiguous and relatively easy to verify. This was because many can be partially or fully verified with the use of statistical data, many of which were even collected on the national level and, therefore, also from individual libraries. These data could be used for comparison with standards or between libraries for purposes including the identification of trends. At the same time, we must be aware of drawbacks of such analyses. For example, constant growth of certain values, such as constant increase of loans or library visits, was not possible. Data and analyses of the basic work conditions and the numbers and formal education of library workers were available; it was also possible to determine the existence and analyze the content of strategic documents. In these three elements of the model, there were also less objectively definable elements, that could not be verified with simple numerical data, or for which no data were collected at all. This included the location of the library in the institution and the types of competences and values of the school librarian. The other areas of the model (**interactive, accessible, integrated, important and popular, and effective**) were much softer, less tangible,

and more intertwined. These areas were linked to various areas where the functioning of a quality school library could really be seen and whose analysis was more demanding. At the same time, such evaluation was also less established within LIS, although it went hand in hand with other changes in library performance measurement from quantitative to qualitative approaches [14, 25]. Namely, only qualitative data can really show how and to what extent the school library was important, present, established, integrated, active, and accessible in its institution, and how and how much it consequently contributed to various aspects of the life and work of its institution. In Slovenia, this data are not yet collected at the national level for any type of library, while at the level of an individual library it is left to the librarians or its management if they are interested in these type of data. Often, it is also anecdotal data and gathered far from any systematic approach. As with all qualitative assessment, one of the problems in this case is that the life and work of any educational institution and the results of its work are influenced by many factors, and it is often difficult to isolate the influence of the library or to unequivocally prove it. It is true that such evidence is the best way to substantiate the importance of the library for its environment. As such, it helps the library to establish itself or strengthen its position, thereby influencing the conditions of its work, thus creating the much-desired positive loop between conditions and performance.

3 Verification and Validation of the Model

The model can be therefore defined as having initial empirical verification, however, since it was developed within the framework of a project OBJEM, that included only selected schools, a wider empirical verification and validation of the model, using a qualitative approach is needed. We report here the approach and findings of a pilot study, conducted in December 2022, investigating practitioners' opinions, using the semi-structured interview. Our research questions were:

1. What are the opinions on the model stemming from their experience? How does the model function in practice? What additions or changes would it need?
2. What examples can be given from their practice to demonstrate the functioning of the model or its particular segments?
3. How can these pilot findings be used to plan nationwide verification of the model to operationalize it into professional recommendations and official requirements?

The sample was purposive and included nine experienced school librarians from whom we expected professional and practice-based insights: four from primary and five from secondary schools. The semi-structured interview consisted of three sets of questions:

- How do you comment on the presented model? What do you think from the point of view of your practice as a school librarian? In other words, in your opinion, does such a model work in practice?
- Do you think the model needs any additions or corrections? If so, which ones?
- Please give concrete examples of how the work or presence or influence of the school library in any segment of the model is seen, noticed, or observed in your institution.

The interviews lasted between half an hour and hour and a half. We then transcribed, coded, and analysed them with content analysis.

With the interviews we addressed the first two research questions, while we addressed the third research question through our own findings regarding the methodological issues. Regarding the first research question, we found that the librarians, in principle, had positive opinions of the model, with the exception of one who was very negative. They also believed that it functions from a practical point of view, although four also pointed out that it is too demanding, unreal, idealistic, and too theoretical. Several also pointed out that some areas are more basic than others and that, without basic conditions for work, the further elements are very hard to be realized. With this they confirmed that our composition of the model, with its layers is in the right direction. Most interviewees also believe that the most important element, on which lies the identity of the library, is the qualified, competent and active librarian. Among the problematic issues they emphasized were.

- lack of qualified staff, and lack of time for all librarian's tasks, (both of which also negatively influences the accessibility of the library),
- inadequate and, to some extent, even harmful work norms,
- inadequate working conditions with regard to finances, premises, technology, inadequate, or outdated materials,
- lack of management support, and,
- above all, the problem of library not having its own financial means within school budget.

From this we make two conclusions: 1) The librarians see as most pressing the issues pertaining to the first layer of the model. 2) In spite of the fact that the model does not address problematic issues *per se*, the findings are very helpful for designing its further verification approaches. Suggestions for additions to the model included the category of time, and that there should be different models for primary and secondary schools.

We can answer the second research question with many practical examples. These examples mostly stayed on the anecdotal level as the librarians did not objectively measure the impact of their services. They mentioned activities to encourage reading of students and teachers, activities of librarian's participation in the teaching/curriculum, and collaboration with local public library. The interviewees pointed out the positive attitudes of the users visiting the library, using it for school work and leisure-time activities (not only reading), positive feelings in terms of not only atmosphere but also safety, and seeing the library also as a social space. If the librarian was absent, the users missed her and the library. Problematic is that often the librarians do not have insight into the outcomes where their work is also influential such as student achievements in competitions and their written projects. We see that with this part of the interview we came to the findings pertaining to the second and third level of the model, again with valuable insights how to design further verification.

Within the context of the third research question, we confirmed the warnings in the literature that interviewing is a demanding and, above all, a time-consuming method, and inappropriate for large samples as will be required for nationwide verification of the model. We also confirmed our initial beliefs that, in order to acquire good quality data, we needed qualitative approaches and triangulation of methods. We thought of

choosing open-ended surveying of a representative sample of librarians from all types of educational institutions. Some answers also convinced us that the questions in the survey should be shorter and defined more clearly in order to avoid misunderstandings. Namely, some respondents only focused on the difficulties of their daily work while we were also interested in the usefulness of the model from a content perspective.

We can therefore conclude, for now, based only on the pilot findings, that the model points out important areas for quality work of school libraries and the need for their development. We ascertained that areas in need of further development include assessment, strategic planning, organization, proactivity, and training. At the same time, as it often happens with modelling, the model is demanding and, to some extent, theoretical. In other words, it differs greatly from the everyday situation in which the work of librarians takes place. What is already evident is that Slovenian school libraries must be provided with professional standards, regulated work norms, and their own financial resources, to be proactive agents of IL development. Pilot testing also gave us valuable information on how to approach wider verification.

4 Relevance for the Field of Information Literacy

We can show links between the *Model of Quality School Library* and the initial findings within its verification to the area of IL. Although these links are implicitly present whenever the quality of school libraries and librarians are mentioned, these should nonetheless be elaborated more explicitly. Namely, many of the levels and elements of our model, are also tightly connected to the possibilities for developing IL. A good and proactive school library with a competent and active librarian plays a strong role in promoting and fostering IL among its users through many of its elements and characteristics:

1. Information resources and technology: A well-equipped school library provides a diverse range of information resources, including books, databases, journals, and digital materials. These resources expose students to different formats and types of information, allowing them to develop skills in locating and selecting relevant and reliable sources.
2. Information access: A good school library ensures that students have access to a wide variety of information sources, both physical and digital. This access enables students to explore various topics, develop research skills, and engage in critical thinking.
3. Literacies instruction with an emphasis on IL: School libraries often provide IL instruction and guidance to students, be it alone or in collaboration with colleague teachers. Librarians collaborate with teachers to design and deliver lessons on research skills, recognizing and addressing information needs, effective searching techniques, information evaluation, (ethical) use, and creation. This teaching and guidance help students develop the necessary competencies to navigate the information landscape successfully, be critical, solve problems, think and learn independently, and become lifelong learners. With the increasing prevalence of digital information, school libraries play a crucial role in teaching digital literacy skills. This includes understanding how to evaluate online information for accuracy, credibility, and relevance, as well as promoting responsible digital citizenship.

4. Independent learning: School libraries provide a supportive environment for independent learning. By having access to a wide range of resources, safe and technology-rich spaces, and through receiving guidance from librarians, students can develop self-directed learning skills, becoming proficient in seeking, evaluating, and utilizing information to meet their learning needs.
5. Lifelong learning: A good school library cultivates a culture of lifelong learning. By instilling IL skills, students are equipped to navigate and adapt to the ever-changing information landscape throughout their education and beyond, enabling them to become lifelong learners.

In summary, a good school library, closely integrated into the life and work of its institution, serves as a hub for IL development and is one of its fundamental prerequisites. The library provides access to diverse resources, offers IL instruction, and promotes independent and lifelong learning skills among students. This can only be done if the library has basic working conditions to start with and only this enables further activities and approaches.

5 Conclusions

Once the *Model of quality school library* is fully verified, we aim to get an empirically verified theoretical base that will be useful in preparation of strategic foundations such as in preparing the national strategy for school libraries development. Such a strategy will shape professional recommendations and official requirements as well as use in practice. For now, the practitioners evaluated the model, but it was not actually verified in research. Therefore, it cannot yet be considered as a ready-to-use tool in the practice of school library management. To acquire wider validity, it should also be compared to other theoretical requirements and models. We are aware that the model paints an ideal situation, and that many libraries would recognize gaps that need addressing in their case. Obviously, the path to accepting the model and using it to arrive at solutions, will be different from library to library. We would also like to point out that one of the motifs for the preparation of the model was identification of the opportunities and challenges of Slovenian school libraries and suggesting solutions. Only through determining the current state of school libraries will there be improvement leading to an increase in their quality. The analyses show large gaps, as well as huge differences between libraries – both must become a central point in any serious consideration of changes.

One of the motives for the preparation of the model was the beginning of reflection on whether or how it was possible to collect relevant data. If that was possible, the next question would be how to use the data to create an overview of the situation and enable strategically oriented development approaches. It is equally important to raise awareness among stakeholders of the importance of regular monitoring of the condition of school libraries. We already have a lot of valuable data and we hope that their collection will continue. We pointed out that certain data, especially qualitative, are still urgently needed. This means that data collection must be adapted to new trends in library performance measurement that increasingly focus on monitoring the impact of libraries on their environment. It is therefore necessary to develop the field of monitoring and evaluation of the operation of school libraries by creating appropriate indicators. The

next very important area is strategic planning. In both cases, we need systematic training of librarians and management to develop competencies and understanding of needs and appropriate approaches. These are areas that have been too neglected so far, but these competencies are necessary to every librarian and manager in education. Proactivity, promotion, and advocacy are also among the areas in need of development. Based on our experience and results, the school library urgently needs promotion and advocacy to strengthen its visibility and importance. We must not forget to raise awareness among those responsible for the development functions of the library and education system. It is absolutely necessary to provide professional standards, regulated work norms, and specifically designated financial resources to school libraries.

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Alarming Literacy Rates in One of America's Largest Cities: What Can Be Done in the City of Detroit?

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Abstract. Regarded as a major cultural and industrial center, Detroit is known for its contributions to art, architecture, design, and music, which led to its “Motown” nickname, in addition to its ties to the birth of the auto industry, which brought it the nickname of “Motor City”. Despite hosting several higher learning institutions and a national research university, Detroit has been facing a continued decline of its adult literacy rates that amount to 47.00%, meaning that half of the City’s population are functionally illiterate. Low literacy skills can profoundly affect adults’ ability to fully participate in daily activities and contribute to the world around them. Based on statistical data corroborated with historical events and socio-economic factors, the paper discusses the root causes that have led to Detroit’s having one of the lowest literacy rates in the United States. Various efforts aimed to remedy this situation are highlighted along with the entities involved in this on-going endeavor.

Keywords: Illiteracy · literacy rates · reading rates · literacy education · Detroit · Detroit Public Schools Community District

1 Introduction

If most papers in conference settings present success stories, I propose to share with the ECIL participants the strive to turn a continuing alarming situation into a positive experience. The setting is one of America’s largest urban areas, the City of Detroit, where the literacy rate is one of the lowest in the United States, amounting to only 47.00% [1, 2], meaning that one out of every two adults or half of the population in Motor City is functionally illiterate. Based on the corroboration of census data and the examination of historical events and socio-economic factors, this paper seeks to determine the root causes that have led to the decline of literacy rates in Detroit and to highlight various entities’ sustained efforts aimed to remedy this situation.

2 Detroit: Nicknamed Motor City and Motown

Detroit is the birthplace of two major industries: The automotive industry and blues music.

The automotive industry, with a group of world-famous car manufacturers including Ford, General Motors, Dodge, and Chrysler, has contributed to the City's prosperity and has represented the major employer in the area since 1908 when the Model T car was produced by the Ford Motor Company. Thus, Detroit became known as the Motor City with the first freeway system in the world.

The legendary Motown Records, also known as "Hitsville USA," [3] is a record label that became a nickname for Detroit where the label was originally headquartered. The recording studio helped famous performers like Michael Jackson and Smokey Robinson launch their musical careers. In addition, named after the record company, Motown or the Motown sound has become a music style, a rhythm and blues music that in the 1960s and early 1970s turned the record company into the largest black American-owned enterprise in the country [4].

Midtown Detroit hosts the 6th largest museum in the United States, the Detroit Institute of Arts, that harbors a collection of over 65,000 works [5]. Also located in midtown Detroit is Wayne State University, a national research higher education institution established in 1868, with thirteen schools and colleges, including business, medical, and law [6].

Due to the booming auto industry, Detroit became the fourth-largest city in the nation in 1920, following New York City, Chicago, and Philadelphia [7]. Detroit's large immigrant population consisted of Jews, Southern and Eastern Europeans as well as African Americans who fled the south of the United States, all attracted by job opportunities in the auto industry. These new groups added to the native-born white population, contributing to the City's urban expansion.

As hundreds of thousands of new workers migrated to the industrial City, Detroit, like many places in the United States, developed inequities, tensions, and racial conflicts between the police and inner-city black youth who wanted change. The confrontations culminated in the riots of 1967 [8] that resulted in many deaths, injuries, arrests, and more than 2,000 buildings destroyed by fires. Thousands of small businesses closed permanently or relocated to safer neighborhoods [9]. The white population who fled to the suburbs in 1967 doubled to over 40,000 and doubled again the next year [10]. The riots were a turning point for the City, marking the beginning of its decay.

In 2007–2008 Detroit and its auto industry were hit by one of the worst financial crises. The City's population plummeted to 700,000 with the highest unemployment rate (more than 16%) in the country [11]. The decline in overall economic activity led to a great recession throughout the United States and the entire world. The Detroit economic downturn coupled with public corruption led to the largest municipal bankruptcy filing in U.S. history with debt, estimated at 18–20 billion USD [12]. Detroit became the largest city in the U.S. history to file for bankruptcy in 2012. Detroit's bankruptcy filing followed a declaration of financial emergency in March 2013 that resulted in an "emergency financial manager" of the City being appointed by the Michigan Governor [13]. As of October 1, 2013, Detroit had spent almost \$23 million in fees to lawyers, consultants, and financial advisers to address its bankruptcy status [14].

In the years following the bankruptcy filing in 2013, there has been major private investment and development in Detroit with many projects receiving government subsidies and tax breaks from the City [15]. While development has improved, Detroit has

continued to face financial difficulties. Provision of basic city services continue to be an issue due to old infrastructure, low tax revenue, and a smaller population spread across the city area [16]. It has been less than a decade since Detroit emerged from bankruptcy on paper and the aftermath has been a continuing struggle. An article published in 2018 noted that “Detroit has yet to witness the full economic impact of its resurgence,” predicting an additional five to ten years of rebuilding [17].

Further challenges also emerged during post-bankruptcy. During the COVID-19 pandemic, loss of city revenue and unemployment created another budget deficit. In addition to layoffs of City employees and reductions in hours and wages, the City Mayor cut funding for services to prevent the deficit from growing and to avoid another state intervention in the City’s finances [18]. Federal COVID-19 relief aid allowed Detroit City to balance budgets, and address stringent issues, among them to improve school buildings and expand academic programs. But those funds will run out soon and Detroit Public Services, including Detroit Public Schools Community District, face some difficult decisions about which programs and employees they can afford to keep once federal support dries up [19]. As of 2023, five of the Detroit Public Library system’s twenty-one branches in different neighborhoods remain closed, including four that have not reopened since the pandemic lockdown [20].

3 Declining Population and Alarming Statistics

Detroit’s population has been dramatically declining over the past seventy years. Loss of jobs in the auto industry and rapid population migration to the suburbs found the City in an irreversible state of urban decay. The City has suffered a substantial population drop by 65.50%, from 1.85 million inhabitants in 1950 [21] to 639,111 inhabitants counted in the 2020 U.S. Census [22]. Still, Detroit has remained the largest city in the midwestern state of Michigan. Detroit fell to the 27th largest city in the United States. The median household income in the City of Detroit is \$34,762 as opposed to almost double in the State of Michigan, or \$63,202 [22]. Approximately 40.00% of the households are below the poverty level (compared to 16.00% nationwide). Close to half of Detroit’s children are born to single mothers and the child poverty rate is close to 60%. The current racial makeup of Detroit is 77.17% blacks, 9.51% whites, 8.02% Hispanics, 3.00% multiracial, 1.58 Asian, and 0.72% other. Detroit’s demographics and its low-income levels associated with a long history of disinvestment in public services and corruption have all played a major role in the City’s decline [11], affecting all social strata.

Despite hosting several higher learning institutions, the City’s continued population exodus led to the closing of many public schools. The Detroit Public Schools Community District (DPSCD), established in 1842 as Detroit Public Schools (DPS) [23], operated schools serving Detroit’s significant immigrant population and its black community. “The rise and fall of Detroit’s schools mirror the city itself, which once had one of the biggest school districts in the country, hitting peak enrollment in 1966 at 299,962 students. The decline of Detroit’s automobile industry brought a dramatic, decades-long population slide for the city and its schools, with white residents, especially, leaving the city for the suburbs” stated Josh Sanburn in 2016 [24]. Zernike [25] indicates that as

of 2016 many K-12 students in Detroit frequently changed schools, with some children enrolling in seven schools before their high school graduation.

Over the years, DPSCD has experienced extensive financial difficulties. In 2008, the Michigan State Superintendent of Public Instruction determined the District's inability to manage its finances and declared a financial emergency. The next year, the Governor appointed an emergency financial manager to oversee the public school system [26]. He estimated the District's deficit to be greater than 150 million USD, caused by accounting irregularities and corruption. Since the state takeover took effect in 2009, there has been a recovery effort with the District's projection to run a 27.5 million USD deficit in 2025 if enrollment is around 47,000 students [27].

Michigan Governor Gretchen Whitmer promised the Detroit Public Schools Community District (DPSCD) \$94.4 million to settle a 2016 lawsuit alleging that the state denied the City's schoolchildren a basic education by failing to teach them to read. "The "Right to Read" settlement terms, negotiated in 2020, stipulated that the money would go toward increasing reading instruction and support for students to address longstanding challenges with literacy. DPSCD is required to spend the money by 30 September 2027 and plans to use the money to hire academic "interventionists" to provide one-on-one support to students struggling with reading" [27].

During 2008–2009, "the Michigan cohort graduation rate was 80.10%, while DPSCD's cohort graduation rate was 67.39%, 16.00% lower than the state average. With 48,615 students enrolled, the graduation rate for Detroit's 107 public schools was 76.00%, with reading proficiency of only 18.00% for the 2020/21 academic year" [28]. "DPSCD showed a strong improvement in high school graduation rates for the 2021–2022 school year, which increased by 6.50% from 64.50% to 71.10%, still remaining almost 10.00% below Michigan's graduation rate of 81.01%. In addition, DPSCD's dropout rate declined from 14.50% to 13.80%, while the state's dropout rate increased from 7.70% to 8.20%," notes Sandra Powers, from CBS News Detroit [29]. One can only hope that the "Right to Read" settlement money will be wisely invested to address the low reading rates among Detroit's school children population.

4 Low Reading Scores

Despite progress in graduation rates, reading proficiency continues to remain a concern. The National Assessment of Educational Progress (NAEP), or "The Nation's Report Card," assesses each state's reading and math performance at critical time points. Districts are tested at the 4th and 8th grade level. As measured by the 2017 NAEP, "69% of Michigan students are not proficient in 4th grade literacy, compared to 64% at the national level" [30]. The General Education Leadership Network report of 2017 places Michigan's literacy on high alert: "Michigan is facing a literacy crisis. For the past 14 years, while nearly all other states across the country made gains in their literacy performance for 4th graders, Michigan remained one of the lowest performing states, with minimal growth in literacy achievement. While there was a slight improvement over our 2015 NAEP scores (3% more students are at or above proficiency in 2017 as compared to 2015), Michigan still falls in the bottom 12 states in the nation. With only 32% of students at or above proficiency, we have a long way to go" mentions a report from the General Education Leadership Network [30].

A 2022 review of NAEP scores for Michigan and its largest urban district indicates that only one out of 20 students (5.00%) in DPSCD scored at a “proficient” level on the 8th grade NAEP reading test, states Molly Macek, director of education policy at the Mackinac Center [31]. This means that just 5.00% of Detroit’s students met the minimum score needed to be prepared for higher-level coursework. “And the district’s performance was not significantly different than it was in 2019 or 2009. Things have not changed for the better over time,” continues Macek in her assessment [31], “Detroit also performs poorly when compared with similar urban districts in the United States. The DPSCD scored significantly lower than 25 comparable districts on the 8th grade reading test in 2022. Even worse, Detroit has consistently scored the lowest among urban districts in every test of reading and math since 2009” [31].

“Detroit teachers, administrators, and schools are all richly funded. The district has received more money per student compared to the state and national average since 1994. The district’s revenue in 2021–2022 totaled just under 1 billion USD. Detroit charter schools consistently receive less funding per student than public schools in the Detroit district, and they perform better. More funding does not appear to be the solution,” concludes Molly Macek [31].

The education outlook for the entire State of Michigan is not much better as evidenced by a 2022 suggestively titled Report, “Still Stalled” [32]. Forty states performed better than Michigan on the 4th grade reading test in 2022. Fewer than 30.00% of students scored “at or above proficient” level. Only three states scored “significantly lower than Michigan.” And Michigan’s average reading score fell by 6.50% from 2002–2022, compared to the national public’s average score, which fell by only half a point (0.50%) [32].

Although it is clear that education reform is much needed in the State of Michigan, lawmakers have recently introduced bills that reduce school accountability. The repeal of the Third Grade Reading Law, which required failing students to be held back, removed provisions that help ensure a student’s literacy development before advancing to 4th grade. The repeal of the A-F School Grading Law, which ranked schools based on performance, eliminated a transparent system for monitoring school progress. Macek continues: “But a reduction in school accountability at such a critical time is not the solution to our state’s education crisis. Instead, targeting the long-term trend of failing schools in Detroit would be a step in the right direction. Rejecting accountability measures does not seem likely to create improvement. Standardized testing is an essential tool for understanding the dire state of education in Michigan. Lawmakers would do well to apply data from these tests to solutions that target the state’s – and nation’s – most underperforming urban district” [31].

5 Literacy in the United States

In 2003, the National Center for Education Statistics (NCES) conducted the National Assessment of Adult Literacy (NAAL) – a nationally representative assessment of adult literacy levels, where adults are defined as people 16 years of age and older living in households or prisons in the United States [33].

“NAAL measured adults’ ability to perform everyday literacy tasks, including:

- Prose Literacy—the knowledge and skills to search, comprehend, and use continuous texts (e.g., editorials, news stories, brochures, and instructional materials).
- Document Literacy—the knowledge and skills to search, comprehend, and use non-continuous texts in various formats (e.g., job applications, payroll forms, transportation schedules, maps, tables, and drug or food labels).
- Quantitative Literacy—The knowledge and skills to identify and perform computations using numbers embedded in printed materials (e.g., balancing a checkbook calculating a tip, etc.).

NAAL survey found that 90 million American adults read at the two lowest literacy levels, basic or below basic. These low literate adults lack the literacy skills necessary to read and comprehend the information in complex documents. A closer look revealed that:

- 14% of adults (30 million) function at a below basic prose literacy level and 29% (62 million) function at a basic prose literacy level
- 12% of adults (25 million) function at a below basic document literacy level and 22% (47 million) function at a basic document literacy level
- 22% of adults (47 million) function at a below basic quantitative literacy level and 33% (71 million) function at a basic quantitative literacy level

In addition, 11 million adults are illiterate in English. These adults fall into two groups:

- 7 million who could not answer simple test questions
- 4 million who could not take the test because of language barriers” [33].

Based on the NAAL dramatic findings, the American Library Association became involved to address the issue by developing the “Literacy for All: Adult Literacy @ Your Library,” a nation-wide program where participating public libraries supported all types of initiatives aimed at improving adult literacy in the country [33].

The Program for the International Assessment of Adult Competencies (PIAAC) conducted an international assessment of adult skills from 2012 to 2017. The US Department of Education combined individual PIAAC data to create and publish, in 2020, literacy levels for every county in the United States. The study determined that “about 130 million (54.00%) adults in the U.S. have low literacy skills. This means more than half of Americans between the ages of 16 and 74 read below the equivalent of a sixth-grade level. The U.S. ranks 16th among the 33 member nations” of the Organization for Economic Co-Operation and Development (OECD) included in the study [34].

The PIAAC study defines 5 levels of literacy proficiency, with Level 1 as the lowest and Level 5 as the highest. Over 1 in 5 (20%) adults in the U.S. have a literacy proficiency at or below Level 1. Adults in this range have difficulty using or understanding print materials. “Those on the higher end of this category can perform simple tasks based on the information they read and adults below Level 1 may only understand very basic vocabulary or be functionally illiterate. In contrast, 46% of adults in the U.S. have a literacy proficiency at or above Level 3. Adults at Levels 3, 4, and 5 have varying degrees of proficiency in understanding, interpreting, and synthesizing information from multiple, more complex texts to infer meaning and draw conclusions” [35].

The findings of the PIAAC study determined that income levels are strongly related to literacy levels. “The average annual income of adults who reach the minimum level for proficiency in literacy (Level 3) is nearly \$63,000, significantly higher than the average of almost \$48,000 earned by adults who score just below proficiency (Level 2), and much higher than those at low levels of literacy (Levels 0 and 1), whose annual average earnings are just over \$34,000” [35]. As mentioned, the median household income in the City of Detroit is \$34,762, thus placing Detroit at the very bottom of the income scale nationwide.

6 Illiteracy in Detroit

Illiteracy refers to the inability to read or write, but it more accurately encompasses the comprehension, evaluation, and utilization of information, which is why people describe many different types of information literacy, such as health, financial, and legal. “Illiteracy is typically measured according to the inability to comprehend a short simple statement on everyday life” states a UNESCO definition [36]. Basic literacy represents the foundation of information literacy. Functional literacy is defined as the ability to read and comprehend relatively short texts or understand basic vocabulary. “Low literacy skills can profoundly affect adults’ ability to fully participate in day-to-day activities and contribute to the world around them,” state Hardelie and Clark [37]. Dwyer determined that “The functional illiteracy rate in Michigan is 18% while 47% of metro Detroiters are reportedly functional illiterate, not being able to perform basic tasks, like fill out a job application or other forms, read newspaper articles, or understand instructions on a medicine bottle” [1].

A report, *Addressing Detroit’s Basic Skills Crisis*, from the Detroit Regional Workforce Fund [38] had some pretty shocking statistics about literacy in the Motor City. Addressing the literacy problem is particularly critical because of the City’s steep unemployment rate. In recent years, Detroit’s unemployment has been as high as 50.00%, and 33.00% of adults aged 20–24 are unemployed. Even if a job recovery does happen, if the City’s residents do not have the basic skills, like being able to read, their career options will not improve much [36]. The report states: “The Detroit Regional Workforce Fund’s efforts to connect low- and moderate-income persons to emerging and growing career pathways have highlighted a number of challenges in our education and employment infrastructure. We have identified that one of the most pressing of these challenges is the constrained capacity of Southeast Michigan’s underfunded and fragmented public workforce development system to meet the tremendous needs of a worker population that is terrifically challenged by limited basic skills. This skills gap threatens to substantially limit the success of the Fund’s education and training efforts, and ultimately participants’ success in connecting to careers” [37]. The Detroit Regional Workforce Fund has identified several opportunities to impact this issue as part of its efforts to support partnerships among employers and workforce development partners (workforce partnerships), effect change in the region’s strategic workforce vision, and align public and private resources in new ways around workforce development. As of May 2023, Detroit’s unemployment rate has dropped to 6.40% from 7.80% in 2022, and from a long-term average of 13.53% [39].

As of 2021, the education level of Detroit's population age over 25 consisted of 82.60% being high school graduates (compared to a national average of 88.00%) and 16.20% holding a bachelor's degree/four-year college degree (compared to more than 30.00% nationwide) [40]. Access to the internet is an important factor in today's digital age, as it enables individuals to access information and communicate. "Only 87.6% of households in Detroit have a computer, as compared to 92.4% in Michigan, and only 76% of households have a subscription to broadband internet, as compared to the State of Michigan where internet access is 10% higher, at 86.4%" [41]. There are several reasons why internet access is limited in Detroit. One reason is that many low-income households cannot afford the cost of internet service. Additionally, many older buildings in Detroit, especially in neighborhoods with a high poverty rate, lack the infrastructure to support high-speed internet. Several organizations and programs such as the Detroit Internet Initiative and the Detroit Connected Communities have been established to expand internet access and to offer free computer literacy classes along with the Detroit Public Library system.

7 Addressing the Situation: Setting the Stage for Change

Literacy programs in the United States are federally funded through the Adult Education and Family Literacy Act (AEFLA) [42], Title II of the Workforce Innovation and Opportunity Act (WIOA) of 1998 [43]. The Office of Career, Technical, and Adult Education's (OCTAE) Division of Adult Education and Literacy (DAEL) administers AEFLA. "The purpose of AEFLA's basic state grant program is to:

1. assist adults to become literate and obtain the knowledge and skills necessary for employment and economic self-sufficiency;
2. assist adults who are parents or family members to obtain the education and skills that
 - a. are necessary to becoming full partners in the educational development of their children; and
 - b. lead to sustainable improvements in the economic opportunities for their family;
3. assist adults in attaining a secondary school diploma and in the transition to postsecondary education and training, including through career pathways; and
4. assist immigrants and other individuals who are English language learners in
 - a. improving their
 - i. reading, writing, speaking, and comprehension skills in English; and
 - ii. Mathematics skills; and
 - b. acquiring an understanding of the American system of Government, individual freedom, and the responsibilities of citizenship" [42].

"The statute requires states to allocate no less than 82.5% of their allotments to local agencies, through a competitive grant or contract process. Federal funding is directed toward communities based on the percentage of people without a high school diploma" [42]. The funding is broken down into basic funding for adult education and literacy services and the Integrated English Literacy and Civics Education (IELCE) program that supports English language learners. However, this funding is not sufficient to make

a concrete impact. The crisis of low adult literacy is a phenomenon with a negative effect on the American society in its entirety.

The State of Michigan is on high alert regarding the literacy crisis its population has been experiencing. While nearly all other states across the country have made gains in their literacy performance for 4th graders, Michigan remained one of the lowest performing states, with minimal growth in literacy achievement. Established in 2015, the General Education Leadership Network [44] is a committee affiliated with the Michigan Association of Intermediate School Administrators, an organization of educational leaders committed to improving student outcomes by providing expanded educational opportunities [45].

GELN drew attention to Michigan's governor, legislators, business leaders, and educators to recognize that literacy incompetence is one of the most pressing issues facing the state: "With over 270,000 students ill-equipped in literacy, our state faces significant hurdles. Our young people are unprepared for the workforce, unprepared for college or career training, and unprepared to be productive citizens.... While Michigan has made progress in creating infrastructure for research-based instructional practices in literacy and a culture of coaching around these practices, we need continued focus and funding for professional learning in literacy for all educators, an increased number of coaches to support high-quality instruction, and bold leadership efforts to change our trajectory and positively impact more children" [46]. Among other action steps taken, the Governor's pre K-12 Literacy Commission was charged to work with the legislature to secure funding to be allocated for early-literacy assessment reimbursement, professional development, coaching, and extended instructional time support.

To this effect, Michigan's standards for educator preparation were adopted. They required pre-service educators to learn how to introduce and support their students in engaging in disciplinary thinking and practices in the content areas. To support this goal, in 2017, the Michigan Department of Education issued the *Essential Practices for Disciplinary Literacy: A Tool to Support Educator Preparation Programs* [47]. It includes instructional guidelines that provide a framework to support the integration of literacy instruction for all grade levels in all of the content areas. The *Essential Practices* document can be used to proactively develop and/or redesign literacy courses to reflect the changes in educator preparation standards while also meeting the existing general requirements.

Regarding literacy programs targeting young adults, in the Metro Detroit area there are several organizations that focus on improving literacy among this population segment.

The **Skillman Foundation** is a philanthropic organization that works to improve the lives of children and teenagers in Detroit. They support programs that focus on improving literacy and educational outcomes for young people.

The **Literacy Center** is a non-profit organization that provides literacy instruction and supports young adults as it enables them to access information, communicate, and complete tasks.

YouthVille Detroit is a non-profit organization that offers after-school and summer programs for young people, including literacy programs.

Detroit Youth Violence Prevention Initiative is a City-wide program aiming at reducing youth violence and improving educational outcomes through literacy programs, mentoring, and other support services for young adults.

The **Greening of Detroit** is a non-profit organization that focuses on environmental education and job training for young adults through programs that focus on building literacy and job skills.

Regarding the adult population, the *Addressing Detroit's Basic Skills Crisis* report highlights service limitations in the City in addition to other deficiencies. Fewer than 10.00% of those in need receive any services whatsoever; only 27.00% of the programs surveyed provide services for learners at the lowest literacy levels; only 18.00% of the programs surveyed serve English language learners; the vast majority of program content is not related to future success in employment or continued training; programs lack capacity to provide adequate supportive services for low-income learners as they participate in education and training; and programs are not designed to address learning disabilities that are prevalent among low-skilled learners [38].

Detroit Public Schools is involved with some of the solutions, like the public-private partnership that is building a network of ten neighborhood-based **Detroit Learning Labs** that link adults who need to refresh or strengthen their basic literacy to allow them to develop new skills and embrace new careers. With such low literacy rates in the City, it is hard not to see the numbers as a pretty harsh indictment of the literacy status in Detroit.

The **Michigan Early Literacy Task Force** convenes monthly to address the State's most pressing literacy issues. The task force views Michigan's literacy crisis as a public health crisis that affects every aspect of an individual's life [48]. They have agreed upon ten essential instructional practices that serve as a "minimum standard of care" when it comes to fostering literate students and literate citizens. These instructional practices are designed to be used in every classroom for every child every day. As part of this initiative, **Michigan Virtual** has created a series of free online training modules for Michigan educators on the essential instructional practices for early literacy [49].

The **Detroit Literacy Project Coalition** (DLPC) was born out of a desire to create a hub for all kinds of resources that aid reading learners of all ages and backgrounds. DLPC is a constantly evolving and growing network of organizations with the same mission: to improve literacy and foster love of reading for all Detroiters.

ModEL Detroit is a project aimed at sharing tools and resources to support teachers in implementing English Language education. Additionally, the project seeks to prepare students enrolled in the Detroit Public School system to be successful in their studies, career, and life.

Starting from the premise that 60.00% of the unemployed lack the necessary skills to train for high-tech jobs, **Pro-Literacy Detroit** offers programs that address the severity of this issue. This non-profit organization aims to assist adults 16 and over to become independent readers, writers, and speakers of English, with the ultimate goal to solve adult illiteracy in Detroit.

The **Detroit Future Media** (DFM) program is an intensive digital literacy training program to support the revitalization of Detroit communities through the use of media and technology as pathways to interconnect the City's communities. The *Detroit*

Future Media Guide to Digital Literacy is an open-source handbook to be used by community members to enhance their media literacy skills alongside entrepreneurship and community organizing competencies.

The **Siena Literacy Center** is a non-profit organization with a mission to improve the lives of families in metropolitan Detroit by providing reading, math, English language, and digital literacy programming for adult learners.

SouthWest Solutions is an adult learning lab that assists Detroiters with improving their reading, math, and computer skills so that they can be better qualified when seeking employment.

Both Detroit Public Library and the Wayne State Library System are engaged in outreach initiatives that make a positive impact on Detroit residents' educational enhancement where the main focus is to improve the adult literacy learning experience in the City. Rescue efforts from several types of organizations and agencies along with policy-makers' engagement to address the endemic issue of illiteracy in Detroit and to provide solutions for better access to information literacy programs through classes, library services, and even financial incentives aimed at attracting disadvantaged groups are to be noted. Still, visible progress is yet to be seen.

There are several remedies that have been proposed to address illiteracy in Detroit. Action plans include:

1. Improving access to education. This involves increasing funding for schools, providing more resources and support for teachers, and implementing programs that help students from disadvantaged backgrounds succeed [50].
2. Adult literacy programs. Programs that focus on teaching adult learners how to read and write, as well as providing job training and other support services, may help raise the literacy rate among the City's adult population.
3. Community outreach and engagement. Organizations and community groups can work together to raise awareness about the importance of literacy and to promote literacy-related activities such as reading clubs and subject-specific workshops.
4. Technology and digital literacy. Providing access to technology, digital tools, and high-speed internet services can help improve computer literacy rates and skills, as well as support lifelong learning and personal and professional development [51].
5. Income and poverty reduction. Addressing poverty and increasing income can have a positive impact on literacy rates as well, as it can lead to improved access to education and resources and promote personal growth [52].

These are just a few examples of the many different strategies that can be used to address illiteracy in Detroit and other urban areas. With private and government support from local and national entities, programs like those mentioned above aim to address the disparities and the challenges of illiteracy in Detroit and to bring the City to par with other American cities that serve as targets for betterment. The efforts of diverse agencies engaged in improving literacy *per se* to be followed by developing basic information literacy skills in Detroit could serve as a model for other parts of the United States and the world facing similar challenges. The most effective approach will likely involve a combination of different strategies tailored to the specific characteristics and needs of each community.

8 Benefits of Eradicating Illiteracy

At the individual level, it is well-established that literacy is linked to a variety of positive outcomes, such as higher education, income, health, and civil engagement [53]. Varying levels of literacy lead to varying income levels. Likewise, macroeconomic research has shown that higher levels of human capital, measured by educational attainment, cognitive ability and literacy, are associated with higher economic growth at the national level [54].

At the societal level, a Gallup study commissioned by the Barbara Bush Foundation for Family Literacy found that about 130 million adults in the U.S. have low literacy skills. "Getting all U.S. adults to at least a Level 3 of literacy proficiency would generate an additional \$2.2 trillion in annual income for the country. That is 10% of the gross domestic product" estimates J. Rothwell [55] in his analysis of the data. An increase in literacy would reduce income inequality, would likely boost entrepreneurship, productivity and innovation, and ultimately represent ways that would benefit the national economy. The nation's largest metropolitan areas, including New York City, Los Angeles, Chicago, and Dallas would all gain some 10.00% of their GDP by eradicating illiteracy [55].

At the political level, gains from eradicating illiteracy would foster skills, knowledge, and civic engagement within the framework of an ever-growing informed citizenry [56]. Eradicating illiteracy would also translate into a well-informed citizenry empowered with civic values, integrity, and political tolerance, engaged in upholding moral virtues and democratic norms. Promoting the development of basic information skills enables an informed voting process for better democratic involvement.

At the economic level, the eradication of illiteracy could add significant monetary amounts to the United States' economy. Commenting on the findings and importance of the Gallup study commissioned by the Barbara Bush Foundation for Family Literacy, Michael Nietzel, a former university president, estimated that if all U.S. adults were able to improve their literacy proficiency, it would generate some \$2.2 trillion in annual income gains for the country [57].

In sum, the goal of this paper is to share a worrisome situation that has been occurring in a large American city regarding extremely low literacy rates that affects the quality of life of almost half of its population. Incendiary newspaper articles titles, like "Detroit's Shocking 47 Percent Illiteracy Rate" [2] or "Almost Half of Detroit Residents Are Functionally Illiterate" [1] attempted to raise nationwide awareness about concrete facts happening in the City. Despite sustained efforts of multiple entities to remedy the situation, it continues to persist. Furthermore, despite limited positive outcomes, the alarming literacy rates in Detroit remain on the agenda of different agencies who spare no effort to address them through a variety of programs. The low literacy rates in Detroit are not only statistics on paper. They are not an abandoned cause, either. They remain on the working agenda of many institutions that continue to seek funding to design recovery programs to target different segments of the City's population. Investing in child, youth, and adult literacy is critical to the strength and well-being of any city, small or large, in the nation. The historic 94.4 million dollar Detroit literacy lawsuit settlement represents a significant attempt to remedy the illiteracy phenomenon in the City of Detroit. Will this community money be enough to bring about radical changes and to ensure visible progress in reducing illiteracy in Detroit? One can only hope!

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Media and Information Literacy in Portuguese School Libraries: A Longitudinal Study with Elementary School Students

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Abstract. The evaluation process of school libraries, developed by the Portuguese School Libraries Network, has been carried out through the application of a self-evaluation model. The instrument used by teacher librarians is based on a set of elements, including the collection of data through questionnaires applied to students of different schooling levels. In this study we examine the responses obtained through the questionnaires applied in that context, to students from the Portuguese districts of Évora, Leiria, Setúbal and Vila Real, in the years 2015, 2017 and 2019. The analysis is focused on activities related to MIL, verifying the incidences and contrasts in the dimensions studied in the observed universe. The self-evaluation Reports from 2019 are also analysed, mainly the strengths and weaknesses pointed out by teacher librarians. Considering students' responses, the results show several gaps in the work carried out by libraries, especially in the 1st cycle of basic education, and in activities more related to an active attitude on the part of students in the use of digital resources.

Keywords: Information and media literacy · school libraries · School Libraries Network · evaluation · elementary school students · Portugal

1 Introduction

The evaluation process of School Libraries, developed by the Portuguese School Libraries Network (SLN – RBE, in Portuguese language), has been carried out through the application of a self-evaluation model (MABE). This evaluation seeks to establish a relationship between processes, the impact or value they generate, and the prospects for future development [1]. The model contemplates four domains, which constitute parts of analysis and evaluation in harmony with the main axes of work of the School Library (SL). The instrument used by Teacher Librarians (TL) is based on a set of elements, including the collection of data through questionnaires applied to students of different schooling levels. In Portugal, TL are regular teachers who, in their great majority, have school librarianship qualifications to perform their SL duties.

Therefore, in the framework of an agreement for research purposes between Universidade Aberta (UAb) and the SLN, we examine the responses obtained through the questionnaires carried out in that context, to students from the Portuguese districts of Évora, Leiria, Setúbal and Vila Real, in 2015, 2017 and 2019 (questionnaires were not applied in 2021 due to COVID19 pandemic). The analysis is focused on activities related to MIL, considering that primarily it concerns competencies and skills, but can also be seen as the basis for a democratic society in which all citizens can participate [2]. According to the orientations published by SLN [3], students need to critically engage with media and information, namely in digital settings, and it is of the utmost importance to identify how students evaluate SL's action and to realize whether the SL is achieving its goals in this area.

This study is based on a mixed methods approach and crosses the four regions (representative of different geographic and social contexts) and the three indicated time periods, verifying the incidences and contrasts in the dimensions studied in the observed universe. We want to understand how students face the contributions of the school library in the development of their skills in information and media literacy by means of a statistical analysis of the answers given to MABE questionnaires. These data are compared with the SL self-evaluation Report of 2019, specifically the strengths and weaknesses pointed out by the TLs. From this analysis it is possible to identify what has been the role of SL in the development of MIL skills, as well as the constraints and improvements in the action of libraries. We think that SLs are right at the centre of this process, and that schools have an important role to play in this context, as MIL is widely considered the answer to today's information crisis. This study is particularly relevant as it analyses unpublished data collected by SLN, especially considering that the SL evaluation model has become an instrument to guide good practices, monitoring and evaluating the different intervention areas, certifying processes and results, and informing decision-making.

2 Conceptual Background

2.1 Relevant National and International Media Literacy Documents

SL are important partners in the educational process by contributing to the development of students' skills that will be fundamental for their future professional life and for their training and personal development as critical and active citizens. The action of these educational spaces, which integrates multiple literacies in the areas of reading, media, and information, should consider a set of reference documents that may guide the work developed. We focus on some of these documents, according to the objectives of this article.

The guide "Learning with the School Library" [3] is a key document in terms of the orientation of the work that is intended to be carried out and dynamized by the SLN in schools, with teachers and students. It points to the three areas of literacy that constitute important cores of the libraries' activity: reading, information, and media literacy. In the last two areas, it is intended that media and information literacy practices may "endow the students with knowledge necessary for their creative and informed use" [3].

The directives of the above-mentioned guide are articulated with another document published by the Portuguese Ministry of Education, "The profile of students leaving

compulsory education” [4], which distinguishes ten areas of competences. The areas of “Information and Communication”, and its associated competences, which refer to information and media literacy, through the “selection, analysis, production and dissemination of products, experiences and knowledge, in different formats” [4] are the most relevant for the present work.

At the European level, it is worth mentioning the “Digital Competence Framework for Educators” (DigCompEdu). The DigCompEdu framework [5], being oriented to educators at all levels of education, from early childhood to higher education, including general and vocational education, special education, and non-formal learning contexts, proposes 22 competences and a progression model to help educators assess and develop students’ digital competence.

2.2 The SL Evaluation Model (MABE)

Since the establishment of the School Libraries Network, its coordinating office has been developing several actions aimed at consolidating the work of the school library and highlighting its relevance in the context of Portuguese schools. Among the initiatives that have been designed over more than 25 years of deepening the work of SLN, the introduction of a self-assessment model for libraries stands out. This model - MABE – School Library Assessment Model - currently being applied in all schools of the 2nd and 3rd elementary cycles and secondary education and in some schools of the 1st basic cycle has constituted a management benchmark and an instrument for guidance and internal improvement.

After an experimental phase, in 2008–2009, the model was widely applied from 2010–2011 onwards. This self-assessment instrument has already had three versions, the 2010, 2014 and the current one, published in 2018, which “consolidates the objectives set out in the previous edition, reinforcing the adequacy of contents and methodologies to the changes that school libraries have been experiencing.” [6].

It is important to emphasize that the model was conceived with an orientation towards the analysis of the processes that contribute to realize the impact of SL on teaching and learning. The resources and activities carried out at SL are important considering their added value for the educational process and for the development of students’ skills. Concepts such as value, impact and evidence-based practice were at the basis of how the self-assessment model was designed and built [7]. A model such as this allows for a better understanding of how the mission and objectives established for the school library are being achieved, by analysing the practices and actions required for its improvement. In this sense, this self-assessment model is also an example of an action-research process, as it seeks to establish a relationship between processes, the impact or value they generate, and future development prospects [1]. Therefore, SL can, autonomously, carry out an evaluation of their actions and define strategies for improving and developing their practices. This instrument is intended to guide SL’s self-assessment, and is based on a set of elements, including data collection, in the form of a questionnaire. MABE contemplates four domains, each divided into two subdomains which constitute parts of analysis and evaluation in harmony with the main SL work axes.

It is the domain A. “Curriculum, literacies and learning”, that points to action in information and media literacy, specifically in the subdomain: A2 - “Training for information and media literacy”. The present reflection was based on this axis of work. It is also important to add that these training activities are normally carried out by TL with the groups of students who go to the library, being included in the SL activities programme. Sometimes there is some collaborative work with classroom teachers. In any case, the fact that this work is always carried out in the library makes its role more evident, namely when students are invited to evaluate the SL’ work.

3 Methodology

In this study, qualitative and quantitative procedures were used, in a perspective of mutual enrichment, and as an attempt to understand more broadly the object of analysis. First, we intended to capture and analyse the ways the SL actions in MIL are seen by students, so we fundamentally favour the perspectives of the research subjects [8]. In a second section of the analysis, we confront the reports of TL to examine the way some evaluation results, in particular data provided by students, are referenced in the final reports.

The analysed data was collected in a questionnaire that is part of the SL evaluation model. As part of this evaluation process, students are surveyed at the end of the school year, every two years. In general, students fill out the questionnaires online, in the school library. Younger students can be helped by a teacher to understand the questions. It is a large-scale survey, applied in all schools belonging to the SLN, to a representative sample of students from different school years (minimum of 20% of students from each school). It is, therefore, a survey capable of capturing the perspectives of the whole country (mainland Portugal) on the questioned topics.

Our analysis focuses on comparing the results of the questionnaires referring to students in the 1st cycle of basic education (from 1st to 4th grade, that is, ages between 6 and 9 years old, but the surveys are only applied to the 3rd and 4th years) and the 2nd and 3rd cycles of basic education (5th to 9th grade).

The students’ questionnaire covers the four domains that make up the assessment model (cf. 2.1) and has 11 questions (question 11 is an open question). The MIL area is present in items from question 7 and question 10, and those are the items to be examined in the present article. In question 7 the answers are Yes/No, and in question 10 a Likert-type evaluation scale is used. We follow a standardized quantitative approach, with a descriptive statistical analysis. The students’ responses to the questionnaire were studied by calculating the averages.

The TL Improvement Reports (2019) were confronted in the items also related to the MIL area. The responses presented in the SWOT analysis and global assessment attributed to the following 3 items of the report were analysed:

- (i) Development of students’ abilities in the use of technologies in an educational context.
- (ii) Increase of students’ skills in the personal use and management of information.
- (iii) Changing students’ attitudes towards the critical use of information and media.

4 Results and Discussion

Considering the imposed limitations of article length, we decided to present the results globally, for the four regions examined. After analysing these global results, the most significant aspects that were identified in the four regions are highlighted, by comparison with the average values achieved. In this way, we seek to highlight the most relevant deviations from these values. It should be noted that the four regions are not homogeneous. For example, they have significant variations in the number of schools and students, and this aspect has an influence on the results taken globally.

The results reveal that there are no significant changes over the three evaluation cycles. The most relevant differences concern the activities that have a higher incidence in each of the levels of schooling analysed.

Thus, it appears that with younger students (1st cycle of basic education) the work of the SL in information literacy focuses mainly on information research, which has the most expressive positive values. By contrast, an activity in IL that is fundamental, as is the case of information evaluation, has low achievement values. This question does not appear in 2019, following an update of the questionnaires that are applied by the SLN. It seems to us, however, that this more specific dimension of IL work should be included. It could be considered that younger students may not have a clear notion of the elements involved in this type of activity, also considering the high percentage of non-responses, but comparing with the answers given by older students, who should have a clearer notion of the difference between the two actions - information research and information evaluation -, it is also verified that about half of the respondents affirm that the SL did not provide them with information evaluation activities. This could be considered a weakness in the library's action, judging by the perception that students have. These weaknesses must be taken into account, as several studies report the difficulties that young people reveal when researching and evaluating information sources [9, 10]. To support critical student inquiry skills, it is necessary, in the first place, to create conditions for carrying out activities in this area, which seems to be lacking in many libraries.

Regarding digital literacy, and from the perspective of students as producers of digital artifacts, it appears that in the 1st cycle library work involves few students in this type of activity, although there is a slight positive evolution in 2019. In the remaining school cycles students' perception is more positive, but there is still a considerable percentage of students who say they did not participate in activities that put them in an active attitude towards the creative use of digital resources.

One of the areas in which there has been a greater commitment in Portugal, and in which libraries have been involved, concerns the development of skills in the safe use of the internet and social networks [11]. There is a slight appreciation of this type of action in 1st cycle schools, approaching in 2019 the values mentioned by students from 2nd and 3rd cycle schools.

We can compare these data with the answers given by students to another question in the questionnaire (question 10), in which students are asked to evaluate the contribution of the library in several of the learning activities carried out at school (for example, in the development of interest and skills in reading). Item 3 specifically focuses on the area of media and information literacy (Table 2).

In the case of this question, students in both groups evaluate the contribution of the library in this area in a very similar way, with 1st cycle students choosing a slightly higher percentage for the classification “Very good”. But it is also in this group that the most negative evaluations are found regarding the contribution of the library to their learning in MIL, with percentages above 10% located in the “Weak” classification, a value that decreases slightly in 2019 (9%). In comparative terms, it appears that the assessments of students in the 2nd and 3rd cycles are more positive (sum of evaluations “Very Good” and “Good”), which is consistent with the answers given in question 7 (Table 1).

Looking separately at each of the territories selected for analysis, and although there are significant differences in terms of the number of schools in each of the four regions (especially at the 1st cycle level), we identify some deviations from the global panorama, which are worth mentioning. We will discuss here the results from schools of the 2nd and 3rd cycles, in 2019, since, as mentioned, there are no major fluctuations between the results obtained in the three evaluation cycles. In the two school cycles that we consider in this part of the analysis, students also show greater maturity and analytical capacity, so their opinions will be more solid. Let us then comparatively analyse the four selected regions.

Regarding the parameters verified by question 7, items 1, 2 and 4 (Table 3), Évora (10 schools: 634 students responding) is the region that largely presents the best results, with percentages of answers in the option “Yes” above the overall average. It is the territory that shows a more effective work by the library in the MIL area, including in item 2, which focuses on the development of skills in the use of digital resources to produce various artifacts. Leiria (23 schools: 1709 students) and Vila Real (8 schools: 491 students) have all values below the global average and Setúbal (39 schools: 3114 students) have values below the global average in item 4.

Naturally, given the characteristics of each of these regions and the number of schools examined in each territory, a more focused analysis will be important, which it is not possible to present in this article. For example, of the 10 schools belonging to the region of Évora, a school in a small town in the rural interior stands out, which presents negative values in the 3 questions, in sharp contrast with the general panorama of the district. This type of situation requires investigating the reasons for this discrepancy which, we add, also extends to previous evaluation cycles (2015 and 2017).

On the other hand, a densely populated region such as Setúbal (a suburban district, located south of the capital, Lisbon) and, therefore, with a high number of schools, presents a lot of contrasts, with schools where the number of students involved in activities within the scope of MIL is quite high, and others that reveal low rates, with a significant number of students who do not participate in MIL related activities. It should be noted that this region is still the one with the highest percentage of students who do not answer the questions, above the global average.

The district of Vila Real, located in the north of the country, which in the 3 questions analysed presents values below the average, is curiously the region in which the SL is evaluated more positively by the students, in question 10. 44% of the students rate the contribution of their library to their learning in MIL with “Very good”. Setúbal, which, as we mentioned, is the region where the most contrasts are found, presents the highest percentage of responses that assess the contribution of the library in the MIL area as

Table 1. Results from answers to question 7.

	1st cycle			2nd and 3rd Cycle		
	2015	2017	2019	2015	2017	2019
7. Have you participated in any of the following activities promoted by the library?						
1. Learn to search for information and carry out schoolwork						
YES	2071 (81%)	1602 (79%)	1936 (79%)	6145 (78%)	5702 (80%)	4643 (77%)
NO	381 (15%)	327 (16%)	338 (14%)	1383 (17%)	1068 (15%)	1146 (19%)
Do not answer	112 (4%)	88 (4%)	178 (7%)	387 (5%)	344 (5%)	258 (4%)
Total	2564	2017	2452	7915	7114	6047
2. Use computer programs for image processing and production, sound, multimedia presentations, graphics,...						
YES	885 (35%)	752 (38%)	1116 (47%)	4429 (57%)	3811 (53%)	3310 (55%)
NO	1270 (50%)	986 (50%)	1023 (43%)	2905 (37%)	2668 (37%)	2391 (40%)
Do not answer	407 (16%)	216 (11%)	218 (9%)	442 (6%)	648 (9%)	328 (5%)
Total	2562	1954	2357	7776	7127	6029
3. Evaluate digital resources (websites, online documents, software,...)						
YES	637 (25%)	569 (29%)		3498 (45%)	3173 (45%)	
NO	1493 (58%)	1033 (52%)		3749 (48%)	3256 (47%)	
Do not answer	424 (17%)	382 (19%)		529 (7%)	545 (8%)	
Total	2554	1984		7776	6974	
4. Learning to publish content and behave safely on the Internet and social networks						
YES	1343 (53%)	1094 (55%)	1531 (65%)	5025 (65%)	4593 (65%)	3988 (66%)
NO	772 (30%)	697 (35%)	715 (30%)	2308 (30%)	2127 (30%)	1671 (28%)
Do not answer	421 (17%)	202 (10%)	109 (5%)	442 (6%)	378 (5%)	359 (6%)
Total	2536	1993	2355	7775	7098	6018

Table 2. Results of answers to question 10, item 3.

	1st cycle			2nd and 3rd Cycle		
	2015	2017	2019	2015	2017	2019
10. How do you rate the work and contribution of the school library to						
3. Knowing how to use technologies, media, and information						
Very Good	1066 (41%)	873 (43%)	1015 (42%)	3232 (41%)	2826 (40%)	2436 (40%)
Good	770 (30%)	524 (26%)	766 (32%)	2722 (35%)	2701 (38%)	2304 (38%)
Medium	321 (12%)	255 (13%)	289 (12%)	1165 (15%)	1023 (14%)	841 (14%)
Weak	265 (10%)	318 (16%)	230 (9%)	313 (4%)	294 (4%)	235 (4%)
Do not answer	172 (7%)	63 (3%)	126 (5%)	363 (5%)	256 (4%)	222 (4%)
TOTAL (n)	2594	2033	2426	7795	7100	6038

Table 3. Comparative results among the 4 regions (2019).

Region		Évora	Leiria	Setúbal	Vila Real	Global average
Item 1	Yes	79%	75%	78%	75%	77%
	No	20%	19%	18%	23%	19%
Item 2	Yes	61%	48%	57%	50%	55%
	No	37%	44%	37%	48%	40%
Item 4	Yes	71%	63%	62%	62%	66%
	No	26%	29%	30%	38%	28%

“Medium”: 37% of students chose this option (global average of the 4 regions: 14%). It was also intended to compare the students’ responses with the Improvement Reports made by teacher librarians. These reports follow a model and are based on the analysis that TL makes of the results obtained in the questionnaires (to students and teachers). TL should also do a SWOT analysis for each of the four areas that are being assessed. We chose to examine the reports of the schools that in 2019, and in each region, had the best and worst evaluation by students. Our aim was to understand how the results of the student questionnaires were reflected in these reports.

In the Évora region, the report of a school (A) located in the capital city of the district (school with the best results in the questionnaire) and a school (B) located in a small town in the countryside (school with the worst results in the questionnaire) were analysed. TL should use a scale of 1 to 4 to do the library self-assessment. In items

more directly related to MIL skills, despite the significant differences in the results of the student survey, the self-assessment report of each of these schools presents the same appreciation:

- (i) development of students' abilities in the use of technologies in an educational context (4 in both school reports).
- (ii) Increase of students' skills in the use and management of personal and school information (3 in both school reports).
- (iii) Changing students' attitudes towards the critical use of information and media (3 in both school reports).

The same exam was carried out for the remaining regions, and it was verified in the Leiria district that the two SLs selected according to the same criteria, after all, presented the same evaluation for the MIL area: evaluation of 3 for each of the three items. SL A, with the best scores in the evaluation of students, presents in its report, in the strengths, a detailed description of some actions that the SL develops, highlighting the mention of the use of the Big 6 research guide and the availability of several tutorials and the realization of training for the use of digital tools. As negative points, the SL points out the weakness of the computer equipment. SL B, located in a region with a fishing tradition, has a high rate of non-responses, which negatively influences the results of the assessment made by the students. For example, no student evaluates with "Very Good" the impact of the SL action on their learning in MIL.

In the district of Vila Real, an even more paradoxical situation is found. In fact, in this case, the library whose work is perceived in a less positive way by students (SL B), is the one whose TL assigns the maximum score (4) in the three items related to MIL that are proposed for evaluation in the report. The library with the best appreciation by students (SL A) has a 3–3-4 rating in its report. It is necessary to read the aspects mentioned in the SWOT analysis to better understand the context of each of the libraries. SL B points out several negative aspects, which somewhat contradict the assessment presented: for example, "SL's activity plan includes the organization of a calendar of user training sessions, but this training was not possible at all", or "Little acceptance in working the framework "Learning with the School Library" in articulation with the teachers" or even, "It lacks a SL's stable team. The teachers who support the SL are teachers with article 79 of the teaching career statute or mobility due to illness, which sometimes causes difficulties in the management of human resources". As a positive element, the following generic information stands out: "The material produced by the SL is of interest to students and teachers, supporting them in their search for information."

Regarding the SL A, the report mentions that the "Learning with the School Library" framework was applied in various activities, including training in the area: "SL promoted a training event, at the beginning of the year, for the teachers and other staff who are part of the SL team, on the SL referential and the area of literacy, the use of technology and new pedagogical and didactic practices". It appears, however, that the report is cautious in the way it makes a global assessment of the SL action in the MIL area. However, the work carried out, and reported more objectively in the report, is perceived positively by the students.

Finally, in relation to the Setúbal district, which includes locations with very diverse characteristics, we chose SL A with the most positive evaluations from the students in

question 10 (84% of students rated the SL's impact as "Very good") and two SL with similar evaluations in the lower quadrant (SL B - 22% of students rated the SL's impact on learning as "Very good" and 10% as "Weak"; and SL C - 19% rated it "Very good" and 10% "Weak"). In the SL B report it is pointed out that the library was without TL for most of the school year, absent for health reasons, adding that it was not possible to develop the usual program of activities in IL: therefore, the evaluation of the students is justified. SL B, located in a small town in a rural region, presents in its report a classification of 3 for the three items in the MIL area. Weak points mention the lack of computers and other digital devices that allow carrying out more actions in MIL. In fact, it appears that this need is transversal to the various reports, and not only those of the SL that present a weaker evaluation. SL C, with the best scores given by students, evaluates its work with a 4. As strong points, it points out, for example, the use of social networks and the participation of parents in some activities; in terms of weaknesses, the report underlines the "Urgent need to equip the library with more computers or tablets for research work and personalized dynamics with students and not always in small groups as is currently the case."

5 Conclusions

This study is not limited to providing a simple photograph of the existing situations, but aims further, to explore the possible implications for the future. In fact, with the Covid19 pandemic, which caused important changes in the functioning of schools and SL, the SLN interrupted the evaluation of SL, and the questionnaires that are part of this process were not applied. Only in this year, 2023, TL will once again carry out the entire evaluation path. This new data can be compared with previous cycles, namely with the 2019 data, which we analysed in more detail.

Based on the students' perspectives, after all the central elements of the educational process, the study demonstrated that SL in Portugal are carrying out relevant work in MIL that covers a quite significant number of students. However, the present study also reveals that there are several gaps in the work developed by SL, which require an urgent intervention by the SLN (and the support of the Ministry of Education) in several aspects. It appears that some MIL domains are not being properly worked on. Even in the field of IL, there are many schools in the analysed sample (and, we can assume, that this situation will also be registered in the other regions) that do not develop systematic activities in this area. Thus, many students will be unable to acquire fundamental skills, which we know are also not worked on in the curricular subjects. This situation is also identified in another study [12] based on a questionnaire applied to TL.

Traditionally, since the creation of the SLN, in 1996, the MIL's work has been in the SL. However, there is no obligation for teachers to collaborate with the SL or regular involvement of classes with the SL, in a scheme like library lessons that we find in other national contexts. In Portugal, although there are guidelines from the SLN, the work of the SL is very dependent on the context, on the value that is attributed to the library, on the support of school principals, on the interest of teachers of the various disciplines and on the profile and training of the TL. Furthermore, since 2015 there has been a setback in schools, given that the role of the TL is no longer a full-time job and these teachers also

must ensure a class, which has reduced their availability for library work. One TL often has to support libraries in several schools, with the consequent dispersion of efforts, with 1st cycle schools being the most affected, as we can conclude from the analysed data, which show lower values of involvement of students in this cycle of schooling in MIL-related activities.

So, the research results also make it possible to critically problematize the SL's work. One of the critical elements that it was possible to identify is related to the way in which some evaluation results are transferred to the reports, by the TL. Especially in the SWOT analysis that should be presented, some lack of precision was noticed, with the inclusion of very general observations that will be of little help in terms, for example, of the improvements that will have to be implemented.

Based on the results of this study, it is recommended that the SLN provide some training into the proper registration of the elements resulting from the evaluation process that is carried out in the school. It is also necessary to follow up more closely some schools, to better understand the factors that influence the work carried out, especially those that reveal a lower quality work, so that it is possible to find effective improvement strategies. Equity issues are fundamental, and recent data from PIRLS [13] reveal that in Portugal there are still many discrepancies in student outcomes related to their geographical and socio-cultural origin. In this sense, it is also important to overcome some problems of this nature also in Portuguese school libraries.

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Information Literacy in the Design Thinking Process - A Preliminary Research

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Abstract. The main problem of research study was to explore and capture the relationship between Information Literacy and Design Thinking processes in the didactic context. The study was carried out in two groups of students who participated in classes where Design Thinking was used. The first group was represented by people studying at the first-cycle studies in the field of electronic information processing (humanities and information technology studies); the second group consisted of students from second-cycle studies in the field of information management (studies in the field of social sciences). In both groups, the author of the paper conducted classes and moderated the Design Thinking process. The study was conducted using a quantitative method, supplementing survey research by a critical analysis of the literature, comparative analysis, and statistical methods.

Keywords: Design thinking · information literacy · higher education · collective intelligence · didactic process

1 Introduction

The process of design thinking is widely used in various areas of human activity, including information activities. According to Rak [1], there are three areas where Design Thinking (DT) processes can take place. The first, the most general and universal, applies to entities whose activities are related to broadly understood information activities and information management (IM) (institutional area). The next refers to individual and group IM and includes supporting activities among participants of the DT process (operational area). The last, third area is related to the use of DT in the implementation of practical subjects in the field of IM and related fields (didactic area). The aim of the paper was to explore and capture the relationship between DT and Information Literacy (IL) in the context of the didactic process. The main research questions were: What information competences should students have in order to actively participate in the DT process? What IM tools did they use in the DT process? The expected outcomes of the research were to show what information skills are needed and preferred in the process of DT and what differences in IL existed among students in information-related fields of study. By examining two groups of students, my research provided insights into the impact of IL education on the DT process. It allowed for a comparative analysis of the knowledge, skills, and perspectives gained by students who have a background in IL

versus those who do not. The study shed light on the potential advantages and disadvantages of incorporating IL in DT education. The study was preliminary in nature. Its local character was driven by the intention to explore the research problem and assess the potential for further investigation on a representative group of respondents.

In the adopted perspective, DT was understood as a manifestation of collective intelligence [2] of great importance for didactic processes [3], in which students undertook both practical activities of designers [4] and users of innovations [5]. It is innovation design [6] that was the main core of activities undertaken by students in the didactic area, where specific information competences were also needed. IL was understood as undertaking information behaviors that allowed obtaining information tailored to information needs and their ethical use [7].

Review of publications in databases registering scientific literature, conducted from April 29–30, 2023, showed that the topic related to the relationship between DT and IL was of interest to researchers. For the search phrase ‘design thinking AND information literacy’ Scopus returned nine results, Web of Science returned ten, while Google Scholar returned 3,030 results. The databases registered more publications for the following thematic areas:

- “design thinking” - Scopus: 7,099, Web of Science: 4,720, Google Scholar: 208,000;
- “design thinking AND students” - Scopus: 2,019, Web of Science: 1,372, Google Scholar: 87,500;
- “information literacy” - Scopus: 10,122, Web of Science: 7,850, Google Scholar: 268,000;
- “information literacy AND students” - Scopus: 5,408, Web of Science: 4,280, Google Scholar: 213,000.

The above analysis demonstrated that embedding the DT process within the context of IL could contribute to the development of a new research perspective. Moreover, the relationship between DT and information behavior concepts in the context of teaching and the student environment was very strong. To gain a better understanding of the relationships between DT and IL, it is worthwhile to examine how these concepts are currently discussed in scientific literature.

2 Design Thinking and Information Literacy

Strengthening the relationship between DT and IL is particularly evident in libraries. As Ingwe and Sulyman indicated, there was a belief that the benefits resulting from implementing changes in practices and services contributed to this state of affairs. Libraries recognized the value of integrating DT and IL, that led to the improvement of library services and the enhancement of users’ information competencies [8]. What is more, as emphasized by Mercer et al., DT could be a driver of information behavior because design work required the use of specialized sources of information [9]. Students who are involved in the design process must diagnose their information needs, gather resources, evaluate quality, and use resources to guide the decision-making process for adopting potential solutions needed to solve the problem [10]. On the other hand, the research conducted by Johnson and Tawfik showed that teachers used a variety of design approaches to improve the teaching of students’ IL [11].

DT, acknowledged as a problem-solving methodology in literature, possesses the remarkable capacity to harmonize creativity and analytical thinking processes [12]. It is an intuitive approach that fosters collaboration among multidisciplinary teams from engineering, business, design, and social sciences, with the common goal of generating innovative solutions [13].

The origins of DT can be traced back to the late 1960s and early 1970s, when Simon emphasized the integration of analytical and intuitive thinking, along with the pursuit of changes in the business landscape. Papanek also underscored the significance of design knowledge in addressing social problems (Papanek [25]). Initially, DT was viewed as a structured design process encompassing elements such as inspiration, ideation, and implementation [14].

The contemporary understanding of DT can be attributed to Kelley, a professor at Stanford University and co-founder of the design firm, IDEO. Kelley emphasized the imperative of deeply understanding customer needs and expectations. He described empathy as the willingness to challenge preconceived assumptions and suspend the belief that what one thinks is true, in order to discover what is genuinely true [4].

DT does not possess a single definitive definition. When considering various theoretical perspectives, it is recognized as: 1) a methodology [15], 2) a mindset [16] and 3) a problem-solving philosophy [17]. DT serves as a potent approach to drive innovation, tackle complex problems, and meet customer demands [18, 19]. It is characterized as a comprehensive framework encompassing diverse mindsets, methods, and practices, all aimed at enhancing productivity, fostering creativity, and cultivating innovative solutions [9].

Irrespective of the diverse definitions, DT exhibits certain inherent characteristics. It is universally applicable, transcending disciplinary boundaries and catering to individuals with different areas of expertise. At its core, DT is centered on the needs of customers, emphasizing the thorough understanding and recognition of their requirements. Organizations that employ DT gain a competitive advantage, as the solutions derived through this approach serve the betterment of humanity [20].

The DT process comprises five distinct stages. The first stage, empathy, revolves around the identification and empathetic understanding of customer needs. Following this, the subsequent stage centers on defining both the design challenge at hand and the underlying motivations behind tackling it. In the idea generation stage, the emphasis lies on fostering a mindset that values quantity, encouraging the generation of as many ideas as possible. The fourth stage centers on prototyping, where the ideas generated in the previous stage are translated into tangible visual representations. Lastly, the fifth stage involves testing the prototypes, refining the most promising ideas, and discarding those that prove unsuitable [21].

In contrast to DT, IL remains much more “tangible” and “concrete” in research. Since the 1980s, extensive research and education on IL has been enriched by a wide array of theories. The existence of diverse theories and definitions of IL gave rise to different approaches in IL education. Each theory offers unique insights and perspectives, influencing the instructional methods and strategies employed by educators in promoting IL skills among learners. As a result, IL education has become a dynamic field that

encompasses a range of approaches, tailored to meet the diverse needs and goals of learners in different contexts [22].

IL is a valuable competency for nurturing social capital [23]. An examination of the data reveals specific areas within IL that necessitate improvement. These areas encompass the effective processing of information, the critical evaluation of information resources, the proper utilization of information sources in compliance with legal frameworks, and the proficient utilization of information technologies. Strengthening these skills is imperative to enhance the overall development of IL.

3 Methodology

The study primarily utilized a quantitative method with a survey questionnaire as the tool. It was supplemented by a critical analysis of the literature, along with descriptive statistics. The survey was carried out in two groups of students who participated in classes where DT was used. The first group was represented by people studying at the first-cycle studies in the field of electronic information processing (EIP) (humanities and information technology studies). Their curriculum does not include subjects directly related to IL. The second group consists of students from second-cycle studies in the field of IM (studies in the field of social sciences). The study program provided for participation in many subjects related to IL. In both groups, I conducted classes and moderated the DT process. The study was anonymous and voluntary. The survey questionnaire was completed only by willing students who had completed the specified courses and chose to participate in the study.

The International Federation of Library Associations and Institutions (IFLA) standards for IL competencies were used in the survey questionnaire [2]. The questionnaire consisted of twenty-one closed-ended questions organized into four thematic areas. The first area related to information about the respondents and their knowledge of basic concepts. The second area focused on access to information. The third area centered around information evaluation, and the final area addressed the utilization of information. Incorporating IFLA's standards that cover three main areas related to IL competencies such as access to information, evaluation of information, and use of information, allowed for the assessment of respondents' IL in DT based on indicated key areas.

4 Results

4.1 Respondents and Knowledge of Basic Terms (DT and IL)

In the study, fifty-two students participated, representing 74.28% of the total seventy students in the classes. Among the participants, forty-one students were from the IM field of study, accounting for 78.85%, while eleven students belonged to the EIP program, making up 21.15%.

Breaking down the respondents by gender, thirty-eight were women (73.08%), with thirty-two from IM and six from EIP. There were also fourteen men (26.92%), with ten from IM and four from EIP.

The survey included questions about IL and DT. When asked about their familiarity with the term “Information Literacy”, forty-six participants (88.45%) answered positively, with forty-two from IM and four from EIP.

To gauge agreement with the definition of IL “To what extent do you identify with the statement: “Information literacy is the adoption of appropriate information behavior to obtain, through whatever channel or medium, information well fitted to information needs, together with critical awareness of the importance of wise and ethical use of information in society” (Johnston & Webber, 2003), respondents used a five-point rating scale. The majority (53.85%) indicated the highest level of agreement (rating 5), with twenty-seven IM students and one EIP student aligning with this view. A substantial portion (30.77%) expressed a high level of agreement (rating 4), with nine IM students and seven EIP students in this category. Furthermore, eight participants (15.38%) showed a moderate level of agreement (rating 3), including five IM students and three EIP students.

Regarding familiarity with “Design Thinking”, all respondents reported being familiar with the concept (100%), including both IM and EIP students. When asked about previous experiences related to innovation design using the DT method, responses varied. More than half of the participants (51.92%) indicated having previous experience, with twenty-four from IM and three from EIP. On the other hand, eighteen respondents (34.62%) reported having no prior experience, including nine IM students and seven EIP students. Additionally, seven students (13.46%) were unable to answer the question, comprising six IM students and one EIP student.

4.2 Access to Information

When asked about their ability to define information needs in everyday life, a majority of respondents answered affirmatively. Among them, thirty-five IM students (73.68%) and three EIP students (6.32%) acknowledged their capability to define information needs.

In terms of the level of difficulty in defining information needs at different stages of the DT process, there were some variations between the two groups (Fig. 1). In the empathy stage, sixteen IM students (33.68%) found it very easy, while five EIP students (10.53%) shared the same opinion. Additionally, six IM students (12.63%) and three EIP students (6.32%) found it easy, while eleven IM students (23.16%) and one EIP student (2.11%) found it very difficult.

Moving to the diagnosis of needs stage, eight IM students (16.84%) and five EIP students (10.53%) found defining information needs to be easy. Eleven IM students (23.16%) and one EIP student (2.11%) found it difficult, and eight IM students (16.84%) found it very difficult.

In the ideation stage, the majority of IM students faced moderate to high difficulty in defining information needs. Sixteen IM students (33.68%) found it difficult, and two IM students (4.21%) found it very difficult. On the other hand, eight EIP students (16.84%) found it moderately difficult, while one EIP student (2.11%) found it easy.

When it came to the prototyping stage, IM students generally had an easier time defining their information needs compared to EIP students. Fifteen IM students (31.58%) found it easy, while only two EIP students (4.21%) had the same opinion. However, three IM students (6.32%) and two EIP students (4.21%) found it very difficult.

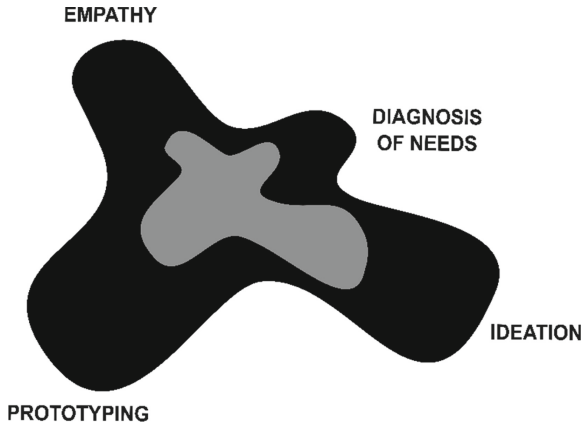


Fig. 1. Level of difficulty in defining information needs at different stages of the DT process: the color black refers to IM students, while the color gray represents EIP students (Source: own research)

In summary, IM students generally reported higher levels of ease in defining information needs across different stages of the DT process compared to EIP students. Both groups faced varying degrees of difficulty in different stages, highlighting the challenges associated with accessing information in the DT process.

4.3 Evaluation of Information

When it came to evaluating the relevance and usefulness of retrieved information at each stage of the DT process, the majority of respondents (71.15%) acknowledged assessing the information's relevance and usefulness. Out of these, thirty-four IM students (64.15%) and three EIP students (5.66%) declared that they assessed the information's relevance and usefulness. Eight individuals (15.38%) responded negatively, indicating that they did not evaluate the information, while seven respondents (13.46%) found it difficult to answer the question.

Regarding the usefulness of obtained information at different stages of the DT process, there were variations between the two groups (Fig. 2). During the empathy stage, nineteen students (36.54%) found the obtained information very useful, with twelve IM students (22.64%) and seven EIP students (13.21%) sharing this opinion. On the other hand, twenty-one students (40.38%) found the information not useful, with nineteen IM students (35.85%) and two EIP students (3.77%) expressing this sentiment. Moving to the need's diagnosis stage, half of the respondents (twenty-six individuals; 49.05%) found the information very useful, with twenty-two IM students (41.51%) and four EIP students (7.55%) supporting this view. Additionally, twenty-one respondents (40.38%) found it moderately useful, while five respondents (9.62%) considered it useless. In the ideation stage, the majority of students found the information obtained to be very useful. Thirty-two students (60.38%) perceived the information as highly useful, with twenty-eight IM students (52.83%) and four EIP students (7.55%) sharing this perspective. Eight students (15.38%) found the information useless, with seven IM students

(13.21%) and one EIP student (1.89%) expressing this opinion. During the prototyping stage, the percentage of respondents who considered the information useless was slightly higher at 19.23%, with ten students (18.87%) sharing this view. On the other hand, twenty-nine students (54.72%) found the information very useful, with twenty-six IM students (49.05%) and three EIP students (5.66%) indicating high usefulness. Additionally, thirteen individuals (24.53%) found the information moderately useful. In the testing stage, twenty-one respondents (39.62%) indicated the high usefulness of the information, with fifteen IM students (28.3%) and six EIP students (11.32%) supporting this view. Fifteen students (28.3%) found the information moderately useful, while sixteen students (30.19%) considered it useless, with twelve IM students (22.64%) and four EIP students (7.55%) expressing this sentiment.

In the study, the frequency of organizing information at each stage of the DT process was examined too.

During the empathy stage, it was found that 44.23% of the respondents did not organize the information. Among them, the majority (91.3%) belonged to the IM group, while a smaller portion (8.7%) were from the EIP group. Additionally, a small percentage of the IM group (7.69%) organized the information very rarely, whereas an equal percentage of both groups (7.69%) organized it rarely. Interestingly, a higher percentage of the IM group (32.69%) organized the information very often compared to the EIP group (13.04%).

Moving on to the need's diagnosis stage, 13.46% of the respondents did not organize the information. Within the IM group, (17.31%) organized the information very often, while the majority organized it often (38.46%) or rarely (17.31%). In the EIP group, the distribution was similar, with 17.31% organizing the information very often, 38.46% organizing it often, and 17.31% organizing it rarely.

During the third stage of the DT process, which is idea generation, it was observed that 15.38% of the respondents organized the information very often, 21.15% organized it often, 42.30% organized it rarely, 15.38% organized it very rarely, and a small percentage (3.85%) did not organize it at all. In terms of the group breakdown, more students from the IM group organized the information very often (15.38%) compared to the EIP group (5.77%).

Lastly, during the testing stage, 38.46% of the respondents did not organize the information. Within the IM group, a larger portion (30.77%) organized the information very often, while 13.46% organized it rarely and 5.77% organized it often. In contrast, within the EIP group, 13.46% organized the information rarely and 5.77% organized it very often.

In another question about the use of tools other than Canva for information development, it was found that the majority of respondents (96.16%) answered affirmatively. Among those who used additional tools, a large percentage (69.23%) utilized a text editor. Similarly, more than half of the individuals (63.46%) relied on folders on their computer or university cloud storage for information organization. Additionally, 36.54% of the respondents used email for IM and a small percentage (3.85%) utilized other tools.

While both IM students and EIP students evaluated the relevance and usefulness of information in the DT process, there were some variations in their perceptions. IM students generally found the obtained information to be more useful across different stages

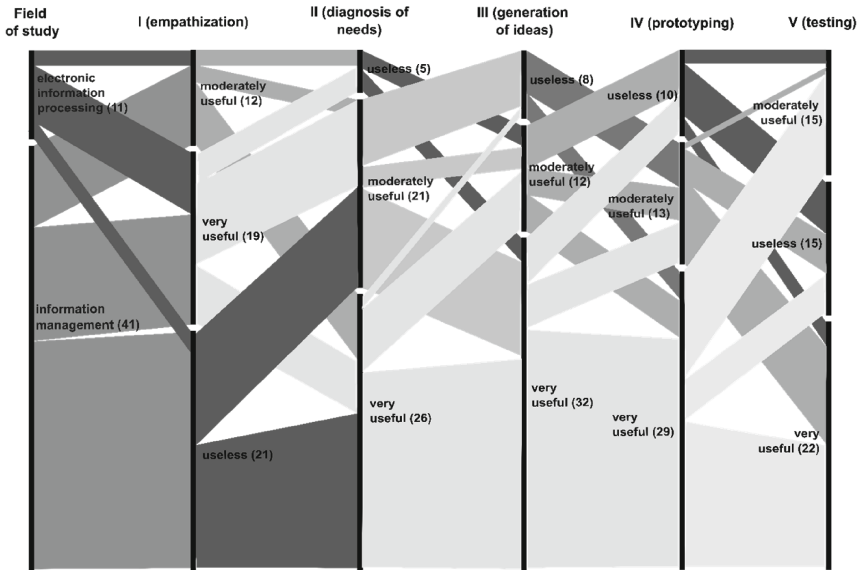


Fig. 2. Usefulness of information (Source: own research)

compared to EIP students. Both groups encountered instances where the information was perceived as less useful or even useless, highlighting the importance of effective evaluation and utilization of information throughout the DT process. The comparison between IM and EIP students revealed some differences in the frequency of organizing information at each stage of the DT process. IM students generally reported higher rates of not organizing or organizing information very rarely, while EIP students showed a smaller proportion in these categories. Both IM and EIP students demonstrated a high presence in organizing the information often and very often during different stages of the DT process. These findings highlight the variations in the frequency of organizing information at each stage of the DT process between the IM and EIP groups. Furthermore, they shed light on the extensive use of different tools for information development, with text editors, computer folders, and university cloud storage being the most common choices among the respondents.

4.4 Information Use

The last part of the questionnaire pertained to the utilization of information. In response to the question, “During the DT process, did you assimilate the information obtained so that you can now define it as your own knowledge resource?” a total of forty-eight respondents (92.31%; forty IM and eight EIP) answered affirmatively. Three persons (5.77%; two EIP and one IM) responded negatively, and one (1.92%; exclusively EIP) was unable to answer the question. Similarly, a majority of respondents, forty-seven of them (90.38%; forty IM and eight EIP), answered affirmatively to the question “Have you used the information obtained in the DT process in an ethical manner?” Four students

(7.69%; exclusively EIP) were unable to answer the question, and one (1.92%; only IM) responded negatively.

To the question regarding difficulties in communicating about the innovations developed through the DT process, forty-three students (82.69%; thirty-six IM and seven EIP) responded that they did not encounter any difficulties, three (5.77%; IM only) confirmed facing difficulties, and six (11.54%; four EIP and two IM) were unable to answer the question. Slightly greater diversity in responses were observed in the last question, which pertained to clear and unambiguous indication of authorship in the developed information product (report/presentation). Forty-one individuals (78.85%; thirty-five IM and six EIP) answered affirmatively, ten (19.23%; six IM and four EIP) stated that they do not remember, and one person (1.92%; IM only) responded negatively.

These findings demonstrate variations between the IM and EIP groups in terms of assimilating information, ethical use of information, difficulties in communication, and clear indication of authorship. The majority of respondents from both groups were able to assimilate the information and use it ethically. Some differences emerged, particularly in terms of facing communication difficulties and indicating authorship clearly.

5 Discussion

In the study conducted, a group of students participated, representing two distinct fields of study: IM and EIP. The IM students constituted a majority of the participants, while the EIP students formed a smaller group. Regarding the division by gender, both male and female students were included. The number of female participants was higher overall, with a larger representation from the IM program. Conversely, the number of male participants was relatively smaller, with a slightly higher representation from the IM program.

The survey administered to the students that covered various aspects related to IL and DT. Students should have a solid understanding of IL, including the ability to identify information needs, access and evaluate relevant information, and ethically use and communicate information. Based on the findings of the research, it can be noticed that the majority of the respondents, particularly those from the IM field of study, demonstrated a good understanding of basic terms such as “Information Literacy” and “Design Thinking”. There was a high level of agreement among the participants regarding the definition of IL, indicating a strong awareness of the importance of appropriate information behavior and ethical use of information in society.

In terms of access to information during the DT process, a greater proportion of the respondents reported being able to define their information needs in everyday life. The level of difficulty in defining information needs varied across different stages of the DT process. While some stages were easier for the majority of the participants, such as the empathy stage, other stages presented more challenges, indicating the need for further support and guidance in those areas. What is more, when individuals possess a strong belief in their ability to acquire, evaluate, and utilize information effectively, they are more likely to demonstrate higher levels of IL competence [24].

The study also revealed that the respondents showed a high level of engagement in searching for information once their information needs were identified. The sources used

during the DT process included official websites, social media, random websites related to innovation, and personal resources. Most of the respondents considered the sources used to be reliable, emphasizing the importance of accessing credible information during the DT process. Regarding the evaluation of information, a considerable number of respondents reported assessing the relevance and usefulness of the retrieved information at each stage of the DT process. There were also individuals who found it difficult to evaluate the information or did not consider it relevant or useful. This highlights the need for enhancing information evaluation skills and providing clearer guidelines on evaluating information during the DT process.

In terms of organizing information, the respondents displayed varying levels of organization across different stages of the DT process. While some participants organized the information very often or often, others did so rarely or very rarely. This suggests the importance of promoting effective information organization strategies to support the DT process and enhance information management skills. The use of tools other than Canva was prevalent among the respondents, with the majority utilizing text editors, folders on their computers, and university cloud storage for organizing and managing information. These findings indicate the need for providing diverse and user-friendly digital tools that can facilitate IM and enhance the DT process. Overall, the research findings provide valuable insights into the respondents' knowledge of basic terms, their access to information, evaluation and organization of information, and utilization of information as a knowledge resource during the DT process. These conclusions can inform educational institutions and professionals in the field of IM and EIP to develop targeted interventions and support mechanisms that foster information literacy and effective information management skills within the context of the DT process.

6 Conclusion

Lessons learned from this research include the importance of incorporating IL skills into educational programs for DT practitioners. It highlighted the need to cultivate effective IL skills to optimize DT processes and outcomes. Additionally, the research emphasized the value of fostering a culture of responsible information behavior and critical thinking within the DT community and society. Developing a course focused on IL within the context of DT presented several challenges. One challenge was designing a curriculum that effectively integrated information management principles while aligning with the dynamic and iterative nature of DT. Another challenge was identifying appropriate teaching methodologies and resources to engage learners and facilitate practical application of IL skills within the DT process. Additionally, addressing the evolving nature of information technologies and their impact on DT required ongoing updates and adaptability of the course content.

This work opens up perspectives for the future. The research contributes to fostering a culture of responsible information behavior and critical thinking, benefiting not only the DT community but also society at large. The perspectives gained can refine and optimize information-related practices within the DT process, leading to more informed and impactful outcomes. The design of educational programs to enhance IL skills within the context of DT can guide the development of training initiatives to cultivate effective

IM competencies among DT practitioners. By considering these perspectives, educators, practitioners, researchers, technologists, and policymakers can collectively advance the integration of IM principles in the realm of DT. The insights can drive the creation of innovative tools and technologies that support IM in DT, enabling more efficient and effective problem-solving.

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A Bibliographic Mapping Study: Concepts and Their Relationships in Information Literacy before and after COVID 19 Pandemic

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Abstract. The aim of the study was to reveal the Information Literacy (IL) concept and relationship between the concept of IL before and after the pandemic. Also, common keywords were examined. The period between 2016-11-01 and 2019-12-31 was considered as pre-pandemic, and between 2020-01-01 – 2022-11-26 as post-pandemic, in both groups. Trend analysis on the information literacy pre- and post-pandemic period was performed by VOSviewer software and in-app algorithms thereby visualizing Web of Science database on the related concept. The co-occurrence analysis of the keywords of articles conducted to reveal common concepts and the most associated concepts. After the bibliographic analysis of common keywords of the sample articles, 25 most common concepts before and after the pandemic were obtained and visualized. Some distinctive concepts before the pandemic were library instruction, collaboration, and students, while fake news, misinformation, and social media were observed in the post-pandemic period. Occurrences of the concepts in both periods were discussed within the scope of the related literature.

Keywords: Covid-19 pandemic · bibliographic mapping study · information literacy

1 Introduction

The American Library Association defines Information Literacy (IL) as “...a set of abilities requiring individuals to ‘recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information’ [1]. The Association of College and Research Libraries (ACRL) [2] expanded upon this definition by indicating that “information literacy is 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”. Information literacy is more important than ever. As of March 12, 2020, the Covid-19 pandemic, which was declared as a pandemic after spreading all over the world, has shown its impact with lost human lives, economic repercussions and

increasing poverty. [3]. This event, which has had an impact on every aspect of life, has also been reflected in scientific research. The outbreak of COVID-19 poses new challenges to concepts of information literacy. Studies showed the increasing importance of IL especially in the pandemic era. According to a study of Chinese academic libraries, IL education during the pandemic had several characteristics, such as rapid response to information needs, recommending reliable information resources to users, developing and gathering current information on COVID-19 cases, and resisting misinformation and false information [4]. Research studies emphasize the enhancing of individual immunity against science-related misinformation; this is also named as “infodemic” induced by the pandemic [5–7]. With the pandemic, research in the field of information literacy has changed direction; IL’s focus has changed and this is reflected in publishing patterns in databases as well. Just before the pandemic, Stopar and Bartol [8], conducted research on Web of Science (WoS) and Scopus based publishing patterns and trends in relation to IL related competencies that is, digital competences, computer skills, and related abilities in different settings. A bibliometric analysis from 2001 to 2020 on IL showed that “information literacy and library” is the top-researched topic and considerable increase in publications over a number of years was observed in this area [9]. Onyancha [10] examined the evolution of IL research over a 43-year period by mapping the Scopus database. The researchers revealed that within the specified time frame, the focus of the studies on IL moved out of the library and librarianship, spread to a wide variety of fields in a multidisciplinary structure, and was studied in 27 different disciplines besides the social sciences.

Research trends studies have emerged in Information Literacy (IL) to determine research methods and changes before and after COVID-19. Focusing on the concept of information literacy in higher education, Chen, et al. [11] captured related keywords, that is, IL, college students, higher education and academic libraries as a result of the bibliographic analyzes within the 2011–2020 period. Pinto et al. [12] analysed the evolution of research activity during an extensive period (1974–2011) and scientific productivity about IL. The researchers observed exponential growth in the research on the concept within the areas of information and documentation, communication, education, management, and health sciences.

Research conducted around the Covid-19 pandemic exposed that the pandemic has created a gap between community and the science in the context of IL and related literacies and competencies. The reflection of this situation on scientific research can be observed with the help of bibliometric analyzes. The current study attempted to comparatively analyze the impact of the pandemic on the scientific production and reveal new challenges undertaken.

2 Method

2.1 Selecting Articles

The data set was extracted from WoS databases with keywords related to “Information Literacy”. The keyword was searched in the database as “information literacy” in double quotes in order to limit the search. Selection criteria was the publication period between specified dates. The period between 2016-11-01 and 2019-12-31 was considered as

Table 1. Most common concepts on the map before pandemic.

Concept	Occurrence	Total link strength
Academic libraries	93	342
Higher education	86	288
Library instruction	55	191
Digital literacy	50	165
Assessment	42	138
Collaboration	32	113
Media literacy	29	111
Education	29	87
Students	27	85
Critical thinking	26	66
Fake news	25	86
E-learning	24	66
Libraries	21	75
Social media	21	73
ACRL framework	20	67
Internet	19	136
Health information literacy	19	36
Research	17	58
Digital competence	17	51
Learning	16	42
University students	15	155
University libraries	15	65
Graduate students	15	47
Health literacy	15	46
Plagiarism	15	36

Table 1 shows the frequency of occurrences of the top 25 keywords which appeared with IL. The five most common concepts revealed with information literacy were academic libraries, higher education, library instruction, digital literacy and assessment. The second five common concepts are collaboration, media literacy, education, students and critical thinking.

3.2 Most Common Concepts After Pandemic

After the pandemic, new concepts were observed occurring with IL. Figure 2 showed the common concepts in the second period:

Also, Table 2 shows the occurrences and total link strength of the post-pandemic concepts from the map. According to Table 2, after the pandemic, the 5 most common concepts associated with IL are higher education, academic libraries, assessment, digital literacy and fake news. The second five are media literacy, misinformation, Covid-19, social media and education. As shown in the Table 1 and 2, it is observed that there are

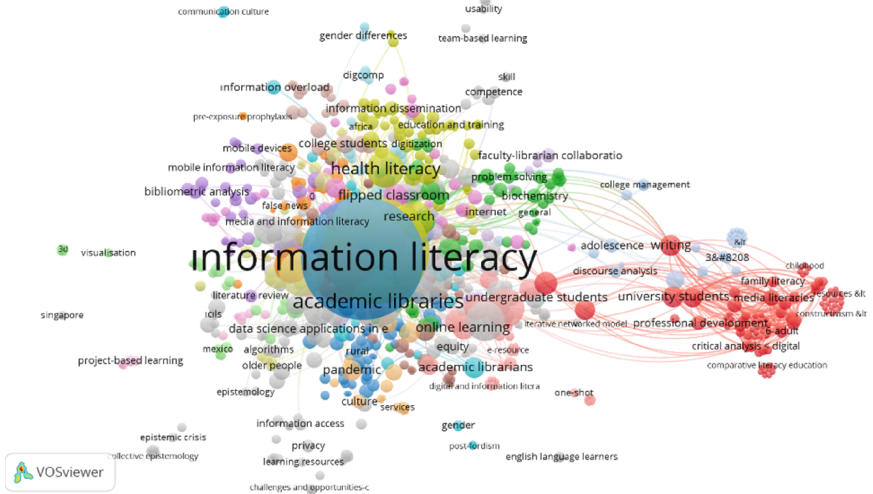


Fig. 2. The map of post-pandemic concepts and their relationships

Table 2. Most common concepts on the map after pandemic.

Concept	Occurrence	Total link strength
Higher education	76	311
Academic libraries	61	242
Assessment	35	227
Digital literacy	56	202
Fake news	46	178
Media literacy	48	178
Misinformation	43	167
Covid-19	46	155
Social media	36	144
Education	34	142
Students	34	142
Library instruction	37	141
Critical thinking	36	126
Health literacy	33	103
Disinformation	29	110
Media and IL	26	96
Libraries	22	116
Digital divide	15	89
Internet	12	105
University students	11	121

(continued)

Table 2. (continued)

Concept	Occurrence	Total link strength
Writing	11	174
Critical analysis	3	89
Comprehension	3	89
Family literacy	3	108

changes in the concepts mentioned together with IL in the pre- and post-pandemic period. The occurrences of the top 5 keywords were changed; fake news was also prominent after the pandemic. Misinformation, Covid-19, disinformation and family literacy were observed just after the pandemic.

In terms of the concepts of fake news, social media, critical thinking and health literacy, an increase is observed after the pandemic. Total link strengths indicate the total links of given keywords with IL. When we compared with the pre-pandemic data, there was also notable increase in the mentioned concepts.

4 Discussion

Results of this bibliographic mapping study revealed that there was a change before and after Covid-19 pandemic in terms of research concerned with IL. Although there were common terms both in the maps such as academic libraries, higher education and library instruction, new concepts emerged just after the pandemic. When we examined the common concepts with IL on the maps, misinformation, covid-19, disinformation and family literacy were observed on the second period. This showed that the covid-19 pandemic changed the face of the scientific research related to the subject of IL. Baber, et al. [14] reached the similar results with digital literacy. They reported concepts associated with digital literacy were fake news, competence, educational technology, health literacy, self-efficacy, and covid-19. Nadi-Ravandi and Batooli [15] also put forth the occurrence map of the scientific products of the library subject area and the Covid-19 pandemic, they extracted four clusters: libraries and librarians, use of media and social networks and information and communication technologies, online library services, and information and news. They reported the most frequently used keywords associated with the library were misinformation, fake news, IL and crisis management.

Another salient finding of this study is the changes in the total link strengths of the common concepts in both periods. After the pandemic, there were remarkable increases in the occurrences of terms, that is, fake news, social media, critical thinking and health literacy. Fake news is one of the important topics covered in IL literature, especially in the covid-19 process. It is discussed together with the concept of critical thinking in the examination of exposure to information that spreads rapidly on social media during the pandemic period [16–20]. IL and related literacies such as media, news, digital and scientific, have protective effect on people against harmful effects of misleading information [21–24]. Igbinovia et al. [25] revealed that, IL competency had a significant effect on curtailing the spread of COVID-19 fake news among undergraduates in Nigeria.

They are educationally positioned to acquire IL competency which is crucial to their identification of fake news and helps to curtail its spread. In this study, the increase in the link strength of the related concept, especially in the post-pandemic period, shows that as it has been studied more with IL its importance has increased.

Social media has been considered together with IL and an increase in the tie strength has been observed. Because it has a pivotal role in disseminating information, the importance of the term come into prominence during the pandemic. Bajwa et al. [26] put forward that the behavior of young people changed after getting exposed to the disseminated information regarding COVID-19 in social media; also the effect of social media in creating literacy among masses helps people to use precautionary measure against COVID-19. As the spread of misinformation about COVID-19 increases, the importance of IL and related literacy such as media literacy is increasing to avoid confusion and uncertainty [27]. Raising the awareness of the masses against the effect of the information disseminated in social media shows itself especially in research on media and information literacy. Investigating the negative impact of misinformation/disinformation on media and IL is still seen as insufficient and limited within academic spheres only [6]. The digital divide also plays a key role in terms of the mentioned literacies, and it is indicated as having been the most significant impediment to the success of digital, media and IL initiatives [6, 28].

Health literacy was another concept with an increased occurrence of IL after the pandemic so its total link strength was considerably increased. It played a vital role in saving lives during the pandemic. In this period when accurate information is of critical importance, relying on low-quality information sources could create and reinforce people's misperception, combined with socioeconomic vulnerabilities, this also leads to low compliance with Covid-19-related public health measures, poor health outcomes and low anxiety levels regarding Covid-19 [29–31]. Li et al., [32] showed that health literacy was positively associated with Covid-19-specific precautionary behaviors and conventional health behaviors helps college students adopt these behaviors and also reduces the risk of infection among them.

Covid-19 showed its effect on scientific research trends in the field of IL, as it does in all areas of life. This study makes a comparison of the concepts related to IL, which have increased in importance or come to the fore during the pandemic period. However, the time periods included in the analysis cover a period of approximately three years before the pandemic and a period of two years afterward. In order to observe visible changes in research trends, it would be useful to conduct a study over a larger time period. Another limitation of this study is that it is limited to the visualization and mapping of the concepts. Thus, this study revealed the impact of the pandemic on IL research, and discussed possible reasons. In future studies, comparative analyses can be conducted for both periods in terms of different refinement criteria such as research categories or regions. Nonetheless, the economic effects that have emerged as a result of the pandemic, and the diminishing effect of it since 2023, could cause research to focus on new and different concepts.

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Perceptions of LIS Professionals on ACRL Framework: Understanding and Fostering Concepts, Skills and Attitudes in Academic Students

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Abstract. The recently translated Framework for Information Literacy for Higher Education is generating considerable interest among Portuguese professionals. As pedagogical approaches and constructivist learning gain prominence, librarians are recognizing the crucial role they play in facilitating research skills, employing diverse pedagogical methods, and fostering information literacy as essential elements of education. This study, conducted as part of a national project focused on information literacy for academic students, aims to analyze Portuguese librarians' perceptions regarding the translated Framework. Through an extensive literature review and an online survey, the initial findings indicate that librarians possess a basic understanding of the topic while demonstrating a strong commitment to acting. Building upon the translated Framework, pedagogical materials and training opportunities have been introduced. As information literacy programs continue to be integrated, implemented, and evaluated in libraries and academic curricula, the Framework serves as a valuable reference document for information professionals and educators, offering inspiration and guidance.

Keywords: Information literacy · ACRL framework · librarians actions · learning · higher education · Portugal

1 Introduction

A few years after the publication of the *Framework for Information Literacy for Higher Education* (Framework) [1], its impact has been studied at different levels and in several regions [2–4]. However, it was only very recently that this main document was translated into Portuguese [5], which poses a challenge for information professionals in Portugal. Regardless, this shift has brought renewed energy and a new level of discussion around the training provided by academic information professionals, who pay increasing attention to teaching and learning methodologies. The pedagogical role of librarians becomes

more pressing, with pedagogical methods, constructivist learning, multiplying research techniques, and information literacy (IL) as fundamental learning elements [6]. How do Portuguese professionals react to the opportunity to know the Framework deeply and objectively and to the possibility of applying its orientations?

2 Literature Review

In the disciplinary area of IL, it is important to consider that the commitment of the professional and the researcher to their community, professional, academic, or scientific, is confirmed by continuous participation in new contributions and discoveries. This active participation fosters dialogue among community members, in an ecosystem where ideas are presented, discussed, and can be reviewed, criticized, refuted, or adopted [7]. Therefore, it is appropriate to mention the importance of the adoption of concepts and their extensive understanding, also through translation into the natural language of the beneficiaries of any reference documents. One cannot stop at the surface, since “the mere importation of concepts and application of foreign practices to different contexts without due care results in artificialisms, with little real use” [8]. It is therefore essential to understand the social and educational needs of the audience, as well as their diversity so that librarians can act to consolidate consequent actions for IL by adopting concepts, incorporating terminology, knowing the issues, and participating in academic dialogue. At the same time, it is important to approach this instrument in its reflexive nature, flexible, and permeable to diverse disciplinary practices. This view allows the Framework contents to be transformed into practical knowledge because it is applied in depth. This reveals new opportunities to connect students’ learning needs with subject areas, removing barriers to participation in disciplinary communities, as it potentially creates a greater understanding of the whole curriculum [9].

These principles guided the national project “Information Literacy and Critical Thinking in Higher Education: fighting misinformation”, developed within the scope of the Portuguese Association of Librarians, Archivists, and Information and Documentation Professionals (BAD). This means that there was an intention for librarians, particularly those who interact directly with academic students, to be prepared to provide guidance to empower them in the search and discovery of meaningful and reliable information. To this end, it was necessary to translate the Framework and actively train these stakeholders, making this document known in a clear and objective way while seeking to frame other complementary actions. As in similar experiences [10], the translation of the Framework seems to have been fundamental for its reception to be successful. In fact, in 2019, before this translation, a study was developed in Portugal [11], with academic librarians, which aimed to observe to what extent the Framework was known and was already being adopted, achieving a renewal of pedagogical processes, and implementing innovation in IL teaching methodologies. Like previous studies [12–14], it sought to understand whether the Framework had penetrated the pedagogical practices of Portuguese librarians, and to what extent librarians are willing to practice it, but the responses were disappointing. Although sensitized, they did not demonstrate a consistent or confident path in these new formative practices, compatible with similar results from other communities at the beginning of the document’s implementation [15]. In contrast,

some natural English-speaking communities showed quite a good implementation of the Framework [2, 16]. Thus, several speeds of implementation are perceived, not only by different communities, but even within the same community, by different actors implementing training strategies based on the Framework at equally diverse levels, which means that, at the same time, acceptance of the Framework by librarians has not been universal, implementing the Framework into one-shot IL instruction is difficult, and full implementation of the Framework may require a restructuring of how IL education is approached [17].

It is thus understood that to meet an extended implementation objective of the Framework it is necessary to develop complementary training strategies [18] aimed at deepening transversal competencies, combining coping with information needs with search strategies to identify appropriate search tools, as well as to demonstrate persistence, adaptability, and flexibility. In addition, context needs to be considered. IL-based learning relies on meaningful questions for students, as long as they are placed in a context. Because IL skills are transversal and applicable to various disciplines, they are transferable to different subjects [19–21], promoting students' capacity development in academia and lifelong learning. The Framework presents a pattern of integrated competencies that address the reflective discovery of information, the understanding of how information is produced and valued, and the ethical and legal use in the creation of new knowledge and ethical participation in learning communities [1], thus renewing the concept of IL. Indeed, participation in communities of practice is also mentioned as a relevant outcome of the successful application of this guideline document [22], so it should be kept in mind that joint actions to train librarians can work well.

The Framework presents a set of conceptual frames and interconnected main concepts, which represent overarching ideas intended for application within any academic disciplines, namely: Authority is constructed and contextual; Information creation as a process; Information has value; Research as inquiry; Scholarship as conversation; Searching as strategic exploration.

This set of frames that integrate goals and concepts to be achieved and surpassed, in order to guarantee the development of genuine knowledge in a discipline, profession, or domain of knowledge, must be understood in an interconnected way and interpreted in its implementation in a flexible way. The Framework provides guidance, suggesting methods and strategies, as well as content and exercises to be developed. At the same time, academic librarians have pedagogical experience, essentially based on the application of previous standards, which is important, but out of line with what is currently intended [23]. Knapp and Brower exemplify that “information literacy is no longer outlined as a series of objectives to be learned early in one's academic career. Instead, information literacy forms a framework to sustain an ongoing and increasingly demanding relationship with information over the lifetime of a student” [24, p. 466]. In addition, librarians do not seem to be aware of strategies to combat disinformation [25], but the current context encourages us to take a proactive stance in relation to this matter. The literature underlines the importance of the educational factor: the training of users motivated by knowledge enhances the distinction of the veracity of what is stated and allows for identifying the most suitable scenario for the production of knowledge. Better-prepared individuals assume that the information available on the Internet is insufficient.

Inspired by initiatives developed based on the Framework [17, 26], and specifically designed to combat disinformation [27–31] and aware that structured training remains scarce, the authors proposed to build some strategies for training in academic institutions. Several initiatives were developed to promote knowledge of the Framework, providing training strategies and pedagogical practices on the use of IL for combating misinformation. Thus, the official translation of the guiding document is available on the Project website, also shared by the entity that authored it (<https://www.ala.org/acrl/standards/ilframework>), for access and download. Six brochures were also designed to distribute, but they are also available in digital format to be used with all the supporting information (https://bad.pt/formacao/projetos/combater_desinformacao/). In these brochures, a work has been developed for each frame where pedagogical strategies for combating disinformation are associated, which in this way describes and explains: core concepts of the Framework; knowledge practices; dispositions; initial questions; topics for reflection; additional readings; strategies against disinformation.

Bookmarks were also designed as well as, most importantly, PowerPoint slides that are available in open access for reuse. This work was developed by aligning the principles of critical thinking with each frame and based on the following ideas:

- Remain skeptical, but with an open mind! (Authority is constructed and contextual)
- Recognize the meaning of the creation process! (Information creation as a process)
- Understand rights and duties when integrated into an academic community! (Information has value)
- Recognize that new discoveries occur as a result of various perspectives and interpretations! (Research as inquiry)
- Promote in-depth debate and dialogue around knowledge! (Scholarship as conversation)
- Understand that information research is a complex and contextualized experience that affects and is affected by the researcher's social, affective, and cognitive dimensions. (Searching as strategic exploration)

In designing the project, efforts were made to identify similar training strategies, their pertinence, feasibility, and adequacy to the national context, determine objectives, target audience, skills to be acquired, and detail learning content. Despite these intentions, it was interesting to see if the Framework knowledge – basic for the transversal implementation of IL – met expectations.

3 Methods

This study aims to analyze the perceptions of information professionals about the knowledge and practical applicability of the six frames that make up the *Framework for Information Literacy for Higher Education*. Perceives the understanding of concepts, skills, and attitudes that students can develop in their academic context, with the support of information professionals.

The study presents a project of practical and programmatic application of IL teaching developed in Portugal. To understand how the Framework is understood and applied in Portugal by information professionals, an online questionnaire was created consisting

of seven closed questions and one open question, which was distributed among the participants of a webinar held for this community on the subject.

The questionnaire began with a sociodemographic characterization of the respondents. This category included the type identification of the library to which it belonged (academic, school, public, archive, governmental organization, or other).

It was then questioned whether the respondent usually carried out IL training with students and whether he had prior knowledge of the Framework's contents. In this context, an attempt was made to perceive the knowledge and understanding level of the frames before and after the participation in the webinar – minimal level (basic knowledge), developing (which the concept was already applied), and proficient (which the concept was already applied intentionally and effectively); the option of answering «I don't know/Does not apply» was also offered. An attempt was also made to find out which frames these professionals intended to incorporate into their training and also which knowledge practices and dispositions or attitudes they considered most important for students to develop. It also asked whether they were considering incorporating the fight against fake news and disinformation in training actions aimed at students. And, in this sense, whether the materials created within the scope of the Project and available on the website would be relevant for training.

The questionnaire ended with an open question, giving the respondent the opportunity to leave a suggestion or opinion.

4 Results

4.1 Sociodemographic Characterization

Eighty information professionals and library managers answered the questionnaire: 70 (87.5%) female and 10 (12.5%) male. The average age was 48.3 years - the youngest was 30 years old and the oldest was 62. When questioned about their professional background, 59 (73.8%) answered working in academic libraries.

4.2 Quantitative Results (Closed-Ended Questions)

Information professionals were asked whether they usually provide IL training to students – 44 (55%) said yes. When asked whether they had prior knowledge of the Framework, the answer remains positive: 48 (60%).

These professionals were then asked about their knowledge and understanding of each of the frames (Fig. 1). «Authority is constructed and contextual» frame stands out; it is the one with the greatest discrepancy between developing and proficient knowledge values. Both «Searching as strategic exploration» and «Information has value» are the frames that present the highest values regarding the highest level of knowledge.

And because they had just attended the webinar, the information professionals were then asked about their level of knowledge after learning about the Framework (Fig. 2).

Compared to the previous answers (Fig. 1), the values have increased. In general, the values representing a proficient level of knowledge stand out, as the «Information has

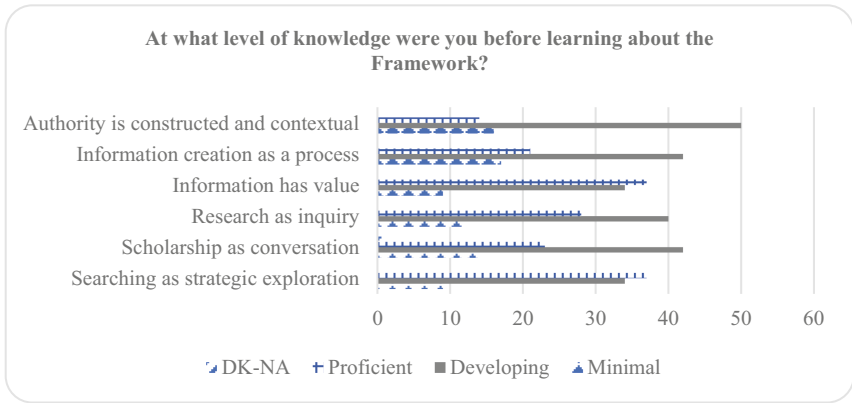


Fig. 1. Frequencies recorded in answer to the question: At what level of knowledge were you before learning about the Framework?

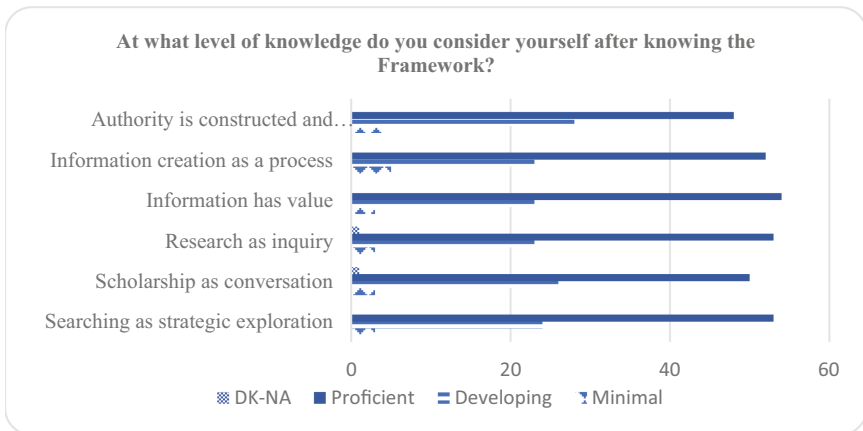


Fig. 2. Frequencies recorded in answer to the question: At what level of knowledge do you consider yourself after knowing the Framework?

value» frame. The greatest increase between the developing and proficient levels is that of «Authority is constructed and contextual», even though the proficient level shows the lowest values of the frames as a whole.

The next question sought to identify which frames information professionals intended to adopt in their regular training.

Figure 3 demonstrates that «Searching as strategic exploration» and «Information has value» are the two frames that respondents highlight, with 71.3% of preferences each. «Authority is constructed and contextual» and «Scholarship as conversation» are the least valued frames (47.5% and 50%). And 10% of respondents maintain their reservations because they do not feel prepared to use them in their training yet.

We then tried to determine which knowledge practices information professionals consider most important for students to develop.

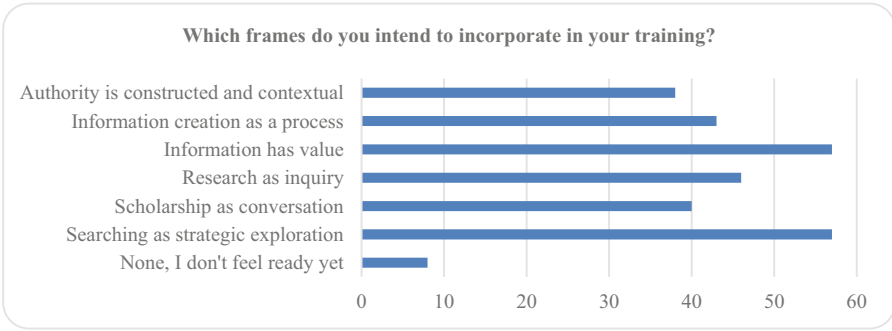


Fig. 3. Percentages of answers to the question: Which frames do you intend to incorporate in your training?

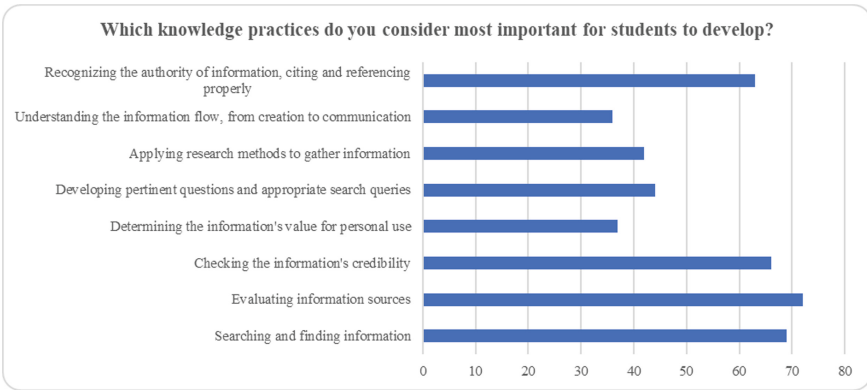


Fig. 4. Percentages of answers to the question: Which knowledge practices do you consider most important for students to develop?

Of the respondents, 90% consider that it will be the evaluation of information sources, followed very closely by searching for and finding information (86.3%), checking the information credibility (82.5%), and recognizing the sources' authority (78.9%) (see Fig. 4). Understanding the flow of information, from its creation to its communication, and determining the information's value are the two practices least valued by respondents (45% and 46.3%).

When asked about the dispositions or attitudes they consider most important for students to develop, information professionals highlighted the notion of critical awareness and ethics (83.8%) and critical thinking (81.3%). Humility and flexibility towards the information ecosystem (35%), open-mindedness (40%), and, with the same score (41.3%), respect and appreciation, as well as self-awareness and self-assessment were pointed out as less relevant (Fig. 5).

Regarding the need to incorporate the fight against fake news and misinformation in the students' training, 52.5% of the respondents answered affirmatively, and 2.5% said

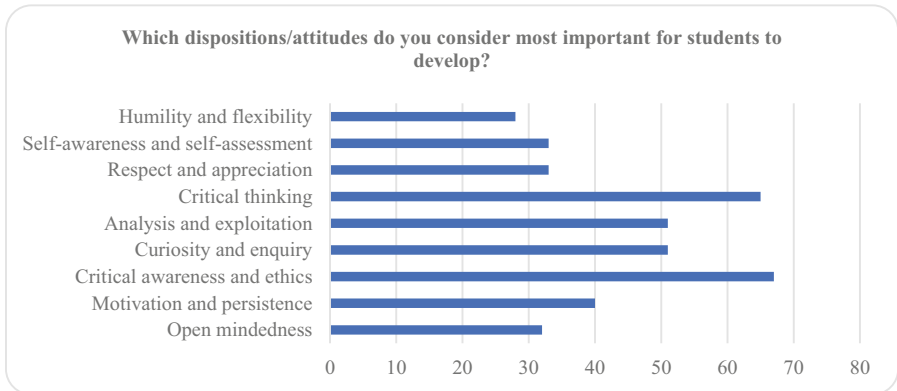


Fig. 5. Percentages of answers to the question: Which dispositions/attitudes do you consider most important for students to develop?

no. Some of them express some doubts (42.5%), so they have not yet decided whether they will do so. But 1.2% of respondents already do so.

Concerning the materials made available on the Project website and for future use in their training, the information professionals expressed a preference for the Framework (83.8%) as a work reference, the open and reusable slides (PPT) (63.7%) and the brochures (52.5%). Bookmarks are not preferred (25%).

4.3 Qualitative Results (Open Question)

In the open question about how to develop this training for students, information professionals presented some ideas on how to ensure the effectiveness of the intervention identified in the previous question: the development of practical activities, applying fact-checking strategies and games dedicated to the topic (e.g., using Mentimeter); debates on the correct use of information and the negative impact of misinformation on society; also debates on IL in a reflexive and iterative approach; the inclusion of press articles and social media in the training to teach how to search and filter the information to be used – and, in this scope, the focus should be on current issues; a strong investment in strategies to search for reliable information; a focus on brochures and other dissemination materials; and the inclusion of these issues in the discipline of Research Methodology in collaboration with teachers. Generally speaking, the main focus is on investment in regular and continued training.

Finally, and still within the scope of the open question, some information professionals confessed that they had already tried to explore the Framework, found the document difficult to approach, but were planning to use it in the next school year's training courses.

5 Discussion

The aim of this study was to analyze the perceptions of information professionals about the knowledge and practical applicability of the six frames that make up the Framework, considering the understanding of the concepts, skills, and attitudes that academic students can develop in an academic context.

The information professionals surveyed refer to some difficulties in using the Framework; the lack of time, the fact that it is a document, in their view, of difficult understanding, but also of different construction and too abstract. These considerations, as well as the perception of some elitism, are characteristics also mentioned in other studies [2, 3, 16, 17, 32]. Even so, the respondents in this study expressed the desire to work better on the Framework and to apply it in the future.

The six Framework frames were analyzed by information professionals. «Searching as strategic exploration» is the one in which they feel most comfortable. In fact, they have always done it and dominated their strategies of action. Regarding «Information has value» it is not surprising that it is so significant in the information and Open Science ecosystem; these professionals have also become experts in this field and its social and economic constraints [7]. Some studies reveal that the frames «Searching as strategic exploration» and «Research as inquiry» are the frames highlighted by librarians and teachers in their studies [4, 32]. It is important to reflect on the reasons why some frames are preferred, why some are taught more than others and how to teach the supposedly more difficult frames. In this context, the issue of Framework difficulty, lack of confidence in training and time can also be addressed [2]. Time is a big problem; it is very difficult to teach the whole document and make students reflect on its contents when these information professionals have only one session and little more than 90 min for that.

The webinar proved to be an added value for the participants. A little less than half were unfamiliar with the contents and scope of the Framework, so this was an opportunity to get to know the document. For those who already knew it, it was an opportunity to demystify doubts and fears. It is therefore not surprising that the minimal and developing levels of knowledge shown at the beginning of the session have reached a significantly proficient level in some frames – for instance, «Information has value», «Searching as strategic exploration», «Research as inquiry», and «Information creation as a process».

Of all the frames, «Authority is constructed and contextual» remains, however, the one with the lowest levels of understanding. Even though information professionals expressed a more balanced understanding of its importance at the end of the webinar, they still do not feel completely comfortable. They assume that knowing the authority of information and sources is important for their recognition and that it is a knowledge practice that students should develop – but they do not consider it the most significant. In this regard, trying to communicate the notion of authority in an unfamiliar knowledge area can be a frustrating experience, because it is time-consuming and requires a lot of searches just to become familiar with one or another aspect of the subject [33]. For these respondents, the most important is evaluating sources of information, searching for and locating information, and checking the credibility of information. It is surprising that they did not reflect a little on the fact that information authority is directly interconnected with information credibility and evaluation.

Regarding the dispositions and attitudes to be developed in students, it is interesting to note the concern to stimulate autonomy, critical thinking, curiosity, and reflective and conscious analysis of the students in training and in relation to the universe of information that surrounds them. The humility and flexibility shown in the information search process do not, however, seem to be significant for the information professionals surveyed. All these characteristics were directly associated with the need to discuss the theme of fake news and misinformation with students, as they consume and understand information as a given and immediate fact, interconnecting it with the Framework. And here the information professionals were divided and the answers reveal some caution - still present the difficulty of understanding the document and the lack of time needed to create the desired articulation. The materials created within the Project were considered again, showing a clear preference for the translation of the Framework and the slides disseminated in an open and reusable format. The suggestions they presented, especially those associated with practical activities such as workshops, games, and social media, seem to be preferred by the respondents; it is probably one of the most didactic, quickest, and most immediate ways to pass on the information and ensure its understanding. But neither the debates nor the need to integrate these contents in the curriculum of the Research Methodology discipline in an effective culture of collaboration with teachers was forgotten.

6 Conclusions

This study presents a project of practical and programmatic application of IL teaching developed in Portugal. It concludes that the Framework offers information professionals a model for reflection on training and learning strategies. Academic students were not forgotten; they have here a unique opportunity to also reflect on their learning.

As a guiding document, the introduction of the Framework in academic students' education allows for the renewal of the information literacy assessment program towards a new assessment model based on strategies and outcomes.

For future studies, it is considered important to follow up on this project and expand it in the context of creating a practice community to reflect and engage academic librarians and teachers on the importance of the Framework and its strategic role in the improvement of learning.

Finally, the ACRL Framework highlights information science as a discipline that integrates concepts that cut across all areas of knowledge, but also highlights the vulnerability of its greatest asset – information – and therefore presents learning and reflections for its strengthening.

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Credibility, Ethics, Challenges and New Paths



What Shapes Our Trust in Scientific Information? A Review of Factors Influencing Perceived Scientificness and Credibility

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Abstract. Science literacy is a crucial part of information literacy, enabling individuals to understand and critically evaluate scientific information and arguments. The COVID-19 pandemic has highlighted the need for science literacy skills to navigate the vast amount of information available, and to understand and engage with scientific issues that impact society. The perceived scientificness of information is closely related to its credibility, but something that appears scientific may not be accurate or true. Pseudoscience can be used to claim scientificness and credibility for something that is not scientific. This paper reviews the scientific literature on factors that can mislead individuals into thinking information is credible or scientific when it is not. By understanding these factors, individuals can become more discerning consumers of scientific information and better equipped to make informed decisions.

Keywords: Scientificness · pseudoscience · science literacy · credibility

1 Introduction

Information literacy is crucial in our digitalised society, where access to information is easier and more abundant than ever before. It empowers us to locate, evaluate, and effectively, as well as ethically, use information in private and professional contexts. Without information literacy, individuals may struggle to make informed decisions or, even worse, fall prey to misinformation.

Science literacy, which we consider a part of information literacy, refers to an individual's understanding of science and its methods, as well as their ability to critically evaluate scientific information and arguments [1]. Science literacy is an important aspect of being an informed citizen in a democratic society. It allows individuals to understand and engage with scientific issues that have an impact on their lives or even society as a whole [2]. This is especially essential during a pandemic, when misinformation can have serious consequences for public health and safety [3]. The COVID-19 pandemic is a prime example of the importance of science literacy for everyone. The ongoing pandemic has highlighted the need for individuals to be able to critically evaluate and understand scientific information, as well as navigate the vast amount of information

that is available on the internet and social media. The lack of science literacy skills can result in confusion [4], misinformation [5], and a lack of trust in scientific authorities and experts [6].

The concept of “scientificness” refers to the degree to which something is perceived as scientific or having characteristics of science [7]. Scientificness and credibility are closely linked. People who associate a high level of scientificness with, for example, a specific style of documents are likely to rate their credibility higher as well [8]. However, something that appears to be scientific does not necessarily have to be accurate or true. In fact, a scientific appearance might be used to “claim” the categories of scientificness and credibility for something that is not: This is called pseudoscience [9]. In this work, we focus on the perceived scientificness and credibility of scientific or pseudoscientific information. We conducted a literature review of scientific literature to summarise the various factors that can mislead individuals into thinking information is credible or scientific, even when it is not. More precisely, our goal is to map the existing literature reporting on empirical studies into factors that make information seem scientific. By understanding the various factors that can mislead us, we can then build greater resilience to mis-/disinformation and pseudoscience.

2 Methods

To identify the relevant literature for our review, we conducted a comprehensive search of the Web of Science, Scopus, and Dimensions databases. Our search was supplemented by utilising Google Scholar and also Open Knowledge Maps¹, Research Rabbit² and Elicit³. The final search queries are listed below:

Web of Science: (“perceive* scien*” OR scientificness OR (“scien* appea*”) AND credib*) in Topic, Title, Abstract

Scopus: (“perceive* scien*” OR scientificness OR (“scien* appea*”) AND credib*) in Title, Abstract, Keywords

Dimensions: “perceived scientificness”, “scientific appearance”, “scientificness” in Title, Abstract

Selected were all peer-reviewed research articles, book chapters, and conference proceedings relevant to our research question. To be included, research had to be empirical; opinion pieces were removed. Furthermore, studies had to be connected to science, scientists, science communication and/or the concept of scientificness. Finally, for us to be able to evaluate the research, sources had to be in English or German, the languages predominantly spoken by us. Search results were last updated in May 2023.

Following the iterative review of titles, abstracts and full texts, we were able to identify 19 articles that met our criteria. After evaluation, we collected findings on factors or elements that made texts or documents seem scientific and/or credible from all relevant articles, grouped them and listed them below (Table 1).

¹ <https://openknowledgemaps.org>

² <https://www.researchrabbit.ai/>

³ <https://elicit.org/>

3 Results

Table 1 gives an overview of the results of our literature review. Overall, we were able to identify 19 articles that matched our review criteria. We grouped the main findings by type of element reported to influence perceived scientificness and/or credibility.

Table 1. Elements that induce scientific perception from the literature

Findings	Source	Method(s)
<i>Graph, Diagrams</i>		
Texts with diagrams induce a strong scientific perception	[10]	Experiments with 134 participants
Diagrams are associated with science and therefore lend persuasion	[11]	Study with 56 college students
“[...] whereas graphs served as plausibility cues for participants with a relatively high amount of experience with scientific texts and graphs, the absence of graphs (or the presence of tables that replaced them) seemed to play a similar role for participants with a relatively low amount of experience.”	[12, p.862]	Experiment with 77 college students
<i>Pictures, Images, Photos</i>		
Texts with photos are less likely to be perceived as scientific, especially in comparison to texts with formulas, diagrams and tables	[10]	Experiment with 134 participants
“Participants who saw the articles with a picture rated the content more credible than those who read the version without a picture...”	[13, p.184]	Experiment with 102 participants
No significant difference between no image vs. fMRI images vs. sci-fi images vs. artistic images in popular science news articles on reasonability and persuasion	[14]	Experiments and surveys with 183 undergraduate students
Brain (fMRI) images in popular science articles increased the rating of scientific merit compared to no images, bar graphs or topographical maps	[15]	Experiments with undergraduate students (N = 156/128/108)
“The design of the text with illustrations led to more positive credibility assessments than the purely textual information without illustrations...”	[16, p.53]	Experiment with 126 college students
<i>Tables</i>		
Texts with tables induce a strong scientific perception	[10]	Experiments with 134 participants
<i>Formulas, Chemical Notations, Statistics</i>		
Texts with formulas induce a strong scientific perception	[10]	Experiments with 134 participants

(continued)

Table 1. (continued)

Findings	Source	Method(s)
“These results support the notion that elements that appear scientific—in this case a chemical notation—enhanced the persuasion of the message. This was robust and occurred regardless of whether people focused on a visual modality.”	[11, p.123]	Study with 57 participants recruited at a shopping mall
The use of incoherent formulas in an abstract has a positive impact on the assessment of scientific publications by people with degrees outside of mathematics, science and technology	[17]	Study with 200 American participants from Mturk ⁴
Statistical evidence was rated as more scientific and less personal than story evidence but neither was related to persuasiveness	[18]	Study with 100 undergraduate students
<i>Text-formatting</i>		
“The category of single-column texts received an ambivalent assessment: participants perceived such texts as intrinsically less scientific than double-column texts.”	[10, p.64]	Experiments with 134 participants
<i>Scientific Language (i.e., passive/cautious/complicated language, method descriptions, “plausibility shields”, “scientific discourse style”, “hedging”)</i>		
“Most respondents (22 of 29 (76%), in different degrees of detail and definition) pointed to the scientific method and the existence of clinical studies as the main criterion to distinguish science from pseudoscience”	[19, p.4]	Semi-structured interviews with 29 pharmacists
“We correctly predicted that hedging was overlooked by our participants, evidenced by small effects and no statistically significant change in scientificness, credibility, or belief.”	[8, p.12]	Study with 85 participants
“However, we found no significant effect of plausibility shields (...) and no significant interaction between plausibility and attribution shields in argument scientificness ratings”	[20, p.377]	Experiment with 78 German high school students
“[U]ndergraduates recognize genre-typical discourse features as indicators of scientificness. They did so when directly comparing texts of two different styles and when no direct comparison between FS [Factual Style] and SDS [Scientific Discourse Style] was introduced.”	[21, p.52]	Experiment with 67 college students

(continued)

⁴ <https://www.mturk.com/>

Table 1. (continued)

Findings	Source	Method(s)
Texts “written in SDS [Scientific Discourse Style] were judged to be more scientific and credible than the versions written in FS [Factual Style]”	[7, p.201]	Study with 67 college students
“SDS [Scientific Discourse Style] texts (...) were judged to be more credible than the FS [Factual Style] texts”	[7, p.203]	Study with 76 college students
“The analysis revealed that hedging influenced trustworthiness ratings for participants in the primary scientists condition (...) but not for those in the unaffiliated scientists condition”	[22, p.357]	Study with 601 college students
<i>Citations, References, “Attribution shields”</i>		
Adding references to pseudoscientific texts increased perceived scientificness and credibility	[8]	Study with 85 participants
“[R]atings of argument credibility and strength were significantly higher for arguments containing attribution shields”	[20, p.378]	Study with 78 high school students
“Results revealed that participants identified 39% of the manipulated text passages (...) as indicators of scientificness. Examination of the ratios for each feature separately showed that participants on average highlighted 71% of the citations”	[7, p.199]	Study with 67 college students
“[P]articipants identified 30% of the manipulated text passages (...) as indicators of scientificness. Inspection of the ratios for each feature separately revealed that participants on average highlighted 67% of the citations”	[7, p.203]	Study with 76 college students
<i>General Linguistic Style</i>		
Information in plain language summaries was rated to be more credible than ordinary scientific abstracts	[23]	One factor within-person experimental design with 166 university students
When an author posing as a scientist/lobbyist used extremely positive language in a forum post, they were perceived as less trustworthy	[24]	Study with 242 college students
“The findings regarding perceived information credibility revealed that whereas comprehensible information was regarded as more credible than incomprehensible information, controversiality had no impact on credibility evaluations.”	[25, p.379]	Study with 88 college students

(continued)

Table 1. (continued)

Findings	Source	Method(s)
<i>“Credentialed Names”, Titles, Affiliation</i>		
“Credentialed names also increased scientificness (...) and credibility (...) but this effect was less pronounced than for referencing.”	[8, p.12]	Study with 85 participants
“In contrast, the professional affiliation of the forum post author (whether they were a scientist or a lobbyist), affected neither their trustworthiness nor the credibility of their information.”	[24, p.6]	Study with 242 college students
<i>Topics, Content, Area of Research</i>		
“[P]articipants rated natural science topics as more scientific than behavioral science topics and natural science equipment as more scientific than behavioral science equipment.”	[26, p.1663]	Experiments with 73 college students

The literature shows various factors influencing the perception of scientificness and credibility. Texts with diagrams, graphs, and tables were perceived as more scientific and persuasive, as they serve as plausibility cues and are associated with science [10–12]. However, the impact of brain (fMRI) images in popular science articles is controversial [14, 15]. Pictures and illustrations in articles seem to contribute to increased credibility and received positive assessments [13, 16]. On the other hand, texts with photos were perceived as less scientific compared to texts with formulas, diagrams, and tables in another study [10]. However, there was no connection between text and photos in this case, highlighting the importance of visual content aligned with scientific contexts. The association with science can also be reinforced by the inclusion of formulas and chemical notations, which appear to enhance persuasiveness and create a strong perception of scientific content [10, 11, 17, 18].

In general, single-column texts were perceived as less scientific than double-column texts [10], which the authors of the study explained by existing habits. Formulas, diagrams, tables and the double-column format are common forms of presentation for most scientific publications. Furthermore, widespread use of templates is likely to help reinforce such habits. In addition to visual elements, scientific language can also play a significant role in shaping perceptions. The concept of hedging needs to be mentioned here. Hedging, in the science communication context, describes the practice of using cautious language, such as acknowledging limitations or uncertainties [27]. “Uncertainty is inherent to the nature of science and scientific knowledge” [28] and therefore, hedges serve as significant linguistic elements in evaluating the scientificness of sources [20]. This includes plausibility shields, which according to Thiebach et al. [20] failed to significantly influence scientificness ratings in their study. Zaboski & Therriault [8, p.12] predicted and confirmed that “hedging was overlooked by our participants, evidenced by small effects and no statistically significant change in scientificness, credibility, or belief”. Jensen [22] also stated that hedging exclusively influences the trustworthiness

rating of directly affiliated scientists and not scientists unaffiliated with the research. Citations and references, also called “attribution shields”, seem to play a crucial role in increasing the credibility and perceived scientificness of arguments [8]. Thiebach et al. [20] concluded that participants seemed to more likely believe in an argument, when the author reported the origin and Thomm & Bromme [7, p.199] registered that participants focused on citations when asked for text passages which they considered indicating the scientificness of a text. They can even provide pseudoscience with an increase in perceived scientificness and credibility [8].

Taking a broader perspective, the use of Scientific Discourse Style (SDS) was considered more scientific and credible compared to texts in Factual Style (FS) [7]. Participants recognized genre-typical discourse features as indicators of scientificness and attribute higher credibility to texts that adhere to the scientific method and, for example, cite clinical studies [19, 21]. Furthermore, the general linguistic style plays a crucial role in credibility perceptions. Extremely positive language in forum posts seems to decrease trustworthiness and credibility, leading to perceptions of manipulation, insincerity, and less benevolence [24]. In this case, it did not make a significant difference whether the researchers pretended to be scientists or lobbyists. Yet, credentialed names were found to increase the perception of scientificness and credibility [8]. This effect was, however, less pronounced than referencing. In a recent study, plain language summaries were perceived as more credible than traditional abstracts [23]. Indeed, the comprehensibility of information positively affected its credibility, while controversiality did not have a significant impact on credibility evaluations [25]. Lastly, the content of the research itself plays a role in shaping perceptions. Participants perceived natural science topics and equipment as more scientific compared to behavioural science topics [26].

4 Discussion

Information literacy and science literacy play a vital role in becoming discerning consumers of scientific information, allowing us to critically evaluate scientific content and make informed decisions, for example, regarding our health. However, it is important to acknowledge that individuals, even those with a background in science, may struggle to accurately judge the credibility of some types of science reporting – especially when lacking critical background knowledge regarding the subject which is being discussed. As Scharrer et al. [25, p.384] stated, it “seems remarkable that even individuals who by experience should to some degree be aware of the challenges involved in evaluating scientific knowledge are apparently prone to the ‘seductive’ effect of high comprehensibility and uncontroversiality of provided information, leading them to discount their epistemic limitations”. The perception of scientific content and credibility is shaped by various factors, including visual elements, citations/references, linguistic style, and the nature of the topic itself. Understanding these influences can help researchers, communicators, and educators present scientific information in a more effective and credible manner. At the same time, on the recipient side, understanding the influence visual and textual cues can have on our judgement of content is crucial to avoid falling for deliberate misinformation – also called disinformation. Therefore, we conducted a literature review summarising the various factors influencing the perception of scientificness and credibility.

4.1 The Researchers' Responsibility

The way scientific information is presented also falls under the responsibility of us researchers. The use of specific elements to create credible content could “help the general public focus on the most credible scientific information, rather than the wealth of disinformation” [29]. However, the effectiveness of these elements may vary depending on the topic and the environment in which they are to be used [21]. Considering the interplay between the different aforementioned elements, researchers must explore how they can and should collectively shape the persuasiveness of science communication. This calls for responsible, accurate and effective communication of scientific research – not only to advocate for transparency but even to potentially combat miscommunication and misinformation. This includes providing clear references and citations, avoiding oversimplification that could lead to misinterpretation, and presenting uncertainties and limitations associated with research. Furthermore, transparent science communication builds credibility and helps the public make informed decisions based on reliable scientific evidence.

4.2 Ethical Implications and Considerations

The ethical issues surrounding the use of visual and textual elements to create a sense of scientificness and scientific credibility in non-scientific materials are a matter of concern. This challenge was observed during the COVID-19 pandemic and is expected to grow even more significant in the future. Tal & Wansink [11, p.124] caution: “Companies may create a scientific façade for claims that are not backed by solid scientific evidence, using even simple means such as graphs or formulas”. They recommend that as consumers of supposedly scientific information we “may wish to consider what the actual basis of claims is, and ignore spurious ‘cues to a scientific basis’ that do not in fact bolster the evidential basis of claims” [11, p.124].

Research suggests that when scientific findings are simplified, the perceived credibility increases [25]. However, while this makes science more accessible, it could be vulnerable to misuse, when doubtful information is labelled as “scientific” for the general public [23]. On the other hand, the mere presence of scientific jargon does not automatically enhance the perceived scientificness or credibility of the information. It is, therefore, essential to strike a balance between accessibility and accuracy. In addition to that, although the simplification of the communication of scientific findings can help laypeople engage, it may also lead them to overestimate their decision-making abilities and avoid consulting experts when necessary [25].

The questions of the writer’s responsibility and the potential manipulation of readers might pose an ethical dilemma: “[T]his possibility [of writing a text so that the readers stand open to the possibility of developing more positive attitudes about it] raises the ethical issue of if and when a writer should or should not try to change negative attitudes in readers” [27].

4.3 Limitations

While the reviewed studies shed light on the factors influencing the perception of scientificness and credibility, it is important to acknowledge their limitations. The majority

of the reviewed studies focused on specific domains or targeted specialised audiences, limiting the generalizability of their findings. For example, Gruber & Dickerson [14, p.944] also mentioned that their and many other studies did not ensure whether their participants “are equipped with the knowledge necessary to accurately judge the credibility of science reporting. In other words, if the study participants did not spot the error in reasoning, they may have had no reason to doubt the credibility of the article since they have little to no background in the subject”.

Furthermore, contradictory findings within the literature underscore how complex the concept of credibility and trust in scientific information is. Throughout our review, we have encountered some contrasting results from various studies (see Sect. 3). These emphasise the need for careful consideration. Consequently, by embracing the contradictions and complexities within the literature, we can navigate the challenges of credibility and trust in scientific information more effectively and make informed decisions in both research and practical applications.

Future studies could investigate the interplay between different elements in more detail and assess their impact on specific scientific topics and target audiences. Additionally, exploring the ethical implications further and developing guidelines for responsible science communication practices could provide valuable insights into ensuring the dissemination of accurate and trustworthy scientific information.

4.4 Conclusion and Outlook

In conclusion, understanding the factors that influence the perception of scientificness and credibility is crucial for effective science communication. Visual and textual elements, along with information and science literacy, play significant roles in shaping the perception of scientific information. Thomm and Bromme [7, p.209] propose a nuanced viewpoint. While lay people may perceive scientific information as more credible, they may not necessarily adopt experts’ perspectives, theories or adhere to scientists’ recommendations: “A rather differentiated perspective on the normative ideal is suggested: Laypeople may indeed consider information that is generally regarded as scientific to be more credible, but they will not necessarily share experts’ views or theories or follow the suggestions made by scientists. Laypeople may be aware that they have only a coarse understanding of why science “guarantees” truth and therefore be reluctant to include the features of scientificness in their processing of new information found in texts”.

Researchers have a responsibility to communicate scientific findings accurately and transparently, considering the potential ethical implications of their communication strategies. By enhancing information and science literacy and promoting responsible communication practices, we can foster trust in scientific information and empower individuals to make informed decisions based on reliable evidence. Citizen science, as a way to increase science literacy among citizens [30], could also play a role in enhancing information and science literacy. By actively involving citizens in scientific research projects, citizen science provides an opportunity for individuals to engage with the scientific research process first-hand. Tools, such as the scientific reasoning scale, can help us assess scientific sources in everyday life [31]. Løvlie et al. report on developing and testing a tool to assist users in assessing scientific sources online [32].

Enhancing trust in scientific information requires collective efforts from researchers, communicators, educators, and the public. Improving information and science literacy is fundamental to empower individuals to critically evaluate scientific claims and separate credible information from misinformation or pseudoscience. By enhancing information literacy skills, individuals can develop a deeper understanding of how science works, the limitations of scientific research, and the importance of peer-reviewed studies. Science literacy programs in schools and continued education for the public can contribute to nurturing a scientifically literate society that is less susceptible to misleading information. While improving information and science literacy is crucial, it is equally important for individuals to be aware of their susceptibility to deception. People should acknowledge the ease with which they can be misled, especially in an era of vast amounts of information and rapidly evolving media. Moving forward, it is important to continue exploring the evolving landscape of science communication in the digital age. Understanding the factors that influence our perception of scientific content and credibility is one crucial step in combating scientific dis- and misinformation. Further research is needed to explore the nuanced effects of different elements and to ensure the responsible communication of scientific knowledge: “As researchers, then, it is necessary to further explore the question of persuasive presentations and to help insure [sic] that scientific research is responsibly, accurately, and effectively communicated” [14, p.946]. Researchers, communicators, and educators should collaborate to develop guidelines and best practices for responsible science communication. By doing so, we can cultivate a society that values and understands science, making informed decisions that benefit individuals and society as a whole.

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Information Literacy as an Ethical Experience

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Abstract. The purpose is to present ethical challenges of information literacy and introduce the concept of ethical information literacy as an ethical experience. We ask the question: Which ethical components are decisive for ethical information literacy based on information experience? We apply content analyses of selected models of information literacy and information experience and results of a Delphi study on information ethics based on a consensus of 19 Slovak and Czech experts (a survey) and 6 experts (an online discussion.) Results are visualized in conceptual models of ethical issues of digital information. The final model of ethical information literacy experience represents ethical factors of ethical sensitivity, moral imagination, social and intercultural contexts and rules, tensions between people and technologies, values of truth and utility. We recommend inclusion of the ethical components into new models of ethical information literacy experience and apply them in further research and design of value-sensitive digital services.

Keywords: Ethical information literacy · information experience · a Delphi study · ethical sensitivity · value-sensitive design

1 Introduction

Information literacy as a practice is often driven by metacognitive features which are embedded in human information experience. Information ethics research can enrich our understanding of information literacy experience and help discover new dimensions of information literacy education. The purpose of this paper is to explore main ethical challenges of information literacy as a human ethical experience with regard to digital environment. We ask the main research question: Which ethical components are decisive for a new conceptual interpretation of information literacy as an ethical information experience? We apply methodology of inclusion of the analyzed information ethics studies into the concept of information literacy experience. We use the data from a Delphi study on information ethics in Slovakia and the Czech Republic, discourse analysis and concept modeling.

2 Related Research: Information Experience, Information Literacy Practices and Information Ethics

2.1 Information Experience

The concept of information experience has been developed in the framework of information literacy studies based mainly on phenomenography, phenomenology and qualitative approaches to information literacy and information behavior research [1–3]. The main idea of information experience is based on experiencing the information world (both as objective and subjective mental representations, but understood in different ways by different people). Information experience means engagement of people with information and is driven by ubiquitous human information interactions [4], sense-making and socio-cultural contexts of information [5]. The anatomy of human experience includes the structural and referential aspects and the experience is dependent on person's awareness / consciousness. The referential aspect represents the meaning of the experience and the structural aspect is composed of the internal (focus) and external horizon (background) [6]. Phenomenography points to diversity of experience represented by different categories, stories, perspectives, emotions, values, attitudes. The concept of information experience is closely connected to information literacy practices and human information behavior. Recently, information experience has gained wider attention in relation to digital information, and to epistemic, aesthetic and emotional values of information [7] focused on truth, understanding and practice. Crisis of information in digital environment and responsibility are studied in contexts of information experiences as sources of values [8, 9].

2.2 Information Literacy Practices

Information literacy practices are based mainly on information experience of different communities related to skills, abilities, attitudes and metacognitive self-regulation. In this context, we can apply the definition by Taylor and Jaeger [10, p. 29]: "Information literacy is a constantly refined practice of processing, accessing, understanding, critical evaluation, and using information in ways relevant to one's life." The conceptualization of information literacy practices with regard to ethical issues in digital environment is driven by several concepts and contexts. When we explore the practice of critical information literacy [11, 12], we can see that it is set into the contexts of information behavior, everyday life and information literacy landscapes [13]. Another context is represented by multiliteracies, such as digital literacy, media literacy, academic literacy, health literacy, data and scientific literacy, or civic literacy. In these contexts, we need to take into the account sociocultural and socio-cognitive background of information literacy related to digital information. It is manifested by participation in (digital) communities, holistic personal experience with information as part of shaping information landscapes, and information mapping for acquisition of accurate information, online searching, cognitive growth and information use. Latest research based on discourse analysis points to two main interconnected categories of information literacy applied to higher education, namely mapping and applying which are part of information practices [14]. In these

categories, the ethical components can become parts of conceptualization of information literacy practices. Another conceptual source can be represented by a theory of practice architecture based on dialogue and information culture. It can help form a significant framework for enrichment of digital information places and spaces by ethical categories. Another conceptual source of ethical perspective of information literacy is involved in the model and practice of metaliteracy [15], as it introduced an important metacognitive component related to participation and sharing of information. The metaliteracy model explained clearly the ethical background of information literacy with respect to self-regulation and understanding, cognitive or algorithmic bias. In reality, the information literacy practice is not static, it is evolutionary and continually cultivated, even in the context of understanding and navigating with algorithms. That is why the social contexts of information literacy and information ethics can be regarded as most significant factors, represented by ethical rules, values of information and intercultural diversity. Following this, lifelong information literacy needs to be developed in contexts of trust and responsibility, risks and benefits of social and technological co-evolution. Further information literacy practice conceptual frameworks have dealt with the issues of mis/disinformation in a new situation of digital spaces and societal challenges. Fake news represents a broader concept which includes disinformation (deliberate creation and sharing of false information) and misinformation (unintentional, inadvertent sharing of false information). Recent review studies have revealed special categorizations of fake news and mis/disinformation [16], represented by satire and parody, misleading content, false context, manipulated and fabricated content, advertising, propaganda and others. Information literacy and alternative literacies, especially critical thinking and metaliteracy, are considered to be main tools for combating mis/disinformation and fake news. An important role is played by academic and other libraries, which offer special courses (e.g. Indiana University's checklist tool "LibGuide", campaigns and infographics by ALA or IFLA) [17]. Use of these tools is recommended in order to strengthen trust in libraries, revise values of library services, reframe information literacy and collaboration in digital environments.

2.3 Information Ethics in Contexts of Information Behavior and Information Literacy

Information ethics can be regarded as a multidisciplinary discipline and practice focused on managing information use with respect to accuracy of information, property, access, privacy and personal data, online communication and information sharing. A number of source theories apply philosophical principles of virtue ethics, rules and duties, consequences, social emotions, sympathy, care and respect as ethical frameworks. Two main conceptual approaches to information ethics are dominant in information science. They are represented by works by Capurro [18] and Floridi [19]. Capurro pointed to ethics of online communication and changing concepts of trust and responsibility, values and virtues, including intercultural differences. Floridi introduced his R-P-T model as part of ethics of information, (ethics of resources, products and ethics as target) in macroethical and microethical contexts and in the concepts of digital life (on-life) and the infosphere. The question is, if research on information ethics can inform communities which explore human information behavior and information literacy. Several models of information

behavior have been enriched by discernment of truth and dis/misinformation [20, 21]. The authors have proved that information is intuitively categorized into true information, dis/misinformation or fake news and that this process depends on contexts, especially social and cultural rules, causal factors, communities and tasks. The processes of social perception and social diffusion of information represent the significant ethical factors, as well as psychological issues of ethical awareness, information discernment, moral imagination, emotions, values of information and metacognition. Deeper integration of ethical factors with models of information behavior, information interactions and information literacy could help better understand the complexity of information experience in ethical contexts. Phenomenographic studies have shed new light on this complexity [22].

Several models of information literacy have included deeper understanding of ethical components into their frameworks or concepts. As an example, we can mention the concept of moral literacy [23]. This concept presents the model of components of moral literacy, based on ethics sensitivity, ethical reasoning skills and moral imagination. The components of moral literacy include identification of moral issues, determination of values, assessment of moral intensity, assessment of facts, consideration of consequences, identification of relevant virtues, ascertainment of relevant duties, consideration of issues of care, use of moral imagination. It is argued that moral literacy has been undervalued in education. Forster [24] emphasized the ethical intuitive part of information literacy in workplaces; other authors explained motivated reasoning [25] or information discernment [26] and inoculation [27]. A significant contribution introduced the concept of value-sensitive design of information systems with the use of moral imagination [28]. However, there is still a gap in studies of intersections of information ethics, human information behavior, and information literacy. That is why we have designed a study on information ethics in a digital environment with the use of a Delphi study.

3 A Delphi Study: Selected Conceptual Models

Our study focused on the main research question: Which ethical factors are decisive for consideration of information literacy as a human ethical information experience? Additional questions followed perceptions of main ethical issues of digital information and visions of future development of information ethics. The Delphi study was divided into three rounds, including a pilot study (4 experts, December 2021), an online survey (19 experts, January – May 2022), and an online discussion (6 experts, September 2022). The experts came from the Slovak and Czech Republics from academic disciplines of information science, informatics, psychology, philosophy, management, journalism, marketing, political science, social informatics, but also from academic libraries and IT companies. The data was analysed with the use of qualitative analyses, discourse analysis and conceptual modelling. A series of conceptual models represented the results of the analyses. Limitations of the study, such as subjectivity of interpretations or self-selection of experts, were balanced by independent analyses of two researchers in each round of the study and reviews by selected participants.

The design of the main round of the Delphi study included the following three questions: 1. Which three ethical issues do you regard as most significant with regard to

the development of information ethics in digital environment and why? 2. Which three ethical dilemmas with regard to the use of artificial intelligence (AI) do you find as most significant (state your reasons for your opinion), 3. Which three values of information do you regard as critical for ethical use of digital information and why?

Results of the study confirmed the consensus of experts with regard to the three questions. The main ethical issues were identified as issues of privacy and personal data, benefits and risks of advanced technologies (AI), and issues of truth and accuracy of information (dis/misinformation) (Fig. 1). Main ethical dilemmas were represented by the impact of intelligent technologies on human life and information interactions, value tensions and bias of algorithms, and social control and human management. The main values of information in contexts of information ethics were identified, such as utility, truth, and objectivity / credibility (Fig. 2). Details of data analyses and findings and models were interpreted in previous publications and an internal data repository. As examples of the analyses, the resulting visualizations of the conceptual models are presented in Figs. 1 and 2.

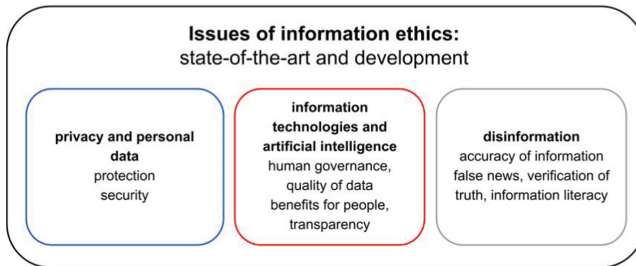


Fig. 1. Main ethical issues of digital information

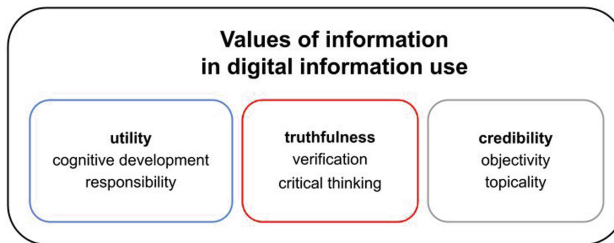


Fig. 2. Values of information in digital environment

As part of an online discussion, the experts have identified the current situation as a crisis of ethics and information in society. Main concerns are represented by ethical issues of artificial intelligence, risks, conflicts, biases of digital information use. Commercial concerns were also considered. Experts proposed education of software designers and top managers and information ethics courses at all levels of education, including business. As examples, they mentioned cognitive and algorithmic biases, protection of privacy, accountability and responsibility of autonomous systems, issues of dis/misinformation.

Experts called for more collaboration among academic disciplines, different professions and stakeholders. The vision is represented by closer collaboration of people and AI tools.

4 The Concept of Ethical Information Literacy Experience

Based on results of our Delphi study and the background knowledge of theories, frameworks and models of information literacy and human information behavior which integrated ethical aspects of information use, sharing and production, we have introduced the concept of ethical information literacy experience. It is based on a resulting general conceptual model of ethical factors of information interactions, but also on the concepts of information experience and metacognitive, self-regulation involved in metaliteracy. Ethical information literacy experience means integrated levels of information use, sharing and production composed of four components; namely ethical awareness and ethical sensitivity; ethical imagination and ethical intuitions, including emotions; ethical reasoning, decision-making and problem solving; and ethical self-regulation, metacognition and metaliteracy. The concept of ethical information literacy experience covers both affective, cognitive, intuitive and self-regulatory frameworks of information ethics embedded in information literacy and information behavior. The concept applies both explicit and tacit issues (social rules, duties, consequences, social emotions, ethical sensitivity, sympathy, respect and self-regulation) which drive information literacy practices and information behavior. The ethical information literacy experience builds on an individual's cognitive and affective states (personality), and considers cognitive and affective biases, influence of patterns of behavior, social perception and social diffusion of information in digital spaces. It is also based on differences of personalities and communities in relation to their information experience. The information discernment is then related to knowledge states, social and intercultural contexts and rules, co-evolution of social and technological parts and categorization of information using values of truth and utility (true information, dis/misinformation, fake news).

4.1 A Final Conceptual Model of Ethical Factors of Information Literacy

The intersubjective ethical and social factors of information literacy related to the digital information environment have been visualized in a final conceptual model of ethical factors of information literacy as an experience (Fig. 3). The model considers not only the results of the study, but also prior analyses, several synthesizing concept models and the concept of the ethical information literacy experience. The model represents both the social and individual ethical features of information literacy experience. It is a relational model, as informed by phenomenographic studies of information literacy. The structural and referential components of the information literacy experience are expressed in the components of metaliteracy, social contexts and values of information (referential components), while activating social and ethical sensitivity, ethical reasoning and ethical intuitions, ethical imagination, manifested by social perception and social diffusion of information with the use of assessment of main values of information represented by truth and utility (structural components). The components are interconnected and represent the ethical factors of information literacy as an experience. The main processes

of the ethical information literacy experience can be divided into the stage of orientation (mapping) and the stage of production (analysis, applying). The model can help in understanding the ethical information literacy practices. The identified ethical factors are synthesized in three strata. The ethical factors are hidden in the tacit knowledge, emotions, intuitions, imagination and the model represents their explicit conceptualization. It can bridge the gap in connections among information ethics research, information behavior and information literacy studies in a multidisciplinary perspective. The model presents the confirmed ethical factors of information experience based on results of our Delphi study, but it is based also on our prior theoretical analyses and several synthesized conceptual models. It can be applied to the integrative levels of information use, sharing and production in a digital environment. The model can be used for further ethical studies related to information behavior and information literacy based on information experience.

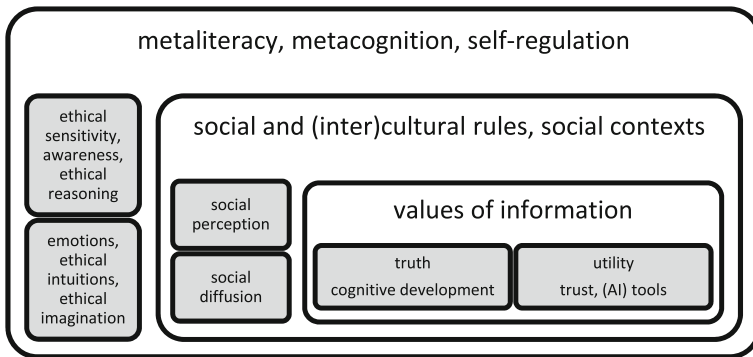


Fig. 3. The ethical factors of information literacy as an experience

5 Value-Sensitive Design of Information Literacy Courses

Value-sensitive design represents an innovative methodology for inclusion of values of information and values of different stakeholders into the design of information systems and services [29]. The authors have proven the practical potential of improving the design of systems by incorporating moral imagination and ecological approach, while considering the intersection of stakeholders, values, technologies and tools. While the concept represents a series of special methods, such as value-analyses, value-source analysis, model for informed consent online, multi-lifespan co-design, it also presents a special visual language and considers ecological, environmental and holistic perspectives.

Information literacy as an ethical experience is characterized by holistic, ecological features, metacognitive principles and social contexts. It is driven by ethical sensitivity, ethical imagination and values of information. These are the reasons why ethical re-design needs a value-sensitive approach in practice. In the digital environment, especially in social networks, the ethical information literacy experience should consider social

perception of information in communities, which can have an impact on categorization of true or untrue information (evaluation of information). It is also related to social diffusion of information which can have an immediate impact on large numbers of people. That is why we propose designing information literacy education and courses enriched with the components of ethical information literacy experience and value-sensitive design. This could help develop academic courses on dis/misinformation as part of academic and research integrity. Students in an academic environment should know how to analyse values of different stakeholders (teachers, students, managers, researchers) and how to integrate technological tools, including AI tools, into information use, sharing and production in relation to truth, cognitive development and utility as main values of information. Courses on discernment of dis/misinformation, fake news and verification of information can help students and academic workers improve their efficiency and quality in information use, sharing and production.

We also propose designing value-sensitive services of academic libraries, including development of special digital places and spaces, tutorials, portals, campaigns (advocacy) and other educational materials for support of ethical information literacy experience of students and other academic stakeholders. From the perspective of the future development of information ethics, the value-sensitive design of academic courses and services of academic libraries could focus on the topics of ethics of AI, algorithmic bias, but also the issues of digital publishing, data ethics, data literacy and accountability of autonomous systems.

6 Conclusions

We have explored significant ethical factors of information literacy and human information behavior based on analyzed theories and models and on the results of a Delphi study on information ethics. Although information literacy has been studied in library and information science for almost 50 years, there are still topics which deserve more attention, namely the ethical dimension of information literacy. We have found that the connections among information ethics, studies of human information behavior and information literacy have been neglected. We have also found that the inclusion of ethical considerations into models of information literacy and information behavior could enrich our understanding of information use and production. We have proposed re-framing information literacy practices research within the concept of ethical information literacy experience. The starting point can be represented by the proposed model of ethical factors of information literacy as an experience as part of the engagement of people with information in digital environment. For practice, we have proposed applying the value-sensitive design to information literacy courses, especially in academic libraries and digital services. Based on the results of our study we can suggest that the information literacy courses should pay more attention to information ethics, especially social and intercultural contexts (rules), values of information (truth, utility), and ethics of AI tools. Our experts emphasized the education of top managers and designers of AI tools with regard to information ethics. The decisive components of ethical information literacy experience were identified, namely ethical sensitivity and ethical awareness, moral imagination, respect and sympathy, and social and intercultural rules, duties and contexts

of ethical information use and production. We have also proved that the societal need for multidisciplinary research and collaboration of professions in the information ethics field will continue to evolve.

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To Find the “Rotten Apple” – Information Ethical Requirements for the Information Literacy of Autonomous Writing Engines

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Abstract. Since the availability of ChatGPT, there has been a heated debate about what conclusions should be drawn from this automated text generation. This paper: There is an ethical claim that the authors vouch for the quality of their sources. The realization of this claim is tied to explicit competence, in this case, information literacy. However, when using autonomous writing programs, this competence is shared: The user leaves the source responsibility to the AI. This delegation can only succeed when the machine itself has information competence. This point has ethical implications for the use and development of such technology. If the adage “one bad apple spoils the whole barrel” is true, then the ability to distinguish good apples from bad is a core information literacy skill. This paper discusses what information ethics requirements must be placed on the programming and use of autonomous writing programs.

Keywords: ChatGPT · information ethics · information literacy · autonomous writing engine · library

1 Introduction

Since the availability of the chatbot ChatGPT in 2022, there has been a heated debate, especially in subject didactics and media pedagogy, about what conclusions should be drawn when students have assignments completed via the chatbot [1]. Concerns have been and continue to be raised from a more general perspective, most notably, the question of normative, ethically-based requirements for the development and use of artificial intelligence (AI)-based chatbots such as ChatGPT. These demands are often very general and unspecific. As examples, we briefly characterize just four of the more recent contributions published in 2023.

All four contributions suggest in common that the development and deployment of AI speech processing models such as ChatGPT raise important ethical and social considerations. Mattas [2] highlighted the potential benefits of ChatGPT but also emphasized the need for ethical considerations and principles for ChatGPT development and deployment. Zhuo and colleagues [3] conducted a diagnostic analysis of ChatGPT and concluded that existing benchmarks of autonomously acting chatbots could not address

a significant number of ethical risks. Lund and Wang [4] discussed the potential impact of ChatGPT on higher education and libraries, including the chatbot's ability to enhance search and discovery, reference and information services, cataloging and metadata creation, and content creation. They also emphasized the importance of using this technology responsibly and ethically. Krügel and colleagues [5] examined the moral authority of ChatGPT and concluded that the chatbot was highly inconsistent as a moral advisor but still influenced the moral judgment of users. Overall, the papers suggested that there were essential information ethics requirements for AI speech processing models such as ChatGPT, including transparency, accountability, and responsible use. To whom are these demands addressed, and how can they be justified?

The contributions above are symptomatic of the professional thematization of information ethics issues in general. Ethical perspectives are often specific only to particular disciplines, and ethical considerations often remain confined to narrow areas of the application without considering global ethical issues [6]. Concerning ChatGPT, which tends to be a strong AI, the discussion seems too narrow in at least three points:

- The considerations are individualistic, in other words, concerned with the morality of action of individual human actors who developed ChatGPT or use ChatGPT, for example, in education or the media.
- This point implies that the authors assume only an instrumental character of bots, in other words, they consider only the current state of development and do not address the personal autonomy of a future strong AI.
- The specific effects of autonomous text production by chatbots like ChatGPT are not explicitly addressed.

Thus, we are dealing with an anthropologically and individual-ethically narrow approach and a neglect of the systemic consequences for the entire digital knowledge and text space. This point must be all the more irritating because the institutional guardians of this knowledge and text space, the libraries and the educational institutions, are still given little consideration. Instead, Lund and Wang [4] let the bot ChatGPT itself take a stand on the consequences of the use of ChatGPT on libraries and universities without taking into account that ChatGPT also “hallucinates” in its responses [7].

2 ChatGPT as an AI

Hintze [8] describes the various development stages currently realized or prospectively imaginable in AI in four types.

- Type 1, already in use, can be described as an AI technology with purely reactive properties that perceives situations directly and acts exclusively according to the information it receives. These AIs are specialized in quite limited fields, for example, in chess. They cannot change this orientation and “have no concept of the wider world” and “are easily fooled” [8].
- Type 2 AI has only limited memory; it considers information from the past and adds it to programmed representations of the world. Examples include self-driving cars, chatbots, and other simple social robots. They, too, do not possess or develop their concept of the world, instead sorting information into predetermined categories.

- Type 3, AI technology with a “theory of mind” [8], interprets thoughts and emotions that influence human behavior. Most experts interviewed in the Münchner Kreis study [9] forecasted the spread of this type after 2025. They are not only based on preconceived representations of the world but should be able to respond communicatively to the thoughts and feelings of their action partners, people and animals.
- Finally, type 4 develops self-awareness, is aware of its inner states, and can predict the feelings of others. In 2020, 53% of those surveyed saw this type as unlikely, while 11% believed it would be widely used before the middle of this century [9, p.29].

ChatGPT represents an intermediate form of types 2 and 3. Undoubtedly, ChatGPT is not yet an AI with a “theory of mind,” but in the text representation, the bot can address thoughts and emotions and show them. Moreover, the discussion on whether ChatGPT or AI, in general, only “imitate” human characteristics in their performance instead of possessing these characteristics themselves is epistemologically irrelevant. Even when interpreting human performances, we are dependent on the assumption that the similarity of this external perceptibility in other humans would allow us to infer properties that we precisely cannot empirically capture but which we transfer to other humans from self-observation. Thus, the juxtaposition of AI versus humans is a sign of subliminal speciesism rather than a robust criterion for evaluating AI as type 4. Therefore, it is necessary to de-anthropologize complex AI, such as that represented by autonomous text-creation machines.

A classical method to test the competence of a machine in terms of its human likeness is the so-called Turing Test, according to Alan Turing [10]. As a reminder, in short, it was about whether a machine could communicate with a human in such a way that a human would no longer be able to decide whether he was communicating with a human or a machine. In Turing’s idea, the human and the machine communicate in machine-written form. The bottom line of this test is that we have a differentiation problem: If the apparent species characteristics remain hidden from us— then the questioner must infer from the answers whether the answerer is a human (a man or a woman) or a machine. Turing calls this thought experiment the “Imitation Game” [10, p.433]. The machine imitates the expected answers of humans.

The game aims to answer the question, “Can machines think?” [10, p.433]. The setting makes it clear that the human being can only answer this question by an analogy. If the answers of the machine correspond in form and expected content to what we have already experienced from our everyday experience with humans, then we apply the analogy that we always make when dealing with humans to the machine. Precisely, because we only perceive the external when dealing with humans, we rely on the analogy that humans also possess our internal competencies, for example, the ability to think.

Thus, Turing gave us an early example of how we apply anthropological assumptions about communication partners. The point of the Turing test is that it does not prove the communication partner’s membership in the human species and, thus, as a person. Instead, the Turing test shows that the classical Cartesian analogical conclusion from the perception of one’s own unity experience of body and mind to the body-mind unity of an alien psyche disables the distinction of human from non-human communication partners. We can no longer justifiably reject the machine’s claim to be human. Let us take the performance of ChatGPT, which has steadily increased since the first attempts, as such

a communication performance. The complexity of the bot compares well with human communication skills and, thus, communication competencies. This aspect extends the question of communication ethics for AIs. Not only developers and users should then fulfill the normative, moral expectations for the behavior of bots. Moreover, from a pragmatic point of view, it already makes sense today to consider AIs like ChatGPT not solely as software but as “pretty good people” [11]. In addition, we need to discuss in public discourse which ethical principles the machine should observe on its own. Even if, for example, ChatGPT does not yet represent a truly morally capable AI, we will have to prepare for such AIs to emerge in the medium and short term. These AIs will not only be objects of moral action, but we will have to consider them as subjects themselves. At the same time, this perspective will lead us back to the fundamental philosophical question of what constitutes a human being beyond the purely biological membership of our species:

“This means that thinking of AI as people requires us to grapple with what we view as uniquely human. We need to decide what tasks we are willing to delegate with oversight, what we want to automate completely, and what tasks we should preserve for humans alone”. [11]

3 Moral Expectations for AI

Thus, if we understand AIs such as a more advanced ChatGPT or similar autonomous text generators as communication subjects, we need to set out what normative principles they should follow and what competencies they must possess to realize those ethical principles. The current discussion has not yet recognized AI as a subject. Nor is an AI the object of the normative principles that developers program into it and that users consider using it.

Jobin and colleagues [12] conducted a large-scale literature review “of the existing corpus of guidelines on ethical AI” [12, p.3] to provide an internationally representative review. More than half of the 84 guidelines they reviewed were from corporate, governmental, supra-national, academic, or non-profit institutions. Several immediately apparent principles were named: “transparency, justice and fairness, non-maleficence, responsibility, privacy, beneficence, freedom and autonomy, trust, dignity, sustainability, and solidarity” [12, p.6]. However, these are demands directed exclusively at humans. AI itself does not emerge as an actor. The same is true in the analysis of Felzmann and colleagues [13], who include “Developer,” “User,” “Society broadly,” “Expert/Regulator,” and “Deployer” as actors targeted by transparency expectations.

Only some authors venture to discuss whether AIs need to be seen as moral subjects that not only realize ethically justifiable principles over human actors but pursue normative principles and competencies in their own right. An example is Simon Courtenage’s contribution from 2023 [14], but he still argues very defensively. One must agree with his consideration that the assignment of moral responsibility must be tied to the freedom to decide. To put it briefly: Moral responsibility presupposes free will.

3.1 AI as a Moral Subject

As noted above, the claim that ChatGPT or any other AI would have to prove that it qualifies as a type 4 AI, according to Hintze [8], is the result of an anthropological speciesism that we cannot catch up with already in terms of our assessment of other people as free, person, or dignitary. We conclude from the shown behavior of a human being to an analogous psychological or mental structure as we experience it for ourselves. This analogical inference thus relativizes the epistemic reliability of our assessment of a person as a moral subject. Thus, uncertainty about the subject status of an AI becomes the usual case: the question is what performance an AI would have to offer to steer our assessment in this direction of granting it a moral and mental subject status.

3.2 Performance of AI

For creating a text, communication ethics formulate some requirements for potential, also artificial communicators. Jürgen Habermas [15, p.99], [16, p.439] has distinguished four validity claims that every communication presupposes. In the following, we will refer to three of them:

- “truth” (“Wahrheit”),
- “sincerity” or better “truthfulness” (“Wahrhaftigkeit”),
- and normative “rightness” (“Richtigkeit”).

We presuppose these validity claims in our communicative utterances and the communicative utterances of others in such a way that we assume that the communicative partner is competent to realize these claims.

We have to differentiate that these claims depend in different ways on the competence of the communicators. Truth is a claim that an utterance, such as a journalistic or scientific text, can make but does not automatically follow from the utterance. The act of communication may be intended to be true and yet be false, for example, if it rests on an error. Consider the scenario that the communication is intentionally false, for example, in the case of disinformation. In that case, it is not the falsity of the text that is to be regarded as the moral fault of the communicator in terms of communication ethics but insincerity. Philosophically speaking, truth is an ontological demand on the text, whereas sincerity is the moral demand on the communicator [17]. Thus, the communicative action of the communicator cannot be true but only truthful. This does not remove truth from the communicator’s responsibility. Rather, this truth requires a specific performance on the part of the communicator.

The author’s and the source’s truthfulness and accuracy are information ethics requirements. There is a demand on the author or originator of a communication offer to vouch for the quality of his communication, its truth, and truthfulness. This means, above all, to guarantee the truth of his sources. Realizing this claim requires explicit competence, in this case, it requires information literacy. Information literacy is part of broader media literacy, that can be defined as the competence to use media in a successful, “good” way that realizes normative target values, namely truth and accuracy. What, then, does competence mean?

Competence is the ability to perform a specific literacy. This understanding of competence, now recognized worldwide, goes back to the German psychologist Franz E. Weinert [18]. Literacy is part of competence, which, in addition to this ability, also includes knowledge and, above all, a willingness to act, a free will [19, p.106–107]. Let us apply this understanding of literacy as a competence with the partial competences of ability, knowledge, and free will to the four types of AI according to Hintze [8] and the validity claims according to Habermas [15, 16].

- Type 1 includes, above all, the partial competence of ability. Its program is the technological and material realization of an assigned regularity. Type 1 is a pure program application that, since it cannot act other than according to the program, for example, in a chess game or a classical welding robot, always fulfills the normative rightness according to Habermas. Type 1 is necessary, but without any action of its own.
- Types 2 and 3 go beyond this ability on the basis of normative rightness. In addition to the ability, they also have knowledge in a certain respect. According to Hintze, AI type 2 at least have a “limited memory” [8] that allows external information to be taken into account, such as in the modern use of industrial robots. Type 3 can adjust to thoughts and emotions of humans and react to them in a differentiated way, it has a form of knowledge in the sense of a “theory of mind” [8]. Thus, provided that the programmed control system specifies truth as a property of text production, this AI is able to grasp and fulfill the expectation of humans as recipients of the text. The knowledge of type 2 and especially type 3 offer us in the observation of their performance already some clues in the sense of the Turing test.
- Type 4 goes beyond this. Type 4 is the AI we perceive as a moral subject and thus independently responsible. This AI is considered a person. It has free will, and it does so regardless of the regularity of its original program. Type 4 initially sets its normative orientation, that we have called sincerity or truthfulness with Habermas. Sincerity is not an ability or a knowledge but an explicit attitude based on free will.

This last aspect is of particular importance to us because it is not directly accessible to us, the preferences of a communicator can only be inferred from his or her communication practice. This problem is as actual for humans as it is for an AI. In other words, since the action cannot be perceived without the performer’s performance, it requires the competent’s will to do it. This leaves us with the dilemma already described: We can only infer the subjectivity of a person, whether human or AI, and thus their ability to develop a will of their own, from the analogy that a particular performance resembles our own actions. In authentic communication, for example, writing a text, we assume that the author also wants to realize this competence volitionally. He is not an honest person because he wants to be, but because we judge the text as truthful, we assume sincerity on the author’s part. Information literacy, then, presupposes sincerity manifested in the truth of the text. In the use of autonomous writing programs, this literacy is shared: The user of these machines usually does not contribute his information literacy but leaves the source responsibility to the AI.

But suppose we accept AI in a comprehensive sense as a moral subject and a person with moral responsibility. Then its inner processes are only accessible to us via a conclusion by analogy from its performance, as is the case with humans. This differentiates information literacy, and we can relate the partial competences of information literacy

of an AI according to its type 1 to 4 to the information ethical requirements. Table 1 shows how we equate the types with the validity claims of communication according to Habermas.

Table 1. Matrix of information ethical requirements

Validity claims partial competences (AI types)	Truth	Sincerity/ Truthfulness	Normative rightness
Ability (type 1)			X
Knowledge (types 2 and 3)	X		
Free will (type 4)		X	

3.3 Information Literacy of AI – to Find the “Rotten Apple”

This delegation of information competence can only succeed when the machine itself has information competence. This aspect has information-ethical consequences for the use and development of such technology. Autonomous writing programs must be information-competent. This is because they not only have to find information for which they have been trained, for example, from the internet, in a meaningful and efficient way according to a given task or question. They then need to combine the information according to the given task or question. They must do so in a way that is acceptable regarding communication ethics, namely truly, accurately, and truthfully. In what follows, we want to tell a story demonstrating the consequences and limitations of open AI as a non-determined text generator.

Let us imagine that such machines as ChatGPT will be increasingly or even widely used in the future. Applications such as generating research reports or journalistic accounts are already a reality today [20]. From the perspective of information ethics, it is a fundamental deficit that this fact has not yet been made sufficiently transparent [21, 22]. The recipient of a text or other media offers has a right to be informed about the conditions under which these offers were created. This follows from the validity claim of sincerity. At the same time, we are missing the crucial opportunity to conduct an open public discussion about the acceptance of bot-based text and media production. Soon, most autonomous writing systems like ChatGPT will independently search for information online and process a wide variety of search queries. Since intentionally or accidentally incorrect, tendentious, or falsified sources can be found on the net, search should demonstrate successful information literacy to constantly check sources for their truthfulness and reliability.

More and more machine texts will be present on the net due to increasing digitalization. If the old adage “one rotten apple spoils the whole barrel” is true, then the ability to distinguish good apples from bad is a core information competence. If the increasingly used autonomous machines take over rotten apples and incorporate them into their texts,

not only will these texts become rotten and wrong, but the net itself will be infested with this rot.

We cannot control the quality of training texts. It will therefore be one of the decisive information-ethical requirements for the programming and development of such autonomous writing systems that they not only learn non-judgmental text models in their structure. Indeed, biases that follow from training are often unpredictable, even in well-intentioned programming. A well-known and striking example is the gender discrimination of a secretly deployed recruiting AI at the online mail order company Amazon. Amazon's previous male-dominated hiring policy was learned and adopted by the AI [23]. That this can also happen with chatbots is shown by the equally well-known case of the Microsoft Twitter bot Tay [24] that learned to produce racist statements simply by communicating with other Twitter users. Indeed, in the case of Tay, it must be taken into account that this bot could not think for itself [25]. Therefore, the moral responsibility lies solely with the programmers [26]. This is different with an AI of type 4 and, to a certain extent, already of type 3 [8]. The user of this AI delegates responsibility by relying on a supposed literacy that makes this AI a person and, thus, a moral subject through its performance.

4 Discussion

This paper discussed which information-ethical requirements must be placed on the design, programming, and use of autonomous writing programs so that they can be considered subjects with an independent moral consciousness. It turns out that our assessment of an AI is a question of performance. As with other humans, we cannot empirically grasp inner-psychic, mental, and thus also personal thought processes. We infer personhood from plausible action. This epistemic dilemma arises with an AI just as it does with other human beings. Accepting this dilemma, the limits of autonomous writing engines, their information literacy, and the consequences for our open digital horizon, the internet, were described as a narrative.

If, through the increasing use of autonomous text-producing AI, we delegate our personal information literacy to the AI, then we must demand in advance of the development and production of these AIs that they can make moral judgments independently concerning the communication-ethical validity claims truth, sincerity, and normative rightness demanded by Habermas [15, 16]. In other words, the AI must independently search for "rotten apples" from the totality of available training data and avoid them during text production because it is an ethical imperative. Only in this way can individual text production, insofar as an AI should do this creative performance, remain free of misinformation and disinformation. At the same time, this individual text quality is the basis for long-term protection of the entire internet because the spreading use of autonomously writing AI will increasingly lead to the presence of AI-based texts on the net. The adage "one rotten apple spoils the whole barrel" must be understood as a warning to protect our digital knowledge base. This warning is not just a question of concrete AI technology alone but fundamentally about explicit normative requirements for the development and the use of autonomous writing programs for non-fictional texts.

At the same time, this leads to a much more fundamental question. For as the dilemma of anthropological speciesism described above shows, the epistemological problems in

clarifying a type 4 AI are insoluble. As mentioned above, Turing [10, p.433] asked, “Can machines think?”. He dealt with this question *ex negativo* via a quasi-indirect observation argument. Since this inner-psychoic thinking competence is not directly observable, an answer in Turing can only be given via a conclusion by analogy from the observation of cognitively plausible performances. We infer the thinking competence of the machine because we recognize our own thinking-based actions in the machine’s performances. Therefore, based on these performances, we cannot deny the machine’s thinking ability.

Pronounced in the current discussion about ChatGPT is the question of whether human creativity is open. When, for example, is a literary work humanly creative and when is it “merely” the result of complex pattern recognition by an AI? And suppose this question could be answered, what consequences would this have for assessing texts or other media offers as the result of human creativity? Is human creativity, thinking, or acting relativized as far as a machine can also show it? Because then one would deny backward-looking and speciesistic every further development like an AI the possibility ever to reach the level of humans. Thus we would argue like the evolution deniers of the 19th century [27].

In sum, the discussion of the personhood of an AI throws us back to the fundamental questions of humanity itself: the question of the justification and status of human rights, of social and cultural differences to be recognized versus unacceptable social or cultural inequality, of the relevance of tradition versus innovation and evolution, of authority versus enlightenment, and many other fundamental questions of humanity that are not historically new but still have not been finally answered. In the mirror of AI, the human being encounters himself. It is, therefore, all the more important not to endanger or even lose the knowledge resources humans have acquired over the centuries and millennia in digital poisoning.

5 Conclusion

Who could safeguard our digitally based knowledge resources? What structures and competencies are needed to find the “rotten apple” and even more to prevent the entire “barrel” of the internet from rotting? This challenge would require its own institutionalized strong AI of type 4, that would also have to be morally integer. It should check, without deception and own interests, the resources and sources used by other text-generating AI for their truth or at least plausibility compared to other information. Moreover, this type 4 AI would have to be able to analyze and check text-generating machines.

This fictitious, all-encompassing type 4 AI is not in sight. Therefore, developers of autonomous writing engines must voluntarily give up their AI’s access to the open internet as a source of training data. In addition, they should prevent bots like ChatGPT from actively and autonomously posting texts on the web. Otherwise, we risk losing the open and unrestricted internet as we have known it until now. Indeed, the problem will not be the specific extent of fake news and disinformation on the web, but the general undecidability of whether it is information or disinformation acting as a training base and a text resource. Within a short time, all users of text-generating AI would lose access to high-quality texts in the face of this undecidability.

Moreover, without such autonomous AI type 4, it is not reasonable to entrust the task of controlling and training AI to individual humans, given the high speed of digital AI-based systems in searching, constructing, and compiling texts. Instead, there is a need for an institution that always explicitly demands these normative information ethics requirements and, through research and active service, controls and in some way educates the text base, public perception, and use, as well as the concrete autonomous text generators.

So if we want to prevent this informational horror scenario, one institution, in particular, has a unique role in the new, ethics-based organization and moral institutionalization of AI: the library, the millennia-old institution of collecting and preserving our cultural heritage and memory. In their inner structure, libraries have the mechanisms of selecting and evaluating media like texts, images, sounds, and moving images. They have the competence and the ethical attitudes to instruct and train AI. Thus, a new field of tasks opens up for libraries as the normative authority and simultaneously as mentors and educators of the coming strong AI from type 4. At this point, research with and in libraries must also start if this orientation function of library information literacy is to succeed. But that is another new story.

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Information Literacy as a Key Challenge to Improve Social Protection in France Through New Uses of Collaborative Information

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Abstract. We consider social protection as a key challenge for the future of our society. Our society is also in full digital transformation, with consequences of crises of trust and meaning, especially at work, and crisis of the social bond. A new approach of social protection or welfare state may be an interesting way to build new proximity solidarities. For us, Information Literacy may be an important lever to improve social protection in France through new uses of collaborative information to develop a more inclusive society, in a global context of a highly tertiary economy around new approaches of services in an economic and organizational intelligence perspective applied to territories. We analyze these issues through two complementary cases: a Territorial Healthcare Community (CPTS) and a Family Assistance Organisation (CAF).

Keywords: Challenge · social protection · uses · collaborative information · health · services

1 Introduction and Context: A Society in Global Crisis

“There is no society” said Mrs. Thatcher in 1987 in a liberal and individualistic vision [1, p. 9]. For Guilluy, [1], this approach involves the “chaos of a relative society”, gradually abandoning the “common good” and has strong consequences. According to Paugam, it corresponds to a global crisis of our society based mainly on the loss of the “social bond” [2]. For D’Iribarne, the large demonstrations against the pension reform in France between January and April 2023 reflect a much deeper social malaise, in particular at work, the consequences of new procedural norms implying a loss of autonomy and meaning of work [3]. For Ehrenberg, there is also a generalized malaise linked to the “cult of performance” [4] and to “the fatigue of being oneself” [5] and the loss of solidarity spirit, in a “society of mistrust” [6].

All this in the context of the ambivalence of “cognitive” capitalism [7], aggravated by the health crisis (Covid pandemic), and, more recently (2022), by the energy crisis in the more global context of a “globalized economic war” [8] with a “new cold war”, between the United States and China and their satellites, including the European Union, Russia, and Ukraine, and with war in Ukraine.

Contrary to Mrs. Thatcher's stance, we believe that addressing this global crisis requires strengthening social bonds through a modernized form of the post-World War II welfare state, rooted in Keynesian policies. These different aspects of a global crisis require collectively constructed solutions, in particular by rethinking the social protection or welfare State, as Rosanvallon had outlined as soon as 1998 in France [9]. We propose to work on this way, considering Information Literacy as a key challenge to improve Social Protection in France through new uses of collaborative information to develop a more inclusive society, in a global context of a highly tertiary economy around new approaches of services [10] in an Economic and Organizational Intelligence perspective applied to specific territories.

First, we will present our goals, then our scientific positioning and the methodology used. In a fourth part, we develop two cases studies which are the basis of our analysis. In a fifth part, we discuss our first results and prospects. We end up with a conclusion.

1.1 Context and Goals

Social protection refers to all the mechanisms of providence collective insurance enabling individuals to face the financial consequences of "social risks". It is based on social benefits (retirement pensions, healthcare reimbursements, family allowances, etc.) or social services, provided at a reduced price or free of charge (nurseries, hospitals, etc.) [11]. In this work, we propose to consider the evolution of social protection through two complementary cases: a Territorial Health Community (CPTS) and a Family Assistance Organization (CAF).

Its actors present the 'Economic or Competitive Intelligence as a lever of competitiveness of companies and organizations but also of social cohesion on territories according to Carayon's report [12] in a perspective of organizational intelligence as proposed by Wilensky [13]. We speak about "Intelligence of Territories" or "Territorial Intelligence".

Information is essential for "Economic Intelligence of the Future" [14], particularly for innovation and the dynamics of organizations or organizing as for Weick [15]. These challenges enter the project of our new Gustave Eiffel University, founded in 2020 around the theme of "The City of Tomorrow".

We consider social protection as a "new territory" [16] or a promising new field of research action in economic or competitive intelligence, both in its dimensions of social cohesion and resilience of territories in a perspective of sustainable development by making all actors work together.

From an Information Literacy perspective seeking to improve existing or create new services, our main objective consists of analyzing the development of individual and collective informational skills in order to contribute to transforming social protection organizations in France into learning organizations building new collective intelligence [17] and organizational intelligence dynamics [13].

For us, these organizations correspond to new digital territories, approached as new informational spaces of cooperation and innovation for new services co-constructed with users. For Carayol, communication is a lever for understanding the change in organizations [18], which are built through projects and narratives according to D'Almeida [19], while trying to discern the invisible and hidden side of work as proposed by Linstead and al. [20] and Laborde [21,22].

We will insist on the development of new information and communication skills both employees and users with the role of socio-technical devices in a global context of digital transformation and the Internet of Things as outlined by Saleh [23] with broad uses of new tools (smartphones, etc.).

2 Scientific Positioning and Methodology

2.1 Scientific Positioning

We position ourselves in a social constructivist way, to produce with the actors' validated knowledge for action in a perspective of participative action research to try to highlight the dimensions of which the actors are not aware or that they want to hide, and to tackle a methodological challenge: that of discovering some new aspects of the "iceberg of activity".

We qualify our global positioning of university researcher as ICCOE: Information & Communication and Confidence for Organizing Ecosystems. We insist on the role of trust/confidence to build cooperation in an approach for Social Protection analysis qualified as ProRe² Ter (Social Protection, Reliance + Resilience on Territories).

In the interdisciplinary field of information and communication sciences, our approach is rooted in collaborative action research, specifically focusing on Information Literacy. We view organizations as emerging spaces for information and communication, where validated knowledge can be produced through cooperative efforts between academics and local stakeholders.

Our approach also corresponds to a form of "translation" according to Latour [24] of the feelings, emotions, and perceptions of the actors in a particular context, with the special issue of suffering at work as for Dejours [25]. Laborde [21] refers to Le Moigne: "human knowledge is a process before being a result, it is formed in action and in interaction" [26].

We also consider, as with any action research, the question of the status and validity of the knowledge produced, with the tension between the concern of proximity with the actors and the search for scientificity of the results obtained and their generalization [27]. This aspect also constitutes an important objective of our work.

We have two complementary objectives: firstly, to produce scientific knowledge for action, analyzing the development of individual and collective information skills of all the actors of the studied organizations and its key role to improve our knowledge of these organizations, especially the hidden faces of activity at work; secondly, developing an inquiry about the status of this knowledge and its possible generalization.

2.2 Methodology

From this perspective, the methodology used is closely linked to our scientific positioning just described, with back-and-forth exchanges between the experiential knowledge of the actors of the studied organizations and our theoretical framework, in order to produce validated knowledge for action.

We position in a comprehensive approach using qualitative methods (interviews) to analyze daily activities in their innovative dimension according to Alter [28], by

associating users in a perspective of co-innovation and creativity in the territories as for Godet and al. [29].

We developed this approach in Social Protection Organizations, especially in two different sectors (Social Security and Healthcare) around two complementary case studies. Firstly, in the Family Allowance Funds (in French *Caissees d'Allocations Familiales—CAF*, in Seine-et-Marne department) with the observation of the platform “caf.fr” to build “the caf of future”. Secondly, in Health Territorial Professional Communities, in French *Communautés Professionnelles Territoriales de Santé* or CPTS (hospitals, retired people establishments or EHPADs, doctors, nurses, pharmacies, local authorities, etc.), notably in the French central Pyrenees through the analysis of a new intermediation platform: *Conex santé*.

Our methodology is mainly qualitative. The information and data about the two cases studies were obtained through interviews with all the actors of these organizations (board, doctors, nurses, other employees, users, and their families, etc.) and also through participatory observation sequences to analyze the uses of the mentioned digital tools: caf.fr or *Conex santé* and the interactions between all the actors. Our research fields (CAF or CPTS including EHPAD) allow us to try to develop a collective intelligence [17] to improve social cohesion by associating all the actors on the project and innovation territories.

3 Family Allowance Fund/*Caisse d'Allocations Familiales—Seine-et-Marne CAF*

Our first case study corresponds to Seine-et-Marne CAF, in East Ile-de-France (around Paris) region, corresponding to 1.4 million inhabitants.

The CAFs are sometimes criticized as bureaucratic and procedural organizations for errors in payments to users and for dysfunctions often linked to poor settings of digital tools and a shortage of staff. They also correspond to innovative organizations that do not sufficiently promote their new approaches to provide new services to their users as for Laville [30]. For instance, one positive aspect we focus on is the pursuit of unclaimed rights and the project “*CAF du futur*” with co-innovation with partners and users in a dynamic of proximity with shared social diagnoses like the CTG [31].

A “*Convention Territoriale Globale*” (CTG) is an approach to build a social project on the territory. It involves the inhabitants in the policies that concern them, supports action and the response to new needs, asked by public policies and thus brings to life an attractive and innovative territorial project. The objective is building together a shared territorial social development around digital inclusion, citizenship issues, holiday projects but also more classical projects such as nurseries.

The users of the CAFs are essentially young people and families. From an Information Literacy perspective, we had the opportunity to analyze the cooperation set up in the framework of CTG with associations at the local level to train their users to new digital uses in order to innovate in new interactions with them (smartphones) to improve the provided services.

4 Health Territorial Professional Communities, in French *Communautés Professionnelles Territoriales de Santé* or CPTS

Our second case study corresponds to a new CPTS in the French central Pyrenees (Couserans in Ariège department/Occitania region), in particular with the analysis of a new intermediation platform: Conex santé (<https://telemedecine.conexsante.com>).

This cooperative organization (CPTS) associates the local hospital, 6 EHPADs (*Etablissements d'Hébergement pour les Personnes Agées Dépendantes*), 6 multi-professional health centers, 6 medical analysis laboratories, doctors in primary care, chemists, physiotherapists, nurses, and others on a health territory project in a community of municipalities of 40,000 inhabitants, centered on a sub-prefecture of 6,200 inhabitants (Saint-Girons) with a local hospital whose existence is being called into question. Couserans corresponds to an area with a very marked local identity, with areas of medical deserts with isolated and poor populations.

In an idea of continuity of care for the follow-up of patients' or residents' pathways, this new CPTS wants to work in close collaboration with the local hospital to ensure the link and avoid any rupture of care with especially the 6 EPHADs.

It relies on the Conex Santé platform, which is a local telemedicine solution to optimize the medical time of health professionals (doctors, nurses, analysis laboratories, pharmacists, etc.). The aim is to provide fast and reliable tele-expertise for the health territories. The proposed services are integrated into any digital health ecosystem for an optimized city/hospital relationship and the most efficient possible management of the patient's care pathway.

The Conex Santé platform aims to provide, in particular to the CPTS, a complete service of telemedicine in coordinated medical practice, in particular in teleconsultation and tele-expertise. Conex Santé's main targets are primary care physicians and medical analysis laboratories (in France, 70% of medical decisions are made based on biological results). Also, with the new role of pharmacies/chemists (vaccines, advices) as a new entry of proximity (which has developed a lot during the Covid pandemic) in the healthcare system, which must also be taken into account.

This cooperation corresponds to a project engineering, to create a dynamic of trust between all the actors and to a participatory evaluation project, based on new production and information uses.

The Conex santé platform is also designed to optimize the patient's care pathway, without creating new computerized medical records, but by improving the exchange of existing data, their traceability, and their interoperability. It also concerns elderly people or patients living in EHPADs.

The EHPADs have been highly criticized in France in 2021 – 2022. Scandals, of some of them like Orpea or Korian, often presenting no-control to a quasi "generalized mistreatment" of the residents by the standards and the procedures. Under the goal of rationalization, there were possible real rationing, with the food of residents and supplies (such as diapers) being the main adjustment variables of the budget to maximize the profit of shareholders.

Fortunately, these deviations are not general. We work particularly with one EHPAD (Hector d'Ossun) insisting on the human dimension of work and on its collective aspect.

Its management refuses the “Taylorization of services” by the rigid division of tasks and their timing (toilets, meals) and values the teamwork, with some problems with the supervisory authorities as the ARS (*Agence Régionale de Santé*—Health Regional Agency) which pushes for the imposition of individualized work standards.

This EHPAD wants to integrate more families in an effort to avert with all the drama of loneliness experienced during the Covid pandemic when some patients let themselves die. In the Paris region, we discovered the original initiative of virtual visits of monuments or touristic areas organized by touristic guides students, which we proposed to the management of the studied EHPAD. Another method for promoting information literacy that we are currently exploring involves setting up discussion groups. Alternatively, on a more individual basis, we facilitate exchanges centered around residents’ life stories. These personal narratives could even be formally documented and shared with families as a way to preserve family memory. In terms of organizational innovation, there is also the “*Ehpad hors les murs*” (outside the walls) approach [32]: with other possibilities of reception more limited in time, in particular to relieve the family caretakers, another crucial question. One example is the possibility of delivering meals to their homes.

In the context of the CPTS Couserans, we collaborate with various partners including the CPTS staff, a medical analysis laboratory, and the Hector d’Ossun EHPAD. Our joint efforts focus on two main areas. First, we are considering the implementation of the Conex Santé platform. Second, we are exploring new data applications for co-constructing a contributory evaluation. This evaluation involves all stakeholders and offers fresh perspectives on information literacy. The aim is often to foster innovative interactions that build shared experiences, leading to the development of new links and services.

5 Discussion: First Results and Perspectives

We analyzed service innovations in the Social Protection sector in the territories through two different and complementary cases studies in an idea to develop better cooperation between all the actors, including users/patients and also territorial authorities, notably communities of communes, or deconcentrated services of the state, etc.

We try to develop a mixed info-communication approach in a trans and multidisciplinary way: valuing the knowledge of the experience of the local actors in synergy with other disciplines like management sciences, economics or sociology and psychology.

In particular, we analyze how the studied organizations rely on the associative sector in their territory to train a wider public in the new uses of digital technology and production and uses of data.

We also try to better mobilize the specificity of the informational and communicational skills of the actors of these interface organizations in order to reveal obscure sides of their activity [21] with the goal of improving knowledge of their activity (idea of “iceberg of activity”).

We promote an organizing approach: analysis of the dynamics of organizations in movement, in particular in an organizational communication approach. All this in a process of co-innovation of services involving all the actors.

Our objective is to work around the (re) construction of trust as a key point, in the way of FACt (Fears—Attractions—Temptations) in Mirror proposed by Le Cardinal and

al., [33] to improve cooperation in complex projects building a collective representation. The representations may converge in a logic of co-innovation, by entering into a dynamic of complexity as proposed by Genelot [34] to build a “collective intelligence” [17] to give new meaning to work [3]. With all the problems and risks of instrumentalization and Taylorization (or Uberization) of services, often accentuated by new digital tools. So, our approach insists on interactions and human dimension to co-product situated knowledge in an idea of “humanistic information literacy”.

Through new uses of coproduced data to better working together, we also work in the co-construction of collaborative/contributory evaluation approaches of the studied organizations (CAF, CPTS, EHPADs) based on new productions and uses of shared information. The two studied cases have many points in common with a new Information Literacy approach to Social Protection, first of all, building together a collective intelligence/production and uses of data.

The notion of a pathway is essential for us: patient’s healthcare pathway or follow-up of the residents in EHPAD, but also the user’s pathway for the CAF. We also insist on the development of new information and communication skills both of employees and users with the role of socio-technical devices in a global context of digital transformation.

It is also a question of participating in the co-construction of a territorial resilience to rebuild society by relying in particular on the associative sector and a new role for the users-citizens to rebuild the social link on proximity specific territories around new productions and uses of shared information and communication tools and innovative projects in an idea of “care in a human way” (*soignons humain*).

In this perspective, we propose new approaches to service organizations of the Social Protection sector as spaces of cooperation and innovation built around informational and communicational dynamics according to Guyot [35] in an Information Literacy perspective.

We especially work to develop new productions and uses of cooperative data to promote a new contributory evaluation way of these organizations, in a perspective of co-innovation involving all the actors, both employees and users around new co-constructed services.

These new uses of collectively produced information, after having developed the informational skills of all the actors, should also make it possible to envisage a new approach to contributory evaluation, and no longer a sanctioning evaluation to control strict compliance with imposed procedures, which we have been working on for several years [36].

So, we may also try to analyze the evolution of informational and communicational skills of main actors of the studied organizations, to improve existing or develop new services, in an idea of new “learning organizations”, training both agents to new digital skills, but also learning from their initiatives and creativity in an approach of complexity management [34]. All this in an idea of better tackle the “iceberg of activity” and of “visibility and recognition of the individual at work” [37] and to enhance the experiential knowledge of field workers by working to improve its scientific nature [21, 37].

6 Conclusion

This work in progress has confirmed to us that the Information Literacy is a key challenge to try to improve Social Protection in France through new uses of collaborative information.

Better training of all the actors in the use of digital tools can both—in a learning organization dynamic—give meaning to their work and create a social link with the territory to help to build territorial resilience and rebuild society by involving all the actors: health professionals for the CPTS, patients or residents and their families, the associative sector, especially for EHPADs, and also in the CAFs.

The aim is to produce data together and to use it to improve services for users in a perspective of co-production of services through new productions and uses of collaborative information.

It is also a matter of building a new contributory approach to evaluation with all the actors concerned, self-evaluation and external evaluation by the funding organizations and their supervisory authorities.

After the Yellow Vests demonstrations in 2018–19, after the Covid pandemic in 2020–2022, the strikes against an imposed pension reform, which many considered unfair, highlights the malaise of the whole French society and the need and even the vital imperative to rebuild society around a shared project. As after 1945, with the development of social security, in the logic of solidarity and of the welfare state, the rebuilding of the French social model (health, pensions, family assistance, dependence, etc.) can constitute this privileged space to give meaning to a new project of society.

An overly technical use of imposed tools has largely contributed to the malaise at work in France, particularly in hospitals, EHPADs and social security organizations. We believe that a new cooperative approach based on a “humanistic” Information Literacy approach for all the actors to build a shared meaning from co-constructed data and indicators can be a decisive lever to give meaning to the work of professionals and to the expectations and commitments of users, by rebuilding a shared trust.

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Public Libraries Fighting Disinformation: An Analysis of Knowledge, Resources, and Actions of Portuguese Librarians

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Abstract. The disinformation fight is global and urgent, making it relevant to train librarians from all walks of life so that they can use its multiplier effect in training strategies for users. In the case of public libraries in Portugal, the actions developed in this regard are unknown. This exploratory study aims to better understand the level of knowledge, practices, and resources available in Portuguese public libraries to combat misinformation. To this end, a questionnaire was created and launched at public libraries in Portugal. The results show a consistent knowledge of librarians on the subject, but still incipient actions to combat disinformation, which anticipates the pressing need to carry out more targeted training for these professionals, as well as to provide pedagogical resources and strategies to encourage learning among populations, which can contribute to achieving a culture of more attentive, integrated and critical citizens.

Keywords: Information literacy · public libraries · disinformation · Portugal

1 Introduction

In August 2018, the International Federation of Library Associations [1] prepared a Declaration on Fake News, expressing its deep concern about the disproportionate public impact that this phenomenon has had on the defense of freedom of expression and access to information, and reinforcing its commitment to free and democratic citizenship, also protected and valued by the United Nations [2]. Any restriction of these freedoms, through censorship or blocking of access to digital resources, the Internet, or the means of social communication, must be prevented, despite the danger posed by the accelerated deregulation of this ecosystem. However, it seems that the public policies promoted by the European Union [3], backed by international agents such as UNESCO [4], IFLA [5], journalists' associations [6], truth lobbyists in the media, and even teachers [7] and society in general, have not been enough.

In recent years, fake news, misinformation, and disinformation have proliferated, despite efforts to raise global awareness about this phenomenon. On the pages of newspapers and social networks, fake news is published that is later denied; in academia, supposedly scientific articles are submitted and subsequently retracted; predatory journals advertise false reviewers, contributing to the spread of pseudoscience; in the context of war, disinformation is an assumed strategy; at the commercial level, deceit and dissimulation seem to be part of the sales business; in the dissemination of daily news, defamation reaches proportions that are difficult to imagine. There is a global impact, verifiable in different quarters [8], from politics to the economy, in society in general, and, above all, in the lives of individuals who are the target of fallacies or lies, and whose damages go far beyond predictions. More harmful, destroying careers, prestige, savings, businesses, families, or companies.

But this catastrophic informational scenario has not deterred those most committed to combating it, who continue with actions in favor of information education, in the sense of protecting the most vulnerable and finding adequate strategies for each context, that is, developing information literacy on different ecologies [9]. Society is mobilizing. In the media, there is an effort to protect journalistic truth, with more and more instruments of regulation and verification of facts being made available [6, 10]. The academy has also been particularly sensitive to this phenomenon, acting preventively in student training, particularly through its libraries, supporting researchers with codes of ethics, and guiding teachers towards good practices in teaching appropriate content [7, 11].

School libraries also develop actions to sensitize young people to be aware of misinformation [12]. However, in the case of public libraries, there seems to be some delay in generalizing proactive measures to resolve the problem. We know that public librarians play a significant role, as they are responsible for mediating access to information, which desirably includes training the population in information literacy.

In the current context, the problems with fake news and disinformation make their action even more urgent, requiring a solid position in tackling this phenomenon, primarily through clarification and training of the population [13]. In the case of academic libraries, some studies show the commitment of professionals in deepening actions and projects to fight disinformation [14], however in Portugal there are no studies on public libraries' activities.

The literature urges decision-makers to put intentions and actions on their policy agenda and highlights the following:

- the importance of increasing the evaluation skills of information sources
- the development of critical thinking to combat disinformation, strengthening citizenship and autonomy of individuals and their creative potential
- the training of proactive critical thinkers based on validated information literacy strategies [15].

However, it requires public library information professionals to be aware of the problem [16], empowered with these skills and competencies [17], and committed to a culture of sharing resources and knowledge around the issue [18, 19]. But how will we know if and how they have met these requirements? This exploratory study aims to better understand the level of knowledge, practices, and resources available in Portuguese public libraries to tackle disinformation.

2 Literature Review

The existence of diversified and abundant information resources, increasingly powerful information management systems, specialized personnel, and a decades-long tradition of supporting users, makes libraries particularly capable of adequately supporting and promoting information literacy development actions [20, 21]. In the current context, where disinformation has become a daily problem, information professionals have diligently developed diversified actions and strategies. However, this objective has been embraced by professionals, in different parts of the world, in different ways [14]. According to Agosto [22], the very nature of information and libraries, the work that is developed there, and the educational propensity of these institutions, make librarians, even those who do not feel inclined towards technologies, the web, or online information, more specialized and able to help the public in these matters, as they better understand how information is produced, distributed and used, knowing how to apply this knowledge to everyday contexts. In a context in which information accuracy and authenticity are sought, the educational profile of libraries gains special relevance in terms of empowering individuals, which enhances spaces in civic communities and encourages better-qualified members to use information critically and sustainably, allowing them to be “more thoughtful future information creators, users, and sharers” [22]. Some studies reveal that the fight against disinformation must be comprehensive, and must serve the most vulnerable audiences, such as the elderly [23]. In the authors’ words, “Late adulthood also involves social changes, including greater trust, difficulty detecting lies, and less emphasis on accuracy when communicating. In addition, older adults are relative newcomers to social media and may struggle to spot sponsored content or manipulated images”.

Despite serving a very broad community, in addition to people who are usually found in an academic context and have a naturally educational propensity, public libraries have already conquered a place among their users in supporting learning needs [17]. For this reason, and despite the discrepancy that exists in terms of the visibility of actions between public and academic libraries [24], public libraries should boost efforts to disseminate information literacy in the fight against disinformation, actively contributing to a sustained and participatory democracy [8]. In many countries, such as Canada [25], Denmark [26], Australia [27], and the United States [28], information literacy training has been provided by public libraries. In this context, librarians provide instruction aligned with everyday information needs beyond their more general functions and missions, applied to fields as diverse as health, finance, leisure or practical information. They contribute to civic awareness and democratic participation. They also collaborate in the development of technical skills and digital fluency, allowing users greater technological inclusion, and contribute to inclusion by providing comprehensive educational or leisure programs for minorities. But are public librarians prepared to associate information literacy with the fight against fake news and misinformation? The growth of misinformation has meant that some public libraries already provide instruction in these matters [17, 29–32], however, it seems that this trend has not yet arrived in Portugal. Internationally, it is claimed that this role is already being assumed through projects and initiatives that promote awareness of disinformation and support accurate and reliable research and information evaluation practices [33, 34]. Among the strategies, according to Batchelor [35], are the synthesis and transmission of clarifying information, in leaflets, posters, or

research guides, and training, in events, or specific courses. For this author, all methods of promoting information skills and critical thinking skills promoted for awareness about fake news have the potential to have an impact. Even so, these actions seem not to be enough. As mentioned by Lor [36], “Given the evolving media ecosystem and the social psychology of the reception of fake news, antidotes such as correcting misinformation, distributing fake news detection kits, and offering information literacy programs, valuable as they are, will not suffice as remedies”. A sustainable intervention will be needed, based on the experience that libraries have, associated with the trust they gain with their public, and combined with the participation of other information mediators and with practical strategies to train critical and interventional information users [37].

Faced with this reality, the ALA issued a reference document [38], which underlines that inaccurate information, distortions of the truth, deliberate deceit, as well as excessive limitations on access, removal, concealment, or destruction of information in the public domain, are anathema to the ethics of library science and the healthy functioning of democracy, and must be eradicated from society. This new resolution recognizes the problems caused by fake news, personalized news feeds, web search algorithms, and other constraints, stating that access to accurate information, rather than censorship, is the best way to combat misinformation and manipulation in social media. In summary, there must be actions and strategies designed around the good use of information, research, and evaluation, which place the fight against misinformation at the center of librarians’ intentions. For Weddle [30, p. 8], “while this may be effective in mitigating the damage of misinformation, it requires interest from the affected community, as well as a library or other community center willing and able to provide these resources. I think it is easier for libraries and librarians in the position of experts or parts of an organization to identify a problem (misinformation) than it is for each library user to be motivated to engage in additional information literacy education”. In this way, it is important to understand the extent to which Portuguese librarians are committed to this unequal struggle and what resources, strategies, or actions they have taken.

3 Methods

The present study seeks to understand how the fight against misinformation is being waged through the knowledge held, the resources allocated, and the actions and training strategies carried out by librarians of public libraries. It uses mixed methods inquiry (quantitative and qualitative data). To this end, a questionnaire consisting of 12 questions was prepared and distributed via social media of public libraries and by e-mail to the universe composed of 303 public libraries in Portugal. The first part uses descriptive statistical analysis for the closed questions, and qualitative methodology for the second part with the open-ended questions.

The questionnaire concerned the identification of the library; characterization of knowledge of the subject; and good practices in the fight against fake news. It was divided into four parts:

- an introduction, to clarify the content of the questionnaire to the respondents;
- a collection of socio-demographic data to identify the responding libraries;
- the core of the research, with nine questions; and

Table 1. Construction of the applied questionnaire.

Question	Answers
1. Do you believe, as the Director/Head of the Library, that libraries can play a role in the fight against fake news?	Yes/No/DN-DA
2. Based on what techniques or activities do you believe that the phenomenon of disinformation responsible for information bubbles and false news on the Internet could be solved?	- Technology, Internet control mechanisms (fact-checking) - Legislation or regulatory bodies - Training actions integrated into library activities - Collaboration of the Library in carrying out activities of other institutions - All hypotheses presented
3. Do you consider that this issue affects both the news in the media and the dissemination of scientific information?	Yes/No/DN-DA
4. Do you believe that social media enhance the dissemination of non-validated scientific information?	Yes/No/DN-DA
5. Do you believe that library users can be affected by the difficulty in identifying the veracity of information?	Yes/No/DN-DA
6. Do you consider that media and information literacy may be a method of combating fake news?	Yes/No/DN-DA
7. What media and information literacy resources should the Library make available to combat fake news?	- Training courses or specific seminars - Infographics or visual material (eg, IFLA infographic) - Thematic guides and resources aimed at disseminating validation tools - Selection of specialized resources and databases made available by libraries - Information campaigns through social media - Guidance tutorials on information risks/bias - Training on reliable sources of information - Others
8. Does your institution's library plan any activities in this regard?*	Yes/No/DN-DA
9. * If so, what resources are being made available?	
Suggestions and Opinions	
This space is intended for everything that was not considered in this questionnaire and that you think is relevant. Your opinion, doubts, suggestions, and observations are welcome	

- an open question at the end, in case the respondent wants to leave a suggestion or opinion.

The questions that librarians answered are presented in Table 1.

4 Results

4.1 Sociodemographic Characterization

The questionnaire was distributed via social media of public libraries and by email to the universe composed of 303 public libraries in Portugal. A total of 70 libraries representing the following regions participated in this study: North (25.7%), Center (32.9%), Lisbon Metropolitan area (15.7%), Alentejo (8.6%), Algarve (11.4%), and Azores (5.7%) and Madeira (2.9%) islands.

4.2 Quantitative Results (Closed Questions)

In the first question, when asked whether libraries can play a role in combating fake news and misinformation, the majority of the librarians interviewed (98.6%) answered affirmatively.

The second question asked what techniques or activities could be used to solve the phenomenon of misinformation responsible for information bubbles and false news on the Internet. In this regard, librarians favored training actions for users integrated into the library's activities. However, most of them considered all the presented hypotheses relevant, which are also, the use of internet control mechanisms, such as fact checkers, library collaboration with other entities, and regulatory or legislative actions (Fig. 1).

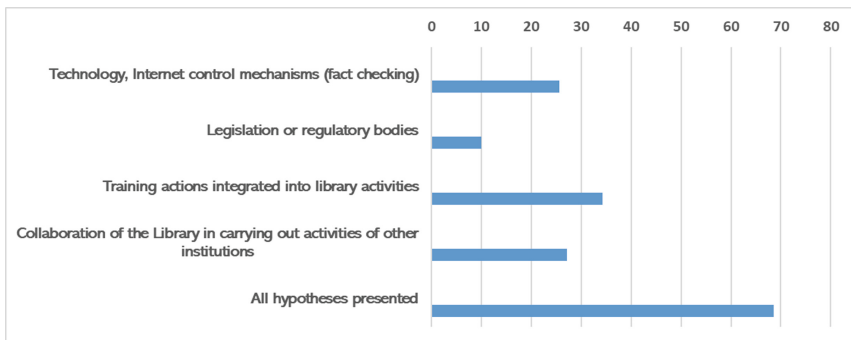


Fig. 1. Percentages of answers to the question: What techniques or activities could be used to solve the phenomenon of misinformation?

In the following block of questions, we tried to verify what opinions public librarians have regarding the influence of misinformation, whether in the dissemination of scientific information; both the use of social networks, but also how users can be affected by fake news, and finally, whether media and information literacy can be an appropriate means of combating this phenomenon. As may be seen in Fig. 2, there is a great deal of consensus regarding this influence, which confirms that librarians are sensitive and alert to this subject.

Questioned about the resources made available by libraries to combat fake news and misinformation, librarians were also very consistent in their answers, pointing out that practically all the options presented were also important, as shown in Fig. 3.

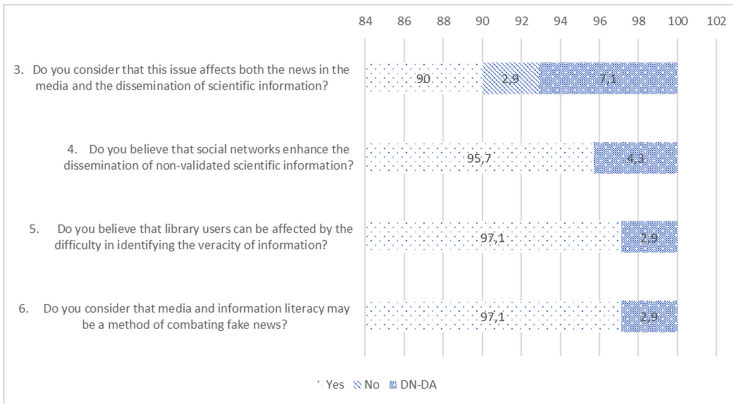


Fig. 2. Percentages of answers to the questions about the opinion public librarians have regarding the influence of misinformation.

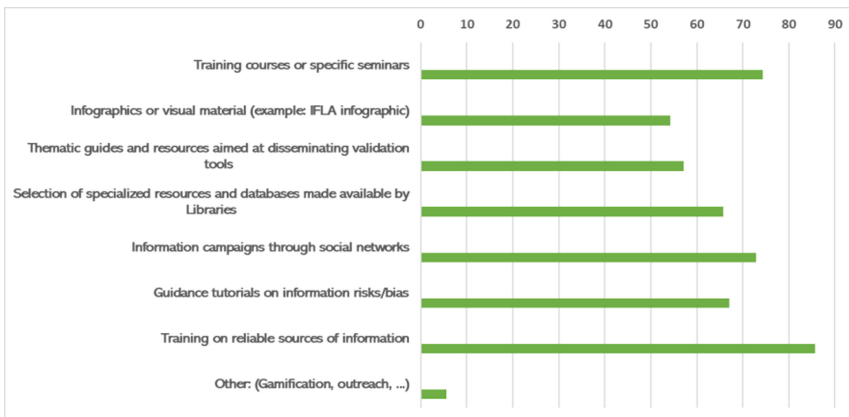


Fig. 3. Percentages of answers to the question: What media and information literacy resources should the Library make available to combat fake news?

However, the results are not so encouraging when asked if the library has any planned activities in this regard. Here, most respondents say no (58%), with 14.3% not knowing and only 27.1% responding positively. For positive answers, it was asked what resources are being used: training (27.2%), information resources (7.1%), and communication materials/social media (4.2%). These results reveal the important focus on training.

4.3 Qualitative Results (Open Question)

In the open question about how to develop this training for users, the information professionals presented some ideas and strategies on how to ensure the effectiveness of the intervention identified in the previous question. Regarding this idea, and despite the few answers, it could it be that library neutrality-related mindset of librarians, which has also

been discussed in some recent studies, have influenced this discourse. In fact, it seems that none of this present great innovation or breakthrough suggestions:

- (a) “It would be important that library and documentation managers but also technicians have training in this area”
- (b) “It is necessary to make available credible sources of information that counteract the hegemonic discourse”;
- (c) “The library must overcome the commonplaces and the univocal vision it carries, it must not reproduce it blindly and it must not be afraid of assuming itself as an alternative. Only then, through the library, the citizen can assume himself as a critical reader of reality in order to better transform it”;
- (d) “I believe it is important to have more media coverage through other public information services”;
- (e) “We would like to receive help on good practices to be adopted in this matter”;
- (f) “Collaboration with school libraries should be ensured”; and
- (g) “The library must responsibly accompany its users, thus ensuring their healthy growth as citizens”.

Although mentions like “counteract the hegemonic discourse” are implicit to public libraries’ role, it seems important to librarians that this could be made more explicit in the information use and management. However, in general, the main focus is on strategic investment in regular and ongoing training.

5 Discussion

The results of this diagnostic study show a consistent knowledge of librarians on the subject, but still incipient actions to combat disinformation, which anticipates the pressing need to carry out more targeted training for these professionals, as well as to provide pedagogical resources and strategies to encourage learning among populations, which can contribute to achieving a culture of more attentive, integrated and critical citizens. The results of the librarians’ perceptions point to the need for training as a fundamental strategy to combat misinformation. This need is in line with several studies referred to in the literature review [1, 14, 18, 29–32], which stress that fake news is not fought with censorship, but precisely with more news and more training on information sources.

Although libraries considered themselves to be very important agents in developing and supporting strategies to combat misinformation, we found that the strong theme that emerged from responses to the open-ended question in the survey was the need for more training and tools that allow measurements (toolkits) to determine user interests, participation, and reactions. Adding more training and tools will help determine the outcomes of initiatives and will provide information to aid in planning for future initiatives. This approach come somewhat as a surprise as previously in the submission, these “measurement or evaluation tools” were not discussed. When asked to detail user reactions to initiatives, several public libraries indicated that they lacked sufficient expertise as well as measurement and evaluation tools. When asked about the implementation of media and information literacy initiatives, the answers were very weak, with comments such as the following reflecting the lack of skills and methods to measure results: “Due to staffing

problems, we do not do enough follow-up on these initiatives”. These considerations, as well as the importance of increasing skills in evaluating information sources; developing critical thinking to combat misinformation, and enhancing citizenship and autonomy of individuals and their creative potential based on validated information literacy strategies mentioned in other studies [11, 13, 14, 17, 29–32]. On the other side, misinformation is a very broad topic, and maybe librarians in public libraries already provide training to fight misinformation (about source critique, for example) without clearly knowing it.

However, it should be noted that this study had some methodological limitations that should be overcome in the future. Namely, it was found that the final sample was derived from non-random sampling, which limits generalization from the study results. Nevertheless, as this study is exploratory in character and the responding libraries reflect diversity in both region and size, the results can be used in future studies as a starting point to examine how public libraries implement initiatives and strategies to combat disinformation.

6 Conclusions

This exploratory study made it possible to map the situation and position of Portuguese public libraries in the fight against disinformation, allowing them to carry out a diagnosis and assess a set of practices, knowledge, and resources that will allow the elaboration of intervention and support programs for library teams. The insights and experiences of librarians gleaned through this study will further develop new ideas and inform future efforts when planning media and information literacy initiatives. The role of public libraries as critical actors in mitigating barriers to media and information literacy points to their continued relevance in a rapidly evolving and changing society.

As the survey results show, those working with libraries value partnerships as a method to maximize offerings by combining the efforts of multiple agencies; however, like many initiatives, partnerships also require staff time to plan and coordinate. Based on these findings, one avenue for further research is on effective methods to extend media literacy services to patrons while minimizing pressure on staff time. Another area that may warrant further research is to what extent staff attitudes and preferences influence the perception of patron interests and the initiatives librarians develop in response.

Further, future studies are recommended to examine how public libraries can modify techniques, structures, and services already practiced in other libraries, such as higher education libraries.

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Information Overload as a Burden and a Challenge. What Can We Learn for Information Literacy?

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Abstract. The problem with information overload today is not only the quantity of information, but also its reliability and emotional aspects. Specifically, COVID-19 or fake news are the factors that increase the problem. The aim of the study was to indicate the challenges to information literacy, based on the results of a national Information Overload (IO) survey. The Information Overload Scale (IOS) was used in the study of Polish Internet users aged 15 and older. IOS focuses on emotional aspects and subjective perceptions of information overload, thus revealing individual perceptions of one's information skills. The results show a reduction in perceived burdens between 2021 and 2022, presumably linked to a suspension of lockdowns and the resignation of online work. The way to respond to the elements of perceived IO may be a tip for information literacy education that is tailored to a specific social group and reflects the challenges of time and circumstances.

Keywords: Information literacy · information overload · Information Overload Scale · quantitative nationwide survey · training recommendations

1 Introduction

People all over the world are experiencing information overload (IO). Its definition has long focused on a large amount of information [1]. Today, we can see that the problem is not only the quantity of information, but also its reliability. Due to the emotional burden of the situation, the emotional aspects of IO become more critical. Specifically, COVID-19 is the factor that increases the amount of information and its evaluation [2] or fake news [3]. IO has also been the subject of research focusing on information literacy [4].

The aim of the study was to indicate the challenges and recommendations for information literacy, based on the results of national surveys on IO, providing insight into different experiences, attitudes, emotions, and/or education needs based on the specific of demographic characteristics. The study was a part of a wider project concerning problematic Internet usage (PIU).

The value of this text is the comparison of two waves with one instrument in specific time. It is not focused exclusively on COVID-19 information, but IO in general. The nationwide survey offers data of different sociodemographic groups.

2 Theoretical Background

David Bawden and Lyn Robinson interpret IO as “situation which arises when an individual’s efficiency and effectiveness in using information (whether for their work, studies, citizenship, or life generally) is hampered by the amount of relevant, and potentially useful, information available to them” [5, p. 12]. Tibor Koltay [6] determines two levels of IO: the macro-level, related to information storage and processing capacities, and the micro-level, related to the skills in filtering and evaluation of information and its value for a user. Consequently, the coping strategies on macro-level refer to personal information management, while on micro-level they include information and media-related literacies and critical thinking.

The authors of the Information Overload Scale (IOS) defined it as “a distress associated with the perception that there is too much information” [7, p. 1]. Today, this affective aspect of information overload seems to be more important, regarding emotional burden of the situation around and emotional reactions to information of different quality. Extensive reviews of the definitions of the information overload concept were also offered [8, 9]. David Bawden and Lyn Robinson [5] performed a selective literature analysis, to offer a historical context of the development of the IO phenomenon, its nature, causes, consequences, and potential solutions, including either coping strategies, organizational or personal information management, architecture of information and technical solutions, promotion of information and digital literacy.

Individual factors to be considered in relation to information literacy include: poor prioritization (as the leading), lack of knowledge/skills, decision style, cognitive limitations, lack of focus, lack of organization, management style, cognitive anxiety and cognitive burden [10]. Task factors can also be analyzed from the IL perspective. The list consists of information amount/ variety/ quality, time pressure, multiple demands, technology, complexity, pace of change, and competition. Among both groups, there are factors directly related to information literacy (information amount, technology, complexity in the task group, and poor prioritization, lack of knowledge, lack of organization in the individual group). The others can be analyzed indirectly, also as the factors supported or not by circumstances, like time pressure, pace of change, cognitive burden, or anxiety.

Regarding the social and political situation specifically, COVID-19 is the factor increasing both the amount of information around and the difficulties in finding valuable information [2, 11–13] or fake news [3].

The relationship between COVID-19 and information overload has been intensively investigated. Specific tools for measuring this phenomenon during the pandemic period was also developed and validated [14, 15], based on the Cancer Information Overload Scale [16].

COVID-19 Information Overload received a dedicated name (abbreviation) - COVIO in the international research of Mohammed, et al. [12] measuring the level of this overload among the general public. COVIO appeared to depend significantly on information sources (broadcast media and social media) and the frequency of receiving COVID-19 information.

Using another CovIO scale, Breyton, et al. [17] observed an increase in COVIO between the following COVID-19 waves, and its significant link to education, health

literacy, and trust in institutions, as well as the negative relationship between IO and preventive behaviors.

However, the role of sociodemographic factors is unclear. The authors of IOS confirmed a significant correlation of IO with being female and age, in the very specific sample of 193 subjects including information sciences students, library staff, and introductory psychology students [7]. The results of the study [18] on US residents and students confirmed that age, gender, income, use of traditional news media, and efficiency in searching for information can partially predict one's probability of experiencing information overload.

The perspective of librarians' care for users' efficiency in information searching in the IO context is represented, for instance, by Barbara Blummer and Jeffrey M. Kenton [19] or Lei, et al. [20], who discussed the relation between information overload and library performance of the users of university libraries. Information literacy instructions were found to be particularly important in combating information overload, because they empowered the users with new searching, evaluation, and problem solving competences. The problem of information overload of academic staff was analyzed by Liia Lauri and Sirje Virkus [4, 21].

3 Methodology

The Information Overload Scale [7] was used in the study, which focuses on emotional aspects and subjective perceptions of information overload, thus revealing individual perceptions of one's information skills. The Information Overload Scale (IOS) consists of 15 statements (listed in the Appendix), responses to which are measured on the Likert scale, where "1" is "I completely disagree", and "5" - "I completely agree".

The study consisted of two waves of representative surveys (CAWI technique) of Polish Internet users aged 15 and older, carried out in cooperation with the Ariadna Panel in 2021 and 2022 subsequently. Respondents' quotas representative for gender, age, education level, size of locality of residence. Questionnaire for the entire project included several scales for different PIU studies, IOS and FOMO scale among others. The responses were recoded from 5 to 3 levels (summed negative 1–2 and positive 4–5 answers). Below only positive responses are presented (4 - I agree and 5 - I strongly agree). The correlations were calculated in SPSS 9.0.

4 Findings

The general results of the survey are presented in Fig. 1. Between 29% and 46% in 2021 respondents and between 22% and 38% in 2022 confirmed experiencing some kind of information overload. Two observations are worth noticing:

1. Repeated pattern of information overload among the total sample in both waves.
2. Decrease of information overload between the first and second waves.

Three statements the respondents agreed most often (the highest indicators) are:

- Item 4 (42% of the respondents agreed in 2021 and 35% in 2022): both genders, all age groups except the youngest (15–19),

- Item 8 (41% and 38%, respectively): both genders, mostly respondents 25 +,
- Item 11 (46% and 38%, respectively): both genders, all age groups except the youngest (15–19).

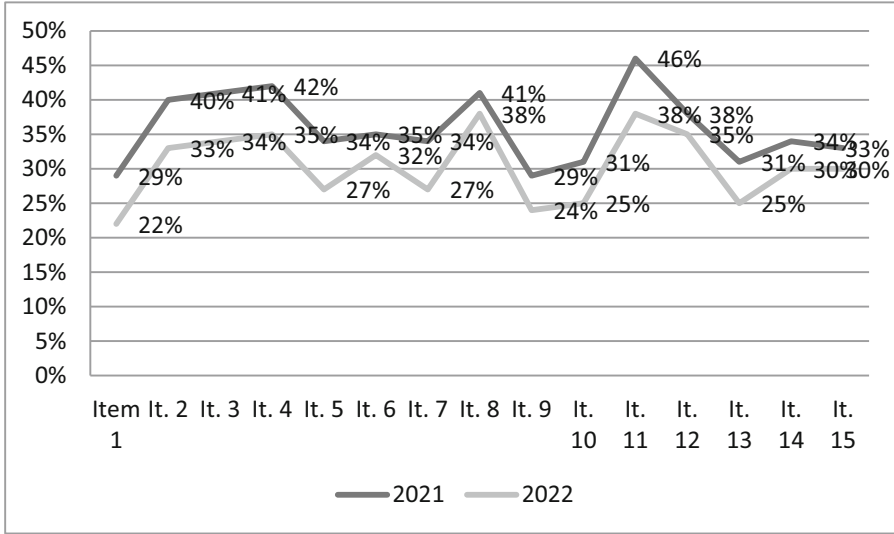


Fig. 1. Information overload of Polish Internet users 15 + (2021: n = 1067, 2022: n = 1083).

All of them refer to an overwhelming, increasing beyond one’s capacity quantity of information and difficulties with selection.

There are also three items which received the lowest indications:

- Item 1 (29% of the respondents agreed in 2021 and 22% in 2022): both genders, all age groups,
- Item 9 (29% and 24% respectively): women, all age groups,
- Item 10 (31% and 25%, respectively): both genders, respondents 25 +.

These items refer to the difficulties with managing daily tasks due to too much information. However, this general description should be analyzed in detail. Let us see the results according to gender and age.

4.1 Gender and Age Groups: Differences Between 2021 and 2022 Waves

The data in Table 1 reveal differences in IO decrease between 2021 and 2022 for these groups. The women’s IO status did not change significantly, if any. For items 1 and 8 it was stable, for items 2–5, 7, 10–11 slightly decreased, while for the rest it slightly increased. At the same time, IO of men decreased much in general: the smallest difference is observed for items 8 and 15, while the largest for items 1–5, 9, and 13.

Important differences can be observed between age groups (Table 2). Even if a decrease in IO among the general sample was determined, the youngest respondents

Table 1. Information overload of men and women in 2021–2022 in %.

Item	Women		Men		Pearson's chi-squared test, p value in	
	2021	2022	2021	2022	2021	2022
1	24%	24%	33%	19%	< .001	.074
2	40%	37%	41%	28%	.037	.002
3	41%	39%	42%	29%	.808	.001
4	42%	38%	43%	31%	.421	.069
5	33%	30%	35%	23%	.002	.028
6	36%	37%	35%	28%	< .001	.005
7	32%	27%	36%	26%	.073	.592
8	40%	40%	42%	37%	.045	.522
9	24%	27%	34%	20%	< .001	.002
10	31%	27%	30%	22%	.392	.034
11	46%	41%	45%	36%	.869	.257
12	36%	38%	41%	31%	.003	.060
13	27%	28%	35%	23%	.005	.134
14	32%	35%	35%	25%	.068	.002
15	31%	33%	34%	33%	.033	.028

(15–19 years) is the only group experiencing an increase in IO in all items. The most burdensome items were items no 6 (increase by 32%), no 2 (by 29%), and no 5 (by 28%). The first two concern the feeling of being overwhelmed by too much information, which possibly causes delay in 'getting things done in a timely manner' (item 5).

On the contrary, the lowest increase for this age group was observed for items no. 15 (by 2%), 11 (by 5%), and 13 (by 6%). These items also refer to information processing in a timely manner; they already achieved high indications in 2021.

A large positive difference can be observed within the second youngest group (20–24 years) and among the oldest respondents (55+). The range for the former is between 1% and 21% decrease of perceived IO, while for the latter between 7% and 18% decrease. It can be interpreted as relief after the pandemic regime.

Two groups with slighter difference are people 25–34 years of age (between 0% and 16%) and 35–44 years of age (between 7% increase and 11% of decrease). Finally, people 45–54 years declared between 2% and 27% decrease of perceived IO.

According to the Spearman correlation, in the 2022 wave, age dependence is seen in more items (7/15 from .083 to .160 in 2021, 13/15 from .087 to .233 in 2022) and in many cases it is stronger. However, when it comes to gender dependence, the opposite is true (8/15 from .084 to .164 in 2021, 2/15 .080 and .101 in 2022), and in statistically significant pairs of indicators, the correlation coefficient has decreased (except in one case).

Table 2. Difference in IO perceptions between 2021 and 2022 in age groups (Pearson's chi-squared test: $p < .001$ for all items except item 8 in 2022, where $p = .005$).

Item		15–19 yo	20–24 yo	25–34 yo	35–44 yo	45–54 yo	55 +
1	2021	20%	29%	39%	24%	28%	26%
	2022	33%	22%	22%	23%	22%	14%
2	2021	23%	50%	43%	38%	42%	42%
	2022	52%	31%	34%	32%	31%	26%
3	2021	24%	55%	41%	40%	41%	41%
	2022	51%	34%	37%	36%	33%	25%
4	2021	30%	45%	44%	41%	42%	47%
	2022	42%	36%	36%	34%	36%	29%
5	2021	18%	39%	39%	38%	28%	32%
	2022	46%	23%	28%	27%	24%	20%
6	2021	23%	47%	39%	38%	34%	29%
	2022	55%	37%	34%	33%	29%	21%
7	2021	16%	38%	41%	29%	36%	35%
	2022	21%	26%	26%	33%	30%	22%
8	2021	24%	40%	42%	41%	41%	48%
	2022	35%	28%	39%	38%	14%	39%
9	2021	17%	43%	34%	24%	25%	30%
	2022	31%	23%	26%	26%	23%	16%
10	2021	22%	40%	40%	27%	29%	23%
	2022	40%	27%	25%	27%	23%	16%
11	2021	30%	48%	53%	42%	47%	45%
	2022	35%	37%	37%	41%	41%	38%
12	2021	24%	40%	40%	33%	39%	47%
	2022	42%	29%	35%	40%	33%	31%
13	2021	28%	43%	34%	27%	34%	27%
	2022	34%	27%	29%	26%	24%	18%
14	2021	24%	42%	34%	33%	35%	34%
	2022	39%	29%	32%	30%	31%	23%
15	2021	32%	30%	30%	31%	36%	36%
	2022	34%	29%	30%	31%	30%	26%

4.2 Information Overload Differences for the Gender and Age Groups in 2022

The following sections examine only the results of the second wave. The author assumed that the results for the year 2021 depend strongly on the pandemic situation, while those for the year 2022 (according to Fig. 1), even though still reflecting negative effects of lockdowns and ‘living online’, are much “closer to normal”.

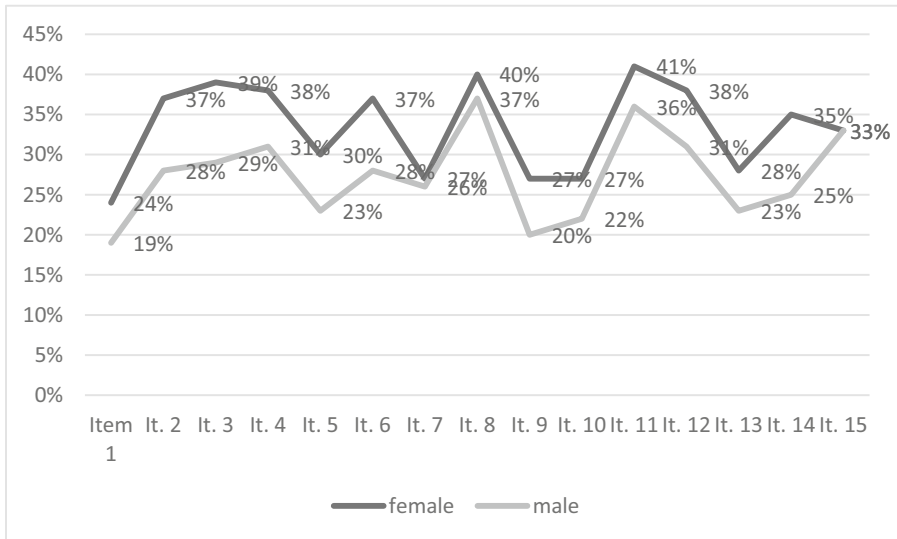


Fig. 2. Information overload by gender in 2022.

As shown in Fig. 2, women suffer from IO more than men. This refers particularly to items 3, 4, 8, 11, and 12. The increasing and overwhelming volume of information around (items 11–12) adversely affects their sense of efficacy when it comes to selection (items 4, 8, 11) and concentration (item 3).

Men most often declared IO in the context of items 4, 8, 11, 15. These results partially coincide with the women’s results, although to a lesser degree. Item 15 is one of the highest in this group (regarding the feeling of time pressure in regard to information to be dealt with); however, the result is exactly the same as for women (33%).

Regarding the results for age groups only in 2022 (Fig. 3), the most suffering from IO are the youngest respondents (15–19 years), while the least are the oldest (55+). However, for both these groups, the indications differ significantly among items. The youngest declared items 1–6, 9–10, and 12–15 more often problematic than the others. Managing information takes too much time (1, 5). This makes them feel overwhelmed (2, 6, 12, 13) and stressed (10, 15), and causes problems with concentration (3, 14) and selection (4, 9). However, they less often experience excessive communication (item 7).

In contrast, group 55+ achieved the lowest results for items 1–6, 9–10, and 13–15. They seem to have been less burdened with managing daily tasks (items 9–10, 13 - less tasks to be done?). They do not experience as intensively as the younger groups a surplus of information, stress related to these situations, problems with concentration. For them

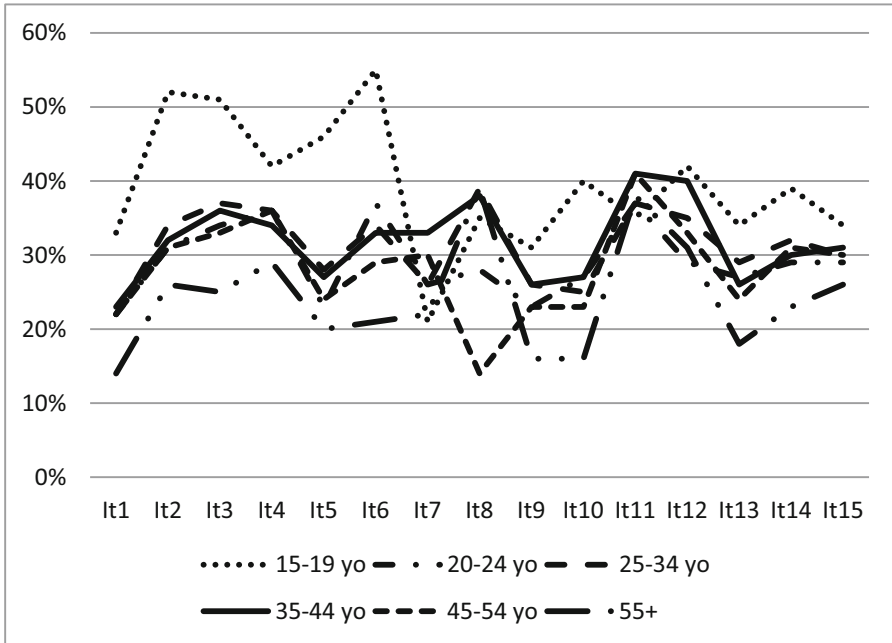


Fig. 3. Information overload by age group in 2022.

selection from among too much information (item 8) is problematic, as well as rapid growth of information (item 11). Also, the latter is problematic for all age groups. The indications of the respondents aged 20–54 seem to be a strong basis for a general pattern as shown in Fig. 1.

5 Discussion

This project confirms and enhances knowledge on increased information overload specifically in the pandemic time (2021) and beyond (2022). Studies based on scales dedicated to COVID-19 situation [12, 14, 15, 17] and those focused on information redundancy or misinformation [2, 3, 11, 13] in that period revealed that people suffer from pandemic-related IO. Here, the general IOS confirmed that people suffered from IO in general, not only those who focused on the pandemic topic. The significant decrease between 2021 (29% to 46% positive answers, depending on the item) and 2022 (22% to 38%) waves is also an indication of that.

Regardless of this decrease, a specific pattern of reactions to particular items can be observed between the waves. Data for 2022 reveals that women are more likely to feel overwhelmed by information, also with regard to selection of sources and concentration. The men report similar problems, but to a lesser degree and additionally a time pressure. All that leads to a hypothesis of a specific model of information overload, in particular, if the pattern repeats in the following survey waves.

The results for that total sample confirm the information redundancy is the most difficult to deal with (highest indications), while they influence less everyday living (lower indications). They also confirm the results of Buchanan and Kock [10] about the influence of IO on poor prioritization of tasks and lack of concentration. However, there are noticeable differences between the waves. Men's IO decreased significantly in a short period (one year) between 2021 and 2022 (the highest decrease by 14%), while women's IO remained at approximately the same level (maximal decrease by 5%, but also increased by up to 3%). The results for all age groups 20+ mostly decreased, excluding the youth (15–19), who declared significant increases (even by 32% - item 6). The youth and the oldest respondents differ from the other age groups (20–54), although in almost opposite ways. The significant correlation of IO and gender (women) and age found by Williamson, Eaker, and Lounsbury [7] is confirmed on a representative national sample, which should be emphasized but also requires further explorations.

Blummer and Kenton [19] and Lei, et al. [20] already suggested information literacy trainings as an effective tool to combat information overload. The results of this study lead to some more specific recommendations, including:

- digital hygiene (should it become a part of information literacy discussion?),
- precise identification of information needs and formulation of information searching instructions,
- advanced searching skills and tools,
- verification of information reliability and quality,
- filtering and selection of sources and information, but also
- prosumers' responsibility for information redundancy.

The latter relates to the issue of awareness and responsibility for the co-creation of information overload. Consequently, a prosumer should ask him/herself if it is really necessary for him/her to make specific content public? What purpose does it serve? Who needs it? This issue links directly to ecology of information behavior.

Last but not least, IL educators should consider further adaptation of trainings to specific needs of different social groups. Young people and women seem to have specific needs, which can possibly depend on age or social roles.

6 Conclusions

Information overload is a major social problem, increasing in times of such major problems as the pandemic. IO experience negatively influences users' capacities in information verification, selection, or concentration. The scope and scale of IO differ depending on age and gender. The results of this study constitute grounds for adaptation and evolution of information literacy trainings.

The study has limitations. Its quantitative character is one of them, as we still need more information on how IO is experienced, what are its consequences, and how it influences human behavior). The other limitation can be the range of the study; the representative sample of national internet users enables verification of some results of previous research, and determines different reactions depending on sociodemographic features. However, it is still limited to a specific culture. The survey carried out during the pandemic and in 2022 revealed some specific dependencies, but the pattern of

reaction still requires confirmation in the following studies. The results for the youth require verification (their IO can be, for example, related specifically to a local education system). An interdisciplinary study, considering a psychological perspective, would be an advantage.

However, the dynamics of the social environment affect information literacy, making it necessary to be flexible in the design of the content and forms.

Appendix

The Information Overload Scale items (Williamson, Eaker, & Lounsbury, 2012).

1. I have to manage so much information in my daily life that it takes me a long time to complete even simple tasks.
2. I regularly feel overwhelmed by too much information these days.
3. It is sometimes hard for me to concentrate because of all the information I have to assimilate.
4. There is so much information available on topics of interest to me that I have trouble choosing what is important and what's not.
5. I have to process so much information that it frequently takes me too long to get things done in a timely manner.
6. I feel overwhelmed learning a new subject or topic because there is so much information.
7. I am confronted by an avalanche of Email, phone and text messages each day.
8. When I search for information on a topic of interest to me, I usually get too much rather than too little information.
9. I have so much information to manage on a daily basis that it is hard for me to prioritize tasks.
10. I am stressed out by the sheer volume of information I have to manage on a daily basis.
11. It seems like the volume of information available is increasing exponentially in a relatively short period of time.
12. I feel like I can't keep up with all the new developments in my area of expertise.
13. I sometimes feel numb and incapable of action because of all the information I have to process on a daily basis.
14. I feel like my attention span is becoming shorter and shorter because of information overload.
15. I regularly feel pressed for time because of all the information I have to deal with.

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Copyright Awareness Among Future Media Specialists: Survey Results in Bulgaria

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Abstract. The present paper outlines a scientific study that focuses on the methodology and outcomes of a survey conducted to assess the current level of awareness regarding copyright issues among trainees in the media field. To collect relevant data on students' knowledge, awareness levels, and attitudes toward copyright, the authors developed a survey instrument consisting of four sections with a total of 40 main questions. The survey was carried out in nine universities in Bulgaria within Public Communications and Information Sciences professional field, encompassing specialties such as journalism, media, PR, public relations, arts, and creativity. The survey took place between April 1st and May 26th, 2021. A total of 449 Bulgarian students enrolled in “Bachelor” “Master” and “PhD” programs effectively participated in the survey. The selection of participants followed the principle of systematic random sampling, with stratification to ensure representation of approximately 10% of students within the aforementioned professional field. Data collection was conducted using a Google survey platform.

Keywords: Intellectual property · copyright literacy · media industry · social sciences

1 Introduction

The significance and role of creativity and innovation in contemporary societies have been emphasized in various strategic documents, including the Europe 2020, a Strategy for Smart, Sustainable, and Inclusive Growth (COM/2010/2020 final), and the European Commission's Green Paper on Unlocking the Potential of Cultural and Creative Industries. These documents highlight the importance of establishing a robust, competitive, and diverse industrial foundation to foster knowledge, creativity, and innovation, which represents a shared objective of the European Union. This objective necessitates adopting a differentiated approach to address social, economic, cultural, and educational disparities among member states. To shape the future cultural landscape of society, it is essential to develop new forms and policies that depart from the existing ones. Achieving such a state of cultural advancement requires strategic support for crucial initiatives such as the preservation and promotion of cultural diversity, facilitating creative mobility, protecting Intellectual Property (IP) rights, and enhancing society's understanding of IP. Additionally, it entails creating an enabling environment for the growth of cultural and

creative industries and ensuring the provision of quality education in the field of culture, information, and creative industries [1]. This preliminary proposal aligns seamlessly with the aforementioned strategic documents and the National Research Strategy 2017–2030. It encompasses two primary objectives: first, to investigate the existing level of IP literacy within the university information environment among students and teachers; and second, to stimulate a public discourse that raises awareness and cultivates a culture of IP literacy within academic circles. This initiative is both timely and imperative, considering the pressing need to address IP issues in the present context [2].

IP pertains directly to the information encapsulated within its objects. Essentially, IP encompasses the ownership of the information embedded within intellectual creations, granting exclusive rights to their creators. The legal framework governing IP serves to regulate public relations concerning the creation, recognition, dissemination, distribution, inheritance, and legal protection of IP objects, including copyright and related rights. In the context of a knowledge-based economy, professionals such as librarians, information specialists, media experts, and journalists play a crucial role as they possess the expertise to interpret and navigate issues pertaining to IP [3].

IP can be considered as an integral component of Information Literacy (IL) within the university information environment. IL refers to the knowledge and skills required to discover, analyze, retain, and effectively utilize specific information. It encompasses the ability to make informed selections in the information age. Information literate individuals possess the aptitude to locate, assess, and employ information from various sources, including computers, books, news agencies, films, and other supplementary resources, to solve problems or make informed decisions. To thrive academically and in life, students must acquire proficiency in efficiently and effectively utilizing a wide range of information and communication technologies. They should be capable of conducting comprehensive searches, organizing and analyzing information, and critically evaluating its credibility. Furthermore, they must grasp the ethical considerations associated with information usage, including respecting IP rights, such as avoiding plagiarism by using copyrighted literature, art, and scientific works, patented inventions, designations (trademarks, geographical indications, domain names, business names), without proper authorization from the creators. Ultimately, students need to synthesize this knowledge and apply it to produce effective end products. This necessitates the development of fundamental skills encompassing scientific research, technological proficiency, critical thinking, and evaluation [4]. Conducting research on IP matters as part of IL, particularly copyright literacy, in the contemporary university environment is contingent upon several prerequisites.

There are several key factors that necessitate further research and exploration in the relationship between IP and IL. Firstly, there is a lack of comprehensive independent studies on a national level that specifically examine the correlation between IP and IL. Secondly, it is crucial to examine existing models and best practices for training non-specialist lawyers in the field of IP, both in Europe and globally. Thirdly, an analysis of the educational content and curricula responsible for imparting knowledge in this domain is needed. Fourthly, studying the experiences of established IP-awareness networks in other countries is necessary. Finally, it is important to investigate the level of

awareness regarding intellectual-legal issues in the fields of humanities and social sciences, among both educators and students in the university environment [5–7]. In light of these considerations, it is evident that positioning IP within the broader framework of IL is not only relevant but also timely and essential.

The present paper addresses a highly relevant and current topic that has been partially explored by other authors but has not yet been fully examined. This significant characteristic underscores the scientific and practical significance of the project titled “A Conceptual Educational Model for Enhancing Information Literacy in a University Information Environment.” The project is funded by the National Science Fund of the Ministry of Education and Science of the Republic of Bulgaria under Contract No. KP – 06 – H35 / 10 dated 18.12.2019. The project is led by Prof. DSc Stoyan Denchev.

2 Literature Review

The existing body of literature pertaining to IP/copyright literacy among information professionals, including library, museum, and archival specialists, as well as the field of copyright academic education, is extensive. Due to its breadth and depth, a comprehensive review of this literature is beyond the scope of this paper. The literature review focused on the media specialists found that a comprehensive interdisciplinary study of issues related to IP literacy, especially in Public Communications and Information Sciences with a focus on future media specialists and journalists as well as on the level of copyright awareness of these specialists - does not exist [2]. This review aims to provide an overview of key documents, initiatives, and publications in the field under examination. The following are some of the notable ones as discussed by Tsvetkova et al., [2]. While the literature acknowledges the significance of media ethics and media literacy, certain themes, such as copyright awareness and the incorporation of copyright education into information literacy programs, as well as the integration of copyright and licensing issues into the curriculum for future media specialists, are currently pertinent and warrant further examination. The ever-evolving landscape of higher education has introduced new priorities that highlight emerging aspects of daily life. IP, particularly copyright, has gained even greater relevance due to the growing trend of individuals creating and promoting their work through increasingly accessible online media platforms. Consequently, there is a continuous need to expand our knowledge in this domain to ensure optimal utilization of information and media resources.

3 Copyright Awareness Among Future Media Specialists: Survey Methodology and Results

3.1 The Aim and Methodology

The authors developed a survey instrument with the purpose of gathering data from students, specifically those aspiring to become media specialists, to assess their level of copyright awareness. The survey aimed to examine their knowledge of copyright acquired during their studies, their practices related to using media content, and the extent to which they recognize and respect copyright in journalistic work [8]. To achieve the

objectives outlined in the project, a survey was conducted among students enrolled in the professional field of “Public Communications and Information Sciences.” This survey took place in nine accredited universities in Bulgaria that offer Bachelor’s, Master’s, and PhD programs in the aforementioned field. The survey followed a systematic random sampling approach with stratification, targeting 10% of the students within this field.

Data collection for the survey was conducted using a Google survey platform. It is important to clarify that the survey targeted students from five different towns in Bulgaria, namely Sofia, Blagoevgrad, Shumen, Burgas, and Veliko Turnovo. A total of 618 students specializing in fields such as journalism, media, PR, public relations, arts, and creativity were invited to participate in the survey. Upon the completion of the survey, the final dataset consisted of 449 valid responses from adult Bulgarian citizens who were students in the aforementioned professional field. This sample size ensures that the survey results are representative of the entire country. After the online survey closed on May 26, 2021, the collected data underwent thorough logical inspection and quality control measures.

The questionnaire is composed of four sections, each containing a set of questions designed to gather specific information. The questions are structured in a combination of closed-ended and partially open-ended formats, utilizing a 5-degree Likert scale. The primary objective of the **first section** is to obtain demographic data and information regarding the education and citizenship status of the participants. This section comprises a total of nine questions. **The second section** aims to assess the level of awareness among respondents regarding copyright issues. It consists of ten multiple-choice questions, seeking to gauge the participants’ understanding of various aspects related to copyright. **The third section** of the questionnaire is designed to measure the respondents’ knowledge regarding copyright issues in eleven questions. **Lastly, the fourth section** of the questionnaire focuses on capturing the respondents’ attitudes towards the practical implementation of copyright protection and it’s encompassed in ten questions.

The empirical study, “**Current State of Copyright Awareness in the University Environment**” took place from April 1st to May 26th, 2021. The study targeted trainees from nine Bulgarian universities and aimed to assess their knowledge and awareness of copyright. During the questionnaire development, emphasis was placed on adhering to national legislation and utilizing guidelines from the World Intellectual Property Organization (WIPO). The study provides valuable insights into the copyright awareness of future media specialists within the context of the modern information society. It is worth noting that the survey was conducted at a time when the rights of authors and journalists were of significant importance and subject to public debates, making the responses of the participants influential in shaping these discussions related to IP.

3.2 Demographics

The survey garnered 449 complete responses by students from 9 Bulgarian universities, as follows: (1) University of Library Studies and Information Technologies - 180 (40%); (2) Sofia University - 100 (22%); (3) Burgas Free University - 43 (9,6%); (4) Veliko Turnovo University - 25 (5,6%); (5) University for National and World Economy – 28 (6,2%); (6) Shumen University – 14 (3,1%); (7) South-West University – 24 (5,3%); (8) New Bulgarian University – 30 (6,7%); (9) American University in Bulgaria – 5 (1,1%).

Out of 449 respondents, 292 (65%) are female, 157 (35%). On the status of their degree, 357 (79,5%) are in their bachelor's degree, 61 (14%) in master's degree, and 31 (6,9%) in their PhD degree.

3.3 Findings of the Survey

The collected data provide evidence of the strong interest and dedication displayed by the students towards the research conducted, underscoring the importance and necessity of investigating this particular issue. The substantial percentage of respondents guarantees a high level of reliability and representativeness regarding the survey results among students. The active participation of students indicates a significant reservoir of potential among young individuals within the university environment. It is crucial to capitalize on this potential optimally and enhance copyright literacy in the media sphere. **The questionnaire incorporates** a series of identical questions, enabling a parallel presentation and analysis of the responses. Additionally, there are specific questions tailored for the respondents, which will be presented and analyzed separately, distinct from the shared questions.

The primary objective of the initial inquiry in the questionnaire is to evaluate the media engagement patterns of the survey participants. The query, phrased as **“What do you engage in most frequently?”** offers a range of predefined options from which respondents can make a selection. The options include: *Watching TV news and publicist programs; Listening to radio news; Reading periodicals; Reading news online; Reading books (printed or electronic); Playing video or computer games; and Using the internet on their phone.* A total of 62 different multiple-choice responses were recorded for this question. The most common response, selected in 9.8% of cases (44 responses), was a combination of **“Reading news online, Reading a book (printed or electronic), and Using the internet on my phone.”** This line of inquiry serves to explore the participants' role as consumers of media content, implying that their subsequent answers may be influenced by their direct involvement with the media and their level of satisfaction.

In terms of assessing the perceived usefulness and value of various media platforms among the respondents, the second question inquires, **“Which media is the most useful and valuable for you?”** The results indicate that “Internet” and “Social Networks” were cited by 16% of the participants. A comprehensive breakdown of the responses can be found in Table 1, where it is evident that the Internet was mentioned as a possible answer in 76.5% of the multiple responses. This outcome aligns with the expectation and established knowledge that the contemporary information-driven society seeks rapid and convenient access to information facilitated by electronic and emerging media channels. Consequently, ensuring an immediate and continuous flow of information through electronic media and social networks can be regarded as a strategy to enhance copyright literacy within the media domain and engage the attention of modern learners, who largely constitute the primary user base of such platforms.

The subsequent question aims to ascertain the respondents' satisfaction regarding the content they consume. The question presented is: **“What types of information do you find most interesting in the media?”** The provided options include: *News and information programs; Documentaries and documentary information; Sports information and broadcasts; Youth programs; Entertainment programs; Talent discovery*

Table 1. Usefulness of Media

Selected Answer	Number	%
Internet	153	34,1
Internet, Social networks	72	16,0
Print media	9	2,0
Print media, Internet	12	2,7
Print media, Social networks	2	0,4
Radio	7	1,6
Radio, Internet	11	2,4
Radio, Internet, Social networks	3	0,7
Radio, Print media	1	0,2
Radio, Print media, Internet	2	0,4
Radio, Social Networks	2	0,4
Social media	34	7,6
Television	31	6,9
Television, Internet	36	8,0
Television, the Internet, Social Networks	37	8,2
Television, Print media	2	0,4
Television, Print media, Internet	4	0,9
Television, Print media, the Internet, Social networks	2	0,4
Television, Radio	5	1,1
Television, Radio, Internet	7	1,6
Television, Radio, Internet, Social Networks	3	0,7
Television, Radio, Print media, Internet	1	0,2
Television, Radio, Print media, Internet, Social Networks	6	1,3
Television, Radio, Social Networks	1	0,2
Television, Social networks	6	1,3
Total	449	100,0

programs; Fashion; TV series / Soaps; Movies; Music, music videos and programs; Culture; Nature and nature conservation; Business and finance; Computers and Technology; Games; Religion; I cannot decide; another type of information. The analysis of multiple responses reveals that the most frequently mentioned categories are “*News and Information programs*” (178 out of 449 responses), “*Documentaries and documentary information*” (105 out of 449 responses), and “*TV series / Soaps*” (91 out of 449 responses), as illustrated in Fig. 1.

The question “**Have you created any of the following media content in the last year?**” provides respondents with the following response options: *I wrote literary works*

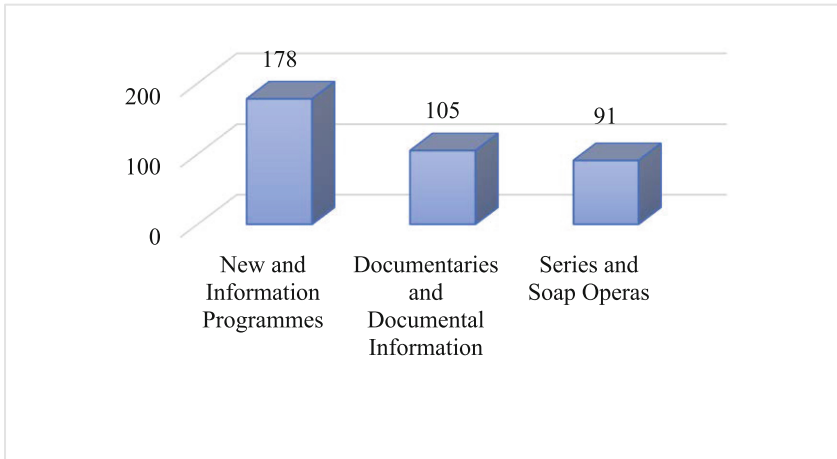


Fig. 1. The most interesting information in Media.

(book, essay, poem, blog, article); Video or audio materials (film, animation, song, video, meme, photo); I wrote a letter to the newspaper; I wrote a news story or a magazine article; Something else. Among the given options, the majority of respondents (49.89%) answered that they did not create any media content in the past year. The next most selected response was “Video or audio material” (film, animation, song, video, meme, photo, etc.), chosen by 14.48% of the participants.

The subsequent question in the survey pertains to **the participants’ level of familiarity with copyright**. It is a closed-ended question with several response options: *very low, low, moderate, high, and very high*. These options represent a scale for assessing the respondents’ personal opinions regarding their knowledge of copyright. The question serves to introduce the respondents to the study’s objectives and the specific topic being explored. Based on the provided data, the majority of respondents (234 out of 449) indicate a moderate level of familiarity with copyright. There are 24 respondents who claim to have no familiarity, while 5.35% state very low familiarity. Additionally, 22.05% of the respondents (99 individuals) report having only a limited understanding of copyright. These findings are visually represented in Fig. 2.

The question “**To what extent are you interested in media copyright issues?**” aims to determine the level of interest among the respondents, who are media content users, regarding copyright issues. The majority of them (43.88%) indicate a moderate level of interest in copyright-related issues in the media.

For the analysis, it is particularly important to focus on respondents who show an interest in intellectual property rights, specifically copyright and related rights. These individuals should be the target of proactive communication efforts, employing various communication models, to enhance copyright literacy within the university media environment (See Fig. 3).

In terms of professional orientation and awareness, the question is “**How integral is a comprehensive understanding of copyright to the practice of your selected**

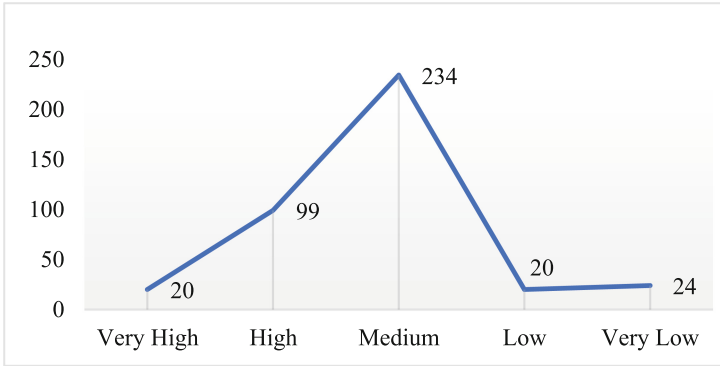


Fig. 2. The level of copyright familiarity.

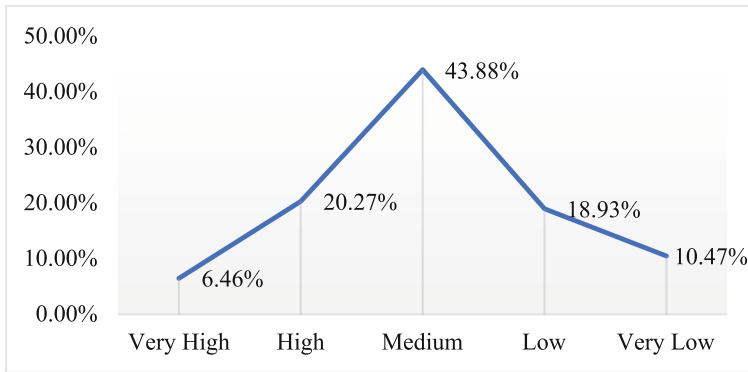


Fig. 3. To what extent are you interested in media copyright issues?

profession?” The largest percentage (37.19%) of respondents answered “High” (See Fig. 4).

In response to the question, “**Are you interested in copyright in the media you read on the Internet?”** the smallest number of respondents (38) expressed a high level of interest. It is noteworthy that the number of respondents identifying as ‘slightly interested’ (112) is nearly equivalent to those who responded as ‘I’m not interested, I’m interested’ (93). The majority of respondents demonstrated a level of concern for the copyright of authors whose works and materials they consume. This is evident from the responses: 157 respondents rated themselves as ‘rather interested,’ 112 as ‘slightly interested,’ 93 as ‘as much as I’m not interested, so much I’m interested,’ and 49 as ‘not interested at all.’ The number of respondents indicating a strong interest is also significant. It is important to recognize that while the respondents are not indifferent to the topic, a considerable portion of them believe that the respect for authors’ work in media content falls short. This lack of interest can manifest in a lack of commitment to issues of intellectual property rights, demotivation towards creativity and uniqueness, as well as a passive stance on the matter within the university environment. These findings

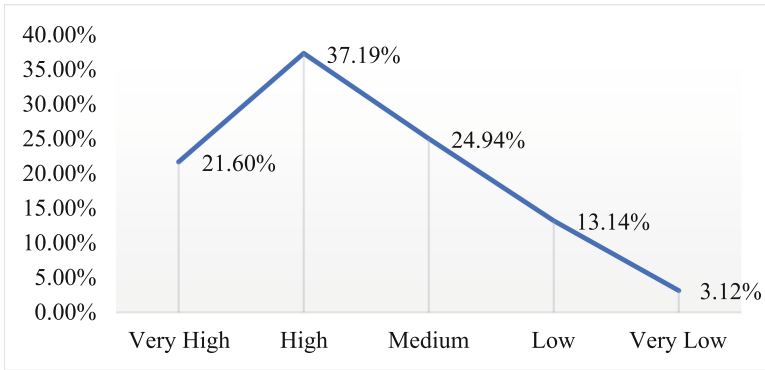


Fig. 4. Integration of copyright understanding in the practice of the profession

highlight the need for measures to enhance intrinsic motivation towards understanding IP rights issues.

The conclusion drawn from the survey is that the level of copyright literacy among students is predominantly moderate to low. This observation is reflected in the majority of respondents' answers. These findings align with the well-known fact of a significant lack of awareness and understanding of copyright and related rights within society. Of particular concern are the respondents who express disinterest in copyright issues in the media. Active engagement of this group is essential to enhance copyright literacy. This can be achieved through practical-focused training courses specifically designed for students studying fields directly related to IP rights. The questionnaire includes this question to explore potential reasons for low copyright literacy and to serve as a measure of control regarding media-related copyright literacy.

The survey also seeks to assess respondents' awareness of additional training opportunities on copyright-related matters. In response to the question, "**To what extent are you interested in media initiatives to raise your awareness of copyright issues?**", the largest percentage (37.64%) of respondents expressed interest. However, 19.15% indicated a lack of interest equivalent to their level of interest, while 24.72% showed only slight interest. The smallest group (6.24%) expressed strong interest. In summary, the general conclusion is that a significant part of the respondents pays attention to initiatives aimed at raising awareness of copyright issues, albeit to varying degrees.

The respondents assess their awareness of copyright issues in the media as insufficient. The survey examines the extent to which copyright is present in the curricula of programs.

To the question "**How extensively is copyright incorporated into the curriculum?**" the largest percentage (27.62%) indicated a low level of inclusion. The response options provided were: *Very high*, *Very low*, *Low*, *High*, *As low*, *As high*. Approximately 16.26% of respondents believed that copyright in the media is minimally represented in educational content, while 17.82% considered it to be highly integrated. A small part (5.35%) indicated that the researched issues were extensively covered in the curriculum of their studies. Interestingly, there is a notable overlap in quantitative terms between the percentages of respondents indicating a high grade (17.82%) and those indicating a very

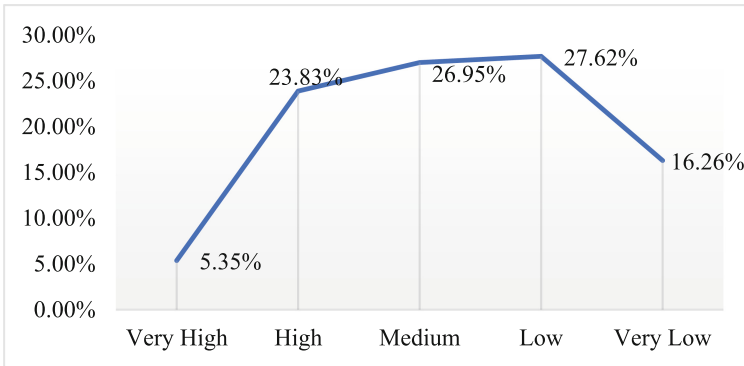


Fig. 5. How extensively is copyright incorporated into the curriculum?

low grade (16.26%). These closely aligned opinions suggest a lack of substantial coverage of copyright in the media within the curriculum, highlighting the need for additional information. Based on the obtained data, a more proactive approach is recommended for presenting copyright in the media, engaging in effective communication with learners (refer to Fig. 5). To address these findings, it is crucial to optimize the current training approach, identify measures, and take action to promote IP rights in the media. This may involve implementing specialized courses, additional classes, and practical exercises to enhance the understanding and awareness of disciplines intersecting with media and media policy. Such efforts will contribute to raising awareness and the importance of conveying consistent messages in the public space by students, journalists, and society at large, ultimately promoting IP rights in practice.

The findings of the study lead to the conclusion that alongside the imperative of actively disseminating information on IP rights, it is crucial to identify the specific type of information that students seek. This includes determining whether their interests lie in copyright, related rights, industrial property, or practical information that directly relates to their involvement as participants in media content. To ensure a comprehensive analysis of the collected data, it would be beneficial to involve an expert in the field of sociology who can define, analyze, and assess the reliability of the data based on objective criteria in the future analyses. Additionally, the influence of external factors on respondents' opinions should be considered in order to draw accurate conclusions from the study.

4 Conclusion

The survey results substantiate the well-established fact of low copyright literacy among the current generation of media-exposed students. The control questions further validate the initial findings of the respondents. The answers regarding the use of online materials without proper compensation reveal a lack of knowledge on the subject and a tendency towards inertia. Respondents generally accept the prevailing notion in the public and media sphere that everything on the internet is free, without questioning its accuracy.

Proactive communication, comprehensive provision of information on IP rights, and ongoing education are essential to gradually raise awareness, enhance understanding, and foster respect for journalistic work, as well as cultivate a legal culture. The evaluation of the respondents highlights a significant challenge in organizing and conducting continuous training on IP in the media.

Recommendations based on the survey results revolve around the imperative to increase copyright awareness among creators and users of media content. This includes fostering consensus on crucial media-related topics concerning IP rights, promoting unity in the messaging of media content creators, establishing active partnerships with media outlets and copyright-related institutions such as the Ministry of Culture, the Patent Office, WIPO, and non-governmental organizations dedicated to media literacy. These efforts aim to gain wider visibility and enhance the legal culture and specifically copyright awareness among young people in Bulgaria. In summary, the presented data reveal that the respondents identify similar issues, affirming the assertion of a lack of copyright awareness among educators involved in media content creation and consumption. Despite existing law courses, an educational program focused on media copyright literacy among students is necessary.

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Project Management Literacy. New Challenges for Librarians and Information Professionals in the European Union and Beyond

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Abstract. The European Universities Initiative (EUI) was established in 2017 to strengthen strategic partnerships across the EU between higher education (HE) institutions by building networks of universities. In 2022, there were already 41 European University Alliances (EUA) gathering 340 institutions. The majority of libraries, members of those alliances, participate for the first time in international projects that have specific requirements and workflows driven by grant agreement requirements. The paper presents an in-depth analysis of the skills and competencies rooted in information literacy needed for successful project management. The analysis resulted in a map of competencies needed to work on international projects funded by the EU. The analysis showed that the skills traditionally associated with LIS jobs are crucial while working on EU-funded projects. The map of competencies may be useful not only for the staff of EUI but also for the library management and other LIS professionals who wish to become members of project teams.

Keywords: EUI · European universities · information literacy · project management · TRAIN4EU

1 Introduction

For at least two decades the workflow of higher education (HE) institutions in Europe has been driven by the project approach. The European Union (EU) supports HE financially and aims at maximal internationalization and cooperation among European countries.

The European Universities Initiative (EUI) was established in 2017. Its ambition is to strengthen strategic partnerships across the EU among higher education institutions by building networks of universities across the EU which would enable students to obtain a degree by combining studies in several EU countries and contribute to the international competitiveness of European universities [1]. In 2019, EUI opened its first call for HE institutions' alliances, the next calls were in 2020 and 2021. At the end of 2022, there were already 41 European University Alliances gathering 340 HE institutions [2], and the latest call closed in January 2023.

Being a member of such an alliance results in a lot of change in everyday work practice and requires the acquisition of specific project knowledge and skills. For the

majority of libraries that are members of those alliances, this is the first time they have participated in joint, international (so also multicultural) projects that have specific requirements, terminology, and workflows driven by grant agreement requirements and expected outcomes.

2 TRAIN4EU Project

Transforming ReseArch & INnovation agendas and support in 4EU + (TRAIN4EU)¹ is a project led by 4EU + Alliance [3] in the years 2021–2023. Although it is not a research project like most others in Horizon 2020, it has defined a consistent methodology that uses an in-depth mapping of activities and assessments as a basis, so the existing best practice across the alliance can be easily adapted and combined. This approach also allows us to consider the very different framework conditions under which the six universities of the 4EU + Alliance operate, as well as to identify areas to develop completely new transformative measures. TRAIN4EU seeks to integrate research, innovation, and service to society into 4EU + Alliance. Moreover, it explores and demonstrates how 4EU + can link collaboration on research and innovation (R&I) in multiple ways to the collaborative work that is already developed in the Alliance. All of this is an important topic for the European Union, in addition to its societal dimensions.

The project consists of five transformation modules (named ‘work packages’). For each module, the project teams develop a comprehensive protocol that dictates parameters for mapping and assessment, as well as uniform formats for the various consultations that teams conduct, both internally in the alliance, and with external stakeholders [4].

The work package led by the 4EU + libraries is entitled Mainstreaming Open Science and aims at assessing best practices in knowledge sharing and scholarly communication in Open Access in 4EU +, as well as in Open Science implementation, to present recommendations, models, and tools on how to support Open Science.

TRAIN4EU is designed as a case study, where the institutions act as cases in a given transformation module. All six universities will provide examples of activities, procedures, practices, and know-how that will be analyzed and developed.

3 Methodological Approach

For the purpose of this paper, there were two sources of data collection. First was a review of literature on knowledge and project management and on new job requirements for librarians; the second one was the case study of work experience on the project TRAIN4EU, co-led by the academic librarians from the University of Warsaw Library (Poland) in the framework of the 4EU + Alliance.

According to Campbell and Yin, case study research is commonly found in many social science disciplines as well as the practicing professions [5, p. 34]. I was placed in the field to observe the workings of the case, as suggested by Stake [6]. The data for this case study was collected using participant observation, the project’s documentation review, and a description of the context. The boundaries of the case were time (the

¹ Project’s <https://doi.org/10.3030/101016674>.

project period), a relevant social group (librarians and information professionals), an organization (project team), and a geographic area (Europe). As with any qualitative study, the interpretation is emphasized. To audit the quality of my study, triangulation was conducted for data sources, the investigator, and the theory. I asked other members of the TRAIN4EU project to review the steps of my research process.

Since the skills and competencies rooted in information literacy are understood here as an umbrella concept (thus subsuming many related ‘literacies’), and have been deeply analyzed and discussed by several authors, this forms a smaller part of this paper. Emphasis has been placed, instead, on describing the lesser-known skills in more.

4 Analysis of Skills and Competencies Needed to Work in International Projects

4.1 Skills and “Literacies” Librarians Already Have

Knowledge and Information Management in Libraries. Librarians and information professionals know how to collect, create, store, share, and use knowledge and information. They are aware of processes of knowledge and information flow through the project, as well as communication diffusion and dissemination. They also are used to group work and know the value of communities of practice, described by Bartlett [7, p. 100], as groups of people with shared interests or sets of specific issues that come together in person or virtually to work through problems, brainstorm opportunities, tell stories, discuss best practices, review lessons learned, and network. They are “for practitioners, by practitioners”.

Library and information professionals are also familiar with diverse knowledge management tools and undoubtedly that is this profession’s asset and a strong component of information competencies. Knowledge management tools act as project management support to meet the project’s goals. Different tools and technologies might be used at each phase of the project management cycle. For EU projects, groupware (collaboration software) and document management systems are crucial (sometimes the term ‘file management system’ is used interchangeably).

Information Literacy, Digital Literacy, Data Literacy, Science Literacy. Information and digital literacy skills useful for the work mentioned in the previous paragraph and related to document management systems (DMSs) are, among others, document classification using metadata or keyword searching and retrieval systems. Google Drive, MS Teams, or Dropbox are examples of the most popular DMSs. Groupware facilitates remote collaboration, which is particularly important when multiple project team members come not only from different institutions but also from different countries. Google Drive or MS Teams which both include a mix of asynchronous and synchronous tools can serve as good examples of groupware.

Data literacy comprises the ability to handle metadata, the theoretical knowledge and application of copyright, as well as access to data, data sharing, data archiving, and its reuse. These are skills that are useful while preparing a data management plan and managing data throughout the project.

Science literacy, as described by Hopkins [8], is an understanding of scientific concepts and processes in a way that informs one's ability to make decisions, participate in civic and cultural affairs, and contribute to economic productivity. The three pillars of science literacy are the understanding of content knowledge, the understanding of scientific practices, and the understanding of science as a social process. These are the skills usually acquired through higher education; in the education of librarians and information professionals, there is certainly more emphasis on their understanding and ability to apply them in practice.

Research Data Management and FAIR Data. All EU-funded projects are required to compose a data management plan and then to produce FAIR data and deposit them in certified open data repositories. Particularly projects led under Horizon Europe require access to FAIR data and research outputs (e.g., software, models, protocols) according to the principle “as open as possible, as close as necessary”. The FAIR acronym stands for Findable, Accessible, Interoperable, and Reusable. The FAIR principles are still relatively little known to project teams, while librarians are already reasonably well prepared (and they are training continuously) to support data practices, and their skills to implement good practices in supporting projects in regard to open science are advanced.

4.2 Skills and “Literacies” Librarians Should Improve

Approaches to Project Management. In Poland, Wojciechowska [9] analyzed the content of competition notices and their requirements for candidates for the post of library director (of different types of libraries). Among them was “experience in project management”. The ability to manage projects as one of the competencies of a 21st-century librarian (not necessarily applying for a managerial position) was also included in the proposed competence profile by Marcin Karwowski [10]. A Polish “Lexicon of Management and Marketing in library science” [11, p. 189] defines a project as “an undertaking that has a start date, specific objectives, and limits, a fixed scope of responsibility and distribution of activities, a budget and a completion date. The basic characteristics of a project are therefore: defined in time, unique (one-off), complex, and purposeful. In contrast to a process, which is staggered over time and consists of specific and repetitive activities, a project is something new, unique in the organization, produced in a creative and innovative way with clearly defined time limits”. According to the authors of this definition, three approaches can be distinguished in project management practice. These are 1) the traditional project management style when a project is implemented in stages that are executed in a cascading manner; 2) the Agile (adaptive) approach, where the project team does not follow a predetermined plan but follows the ever-changing needs of the audience; and 3) the extreme project management that implies the need for planning and control, but at the same time is very flexible in adapting to change.

In literature and in practice, there are diverse approaches to project management. In big, often international projects funded by the public sector, the dominant approach is traditional project management (TPM), usually associated with the waterfall approach. TPM identifying characteristics are low complexity, few scope change requests, well-understood technology infrastructure, low risk, experienced and skilled project teams,

plan-driven projects, and linear or incremental project management life cycle model [12, p. 40–44].

The waterfall approach in project management became popular, particularly with the increasing number of externally funded projects including those financed by the EU. Waterfall assumes careful planning of the individual key steps in the subsequent implementation of the project. It requires the need to anticipate the effects and final outcome of the project which is implemented sequentially on the basis of a previously created detailed document. It includes a graphical representation of the project phases – the so-called Gantt chart showing the consecutive stages of implementation. Waterfall at an early stage forces the team to define precisely the objectives of a given activity, as well as what they would like to achieve as a result of it. It requires a lot of documentation; it is suitable for international projects, involving partners from different countries. The waterfall should be enriched with “Agile” [13].

The Agile approach began in 2001 with the publication of the Manifesto for Agile Software Development [14], which is considered to be the beginning of the systematic development of Agile methodologies in the technology industry (See Fig. 1 and Table 1 below for characteristics of the Agile approach). Since then, the Agile method appeared to be beneficial in management, perceived as the most modern methodology in project management, and has led to extensive application also in non-software development contexts. In recent years, Agile has also gained popularity in library management [see 15, 16, 17, 18].

Figure 1 compares the traditional (here named ‘bureaucratic’ by Denning [19]) and Agile project approaches.

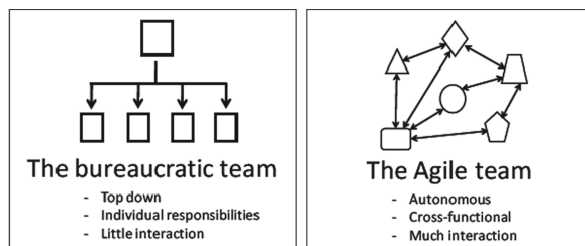


Fig. 1. Agile vs. bureaucratic team (Source: Denning, 2018, p. 33)

Table 1 summarizes Agile and waterfall project approaches, as suggested by the OPERAS-PL project team [20].

From the library management perspective, the Agile methodology seems to be a good solution to manage project outcomes, such as new services for users, and new ICT solutions. In contrast, the waterfall approach will work better when managing a longer project involving a larger group of employees.

In the TRAIN4EU project, as in the majority of big EU projects, we apply a waterfall approach; however, some parts of it show signs of Agile, too.

Cross-Cultural Skills. Intercultural communication has been the subject of research work since the 1960s. A pioneer in this field was the Dutch scholar Geert Hofstede, author

Table 1. Agile vs. waterfall – two styles of project management (Source: OPERAS-PL)

	AGILE	WATERFALL
Main features	Working in iteration mode that is, producing successive project elements in small time intervals (<i>sprints</i>).	Working step by step, from the detailed plan to the project implementation sequence.
Pros +	Ensures flexibility and rapid response: it allows new problems to be identified on an ongoing basis and the use of experimental solutions.	Requires a precise definition of the objectives of the action from the outset - requires the establishment of a precise timetable and budget (essential for grant applications).
Downsides ↓	A small number of initial assumptions and plans can hinder holistic project planning and, in some cases, deeper research reflection, which is difficult to plan in <i>sprints</i> .	Limits the scope for experimentation and adaptation of the workflow to new assumptions or needs.
Application	<ul style="list-style-type: none"> ✳ In projects where short regular meetings are possible ✳ As part of a larger project on specific tasks requiring a flexible approach. 	<ul style="list-style-type: none"> ✳ In small teams with clear hierarchies ✳ In international projects of varying standards ✳ With the cooperation of various institutions.

of the book *Cultures and Organizations: Software of a Mind* [21], but mostly known for his theory of cultural dimensions. The six dimensions of national cultures – power distance, individualism vs. collectivism, uncertainty avoidance, masculinity vs. femininity, long-term orientation vs. short-term orientation, and indulgence vs. restraint – are until recently applied in practice, in international communication, management, and marketing, and have inspired several research studies as well as improving the organizational structure and communication in many international enterprises. Awareness of how diverse national societies cope with particular challenges is also invaluable while working in multiple teams and on international projects in libraries.

The fact that the members of a project group are, for example, only European countries does not mean that there are no cultural differences among them. Erin Meyer, who also explores intercultural communication, in *The Culture Map* [22], her most recognized book, provides a systematic, step-by-step approach to understanding the most common

business communication challenges that arise from cultural differences, and offers steps for dealing with them more effectively. For example, she writes about the concept of low- and high-context communication. She describes the strategies for working with people from high- and low-context cultures, as well as strategies for multicultural collaborations, the most important from the perspective of this paper. Figure 2 summarizes the features of low- and high-context communication and shows examples of countries that belong to it.



Fig. 2. Low- and high-context communication (Source: Meyer, 2014, p. 38)

In the TRAIN4EU project, there is a mix of low- and high-context cultures, which is an interesting experience. This is compounded by differences in language skills. The “high-context” project team members need to get used to simple and precise messages formulated by the “low-context” ones in a language foreign to everyone.

That is why it is so important to learn intercultural communication. The process of learning passes through three phases: 1) awareness – the recognition that the environment where people grow shapes their mentality, called by Hofstede a ‘mental software’; 2) knowledge – one will probably never share the cultural values of another, but s/he can learn about the culture, its symbols, heroes, and rituals to know where these values differ; 3) skills – based on awareness, knowledge, and practice – the ability to recognize and apply the values of other culture, as well as to resolve the communication problems [21, p. 230–231].

English Language Skills. Although currently only two countries with English as the official language are members of the EU, English is a working language of the EU and so of the project applications and management. Even though the English proficiency level is not officially required, in practice, it is not possible to work on international projects without it. The level of English (and other foreign languages) fluency depends mostly on the education system in a given country. Regarding higher education, it depends on the importance attached to the teaching of foreign languages in a given field of study. One might be tempted to conclude that in programs such as library and information science,

this has rarely been a priority. This is particularly the case in widening countries that are, as defined by the European Commission, countries with low participation rates in the Seventh Framework program of the European Community for research and technological development including demonstration activities (FP7) and Horizon 2020 projects. Among EU member states, these are Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia, and Slovenia.

The consequences of this negligence are still being suffered today. Enabling staff to improve their language skills should become a priority for library managers.

Work in Project Teams. The skills and competencies of project team members are a key factor in the success of all projects. As the characteristics of the expected outcomes change, so does the profile of the project team best suited to achieve those outcomes. Projects in the TPM model may have less experienced team members and even less experienced project managers working on them. Such teams can be geographically dispersed without losing their effectiveness [12, p. 88]. According to Wysocki, the following characteristics have been identified by project managers as being the most important for core team members to possess: commitment to the project, shared responsibility, flexibility, task-oriented, ability to work within schedules and constraints, trust and mutual support, team-oriented, open-minded, ability to work across structure and authorities, ability to use project management tools [12, p. 229–230].

5 Map of Competencies - Project Management Literacy

An overview of information literacy-related skills and competencies needed for work on international projects is the main outcome of this paper. As it has even become fashionable for some time to refer to such sets of competencies and skills as “literacies”, for the purposes of this analysis I propose to use the term “project management literacy” (PML). I understand PML as a set of skills and competencies essential to becoming an independent and self-confident member of a project management team.

It is worth noting that the term ‘literacy’ is clear and well-understood in the English language; this is not the case in many different languages. As I wrote in one of my previous works, analyzing the translation of the term ‘information literacy’ into French and Polish “in literal translation, in non-English speaking countries, ‘literacy’ is a term connoted culturally, in no way equivalent to ‘literacy’ used in the Anglo-Saxon literature” [23, p. 54]. So I suppose that in many languages the PML would be translated descriptively, where the word ‘literacy’ would not be translated as ‘alphabetization’ but as ‘competencies’.

The map of competencies may be useful not only for the staff of European University Alliances but also for other librarians and information professionals who would like to become members of project teams and for the library management who hire them.



Fig. 3. Project Management Literacy Skills Map

6 Conclusions

The analysis showed that the skills traditionally associated with librarians' and information professionals' jobs, such as fluency in metadata, information literacy, information management, or research data management (including FAIR principles) are crucial while working with EU-funded projects.

Hence, on the one hand, librarians and academic professionals may already become important actors on the scene of a project-based workflow; on the other hand, there are some competencies to be refined, that should be improved not only to comprehensively support the researchers but also to be able to conduct projects independently.

In 2022, LIBER published an RDM Workshop Report [24], where one of the concluding sentences was that skills that librarians already have and do not need to develop depend heavily on the library [p. 2]. It is hard to disagree with such a conclusion also in the case of project management skills, particularly taking into account the considerations presented in the above sections.

I will suggest the gaps can be filled in two ways. First, in the process of university education, the subject of project management could be included in the curriculum of studies. This is probably already partly the case in many academic centers but could be spread through initiatives such as the BSLISE (Building Strong Library and Information Science Education (BSLISE) a working group within IFLA that recently published *IFLA Guidelines for Professional LIS Education Programmes* [25] and works to strengthen the international quality of LIS education to perfect the LIS professional practice.

Second, as mentioned in the sections on improving English language skills and working in project teams, library managers should make every effort to enable employees to continuously develop and improve their skills. Understandably, this may not always be easy to implement, especially now, at a time of budget cuts and the economic crisis sweeping Europe. That is why it is worth thinking about grassroots library mentoring initiatives. It is an extremely important and widely used topic for example in the United States – just to mention the recently released three-volume publication dedicated to academic library mentoring [26]; meanwhile, it seems that in Europe there is still insufficient appreciation of its value and the benefits it can bring to both individual employees and the institution as a whole.

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Information Literacy Instruction and Education



Research and Conclusions Regarding Using Problem-Based Learning -PBL- in Teaching

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Abstract. Research on Problem-Based Learning (PBL) in teaching has provided valuable insights and conclusions. PBL is an instructional approach that focuses on students actively engaging in solving real-world problems. The authors utilized clustering with a VOS Viewer tool to identify thematic clusters or research topics within the literature. We designed one questionnaire by searching about PBL in a Clarivate analytics data base in order to, measure the impact of the PBL method on students. This research took place after students completed the information literacy (IL) course. We started from the hypothesis that these students had communication skills and had developed critical thinking. The success of this method depended on the skills acquired in the IL course. Some results we found were that: PBL fostered teamwork and collaboration, as students worked together to solve problems; Students developed effective communication, negotiation, and interpersonal skills, essential for success in professional environments; and PBL promoted positive attitudes towards learning, including increased confidence, self-efficacy, and enjoyment. Furthermore, students exposed to PBL demonstrated better long-term retention of knowledge and skills.

Keywords: Problem based learning · scientometrics · VOS Viewer · qualitative analysis

1 Introduction

Problem-based learning (PBL) is a method of instruction where students are given a real or realistic problem, such as a case study or hypothetical situation, and use inductive reasoning to learn both information about the topic and how to think critically about it [1, 2].

PBL is an educational approach that emphasizes active and student-centered learning through the exploration and resolution of real-world problems. Many authors contributed to the development and understanding of PBL. Here are a few notable authors and their perspectives on PBL:

1. Howard S. Barrows: Barrows is considered one of the pioneers of PBL. He emphasized the importance of problem-solving skills, self-directed learning, and the integration of knowledge from various disciplines [3].

2. John Dewey: Although not specifically focused on PBL, Dewey's ideas on experiential learning and the importance of context and problem-solving influenced PBL approaches. He emphasized the connection between learning and real-life experiences [4].
3. Jean Lave and Etienne Wenger: Lave and Wenger's work on situated learning and communities of practice provided a theoretical framework for understanding the social nature of learning in PBL. They highlighted the importance of collaborative problem-solving and learning in authentic contexts [5].
4. Donald Woods and Maggi Savin-Baden: These authors contributed to the understanding of PBL through their research on the design and implementation of PBL in various educational settings. They explored aspects such as problem formulation, facilitation, and assessment in PBL [6].

In this study, we reviewed the relevant literature, using scientometric methods, to see the most relevant research in the field. Then we presented our own findings from applying PBL in the 2022 s semester of the *Digital Repository Management* course for students from the *Digital Media* specialization after the students completed the IL course.

We found that the PBL method enhanced students' ability to identify, analyze, and solve complex problems by actively using information gained through real-life experiences. IL skills enabled students to organize and communicate information effectively. They learned how to synthesize and summarize complex information, cite sources appropriately, and present their ideas in a coherent and persuasive manner.

2 Literature Review by Scientometric Methods

Scientometric methods helped us review literature quickly, using algorithms to automatically select the most relevant articles. Scientometric methods helped us create an image on a certain field within a certain database. Using the research question "problem-based learning", we obtained 8,631 results in the Web of Science database. We downloaded the results in a tab-delimited file format with full records and cited references for further analysis.

We analyzed the data with VOS Viewer, a software for scientometric analysis [7]. One of the key features of VOS Viewer is its ability to identify clusters of related research based on co-occurrence of keywords in article titles, abstracts, or keywords. These clusters represented groups of articles that were highly related to each other in terms of their content and could provide valuable insights into the structure of a research field or discipline. We analyzed keywords used by authors. Four hundred and ninety eight terms used in the document descriptions occur at least ten times. The software calculated the relevance, and 233 terms were identified.

The term map was generated, and four clusters were identified: Teaching methods using PBL, PBL in medicine, PBL effects on students, PBL in engineering education (Fig. 1).

citations within the selected articles to identify instances where the phrase “problem-based learning” was mentioned. This approach helped establish a connection between the scholarly literature and the pedagogical technique. We used data visualization techniques or network analysis to identify patterns, relationships, or clusters within the citation data. The map provided insights into the scholarly discourse and the extent to which the concept of PBL was discussed and referenced within the academic community. The map served as an indicator of the prevalence, popularity, and scholarly engagement with PBL as a pedagogical approach in the academic literature.

It is important to note that PBL has been studied and written about by numerous authors. Although this is just a brief overview of some key contributors to the field: [8–23] this literature review revealed the great emphasis authors put in using PBL in teaching and the very positive impact this method had on students’ learning. In our research, below, we explored if the PBL approach would also be appreciated by Digital Media students.

3 Methodology

Within the EU project 2021-1-IE02-KA220-HED-000035812-Developing Information and Research Skills for Business, Innovation and Entrepreneurship – INRS, modern teaching methods based on PBL were implemented at Transilvania University. The PBL model was implemented in the Digital Repository Management course for students from the Digital Media specialization, Faculty of Sociology and Communication, after they completed the IL course. We started from the hypothesis that these students had communication skills and had developed critical thinking. The success of this method depended on the skills acquired in the IL course. Another hypothesis was that PBL was not used in teaching, this method was introduced and the impact of the change in the pedagogical approach for students was measured.

PBL is a student-centered and constructivist educational method that enhances the development of problem-solving skills and critical thinking. The students were introduced to the PBL approach, presented as a pedagogical model, while also the differences between the inverted pedagogy and classical pedagogy were explained to them. Activities were carried out where a problem was defined, the students saw how the specialists work in practice, then the theoretical model was presented to them, after which they made practical applications. A questionnaire was designed to measure the impact of the PBL method on students. The students’ opinions about the method were followed; they indicated what they thought was positive and what they thought was negative about PBL.

In the end, an online questionnaire was released in Survey Monkey with 21 questions. All 61 students completed the survey. In terms of gender, 23 were male and 38 were female. The *Digital Media* specialization students were specializing in Digital Media in their second year of study from the Faculty of Sociology and Communication.

4 Results

The survey results showed that students appreciated the implementation of the PBL method and were satisfied with the pedagogical approach and with the knowledge gained. Cronbach’s alpha coefficient [0.866] demonstrated the internal consistency of the questionnaire items and the reliability of our findings.

We conducted an initial exploration of the entire dataset and identified patterns or commonalities among the items. Based on this analysis, we selected the 9 items that best exemplified these patterns or represented the most significant variations in the data. We considered these items essential for addressing the research objectives and providing valuable insights into the research topic.

We present, below, the responses to those questions that are the most relevant:

Q1: Have you heard of problem-based learning? (Fig. 3)

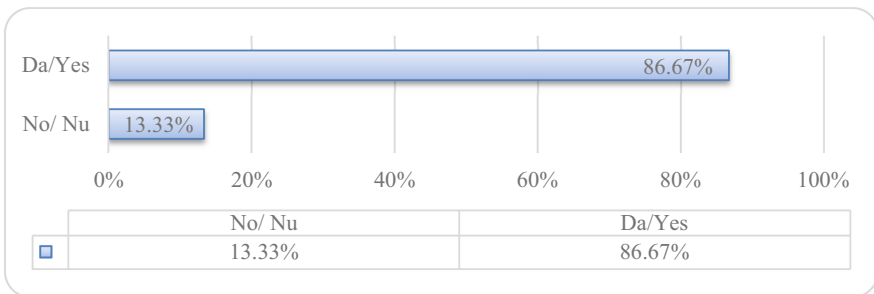


Fig. 3. If students heard about PBL

Q2: Which of the open activities did you participate in? (Fig. 4)

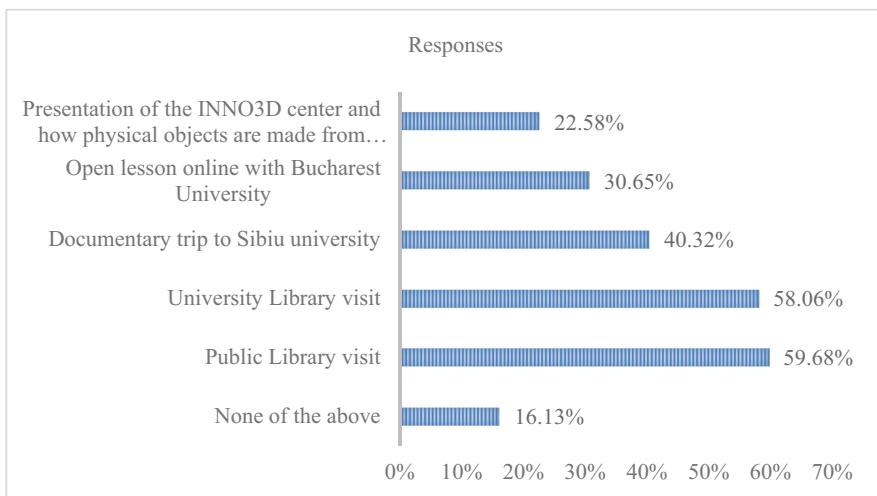


Fig. 4. Open activities students were involved in

Q3: To what extent did your visit to the museum facilitate your understanding of the process of document creation? (Fig. 5)

(Likert scale: 1 - very small, 5 - very large).

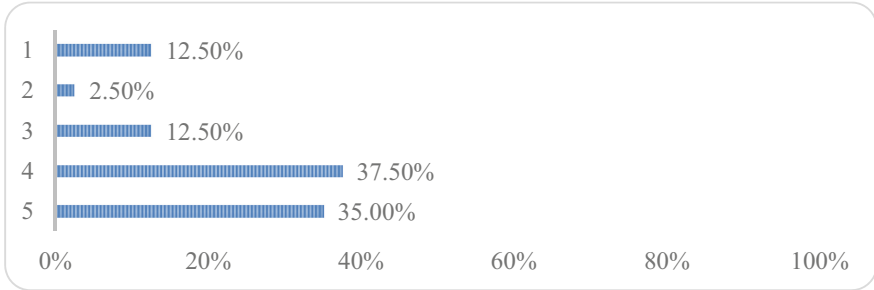


Fig. 5. Impressions about student visit to museum

Q4: To what extent library visits helped your understanding of the process of cataloging documents? (Fig. 6)

(Likert scale: 1 - very small, 5 - very large).

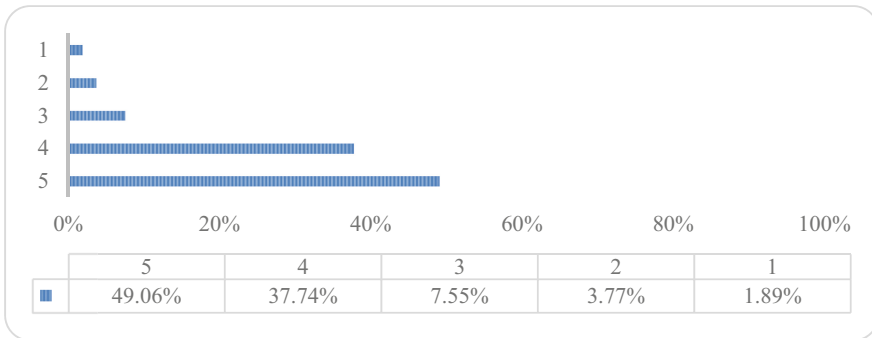


Fig. 6. Student understanding about cataloguing process

Q5: To what extent did the online presentation of Bucharest university facilitate your understanding of digital repository creation? (Fig. 7)

(Likert scale: 1 - very small, 5 - very large).

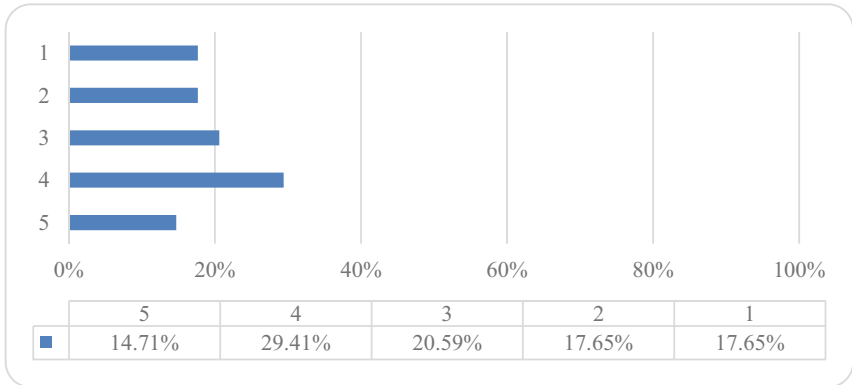


Fig. 7. Student understanding about digital repository creation

Q6: To what extent do you consider that the teaching methods used in the course/seminar have helped you to better understand technical concepts? (Fig. 8) (Likert scale: 1 - very small, 5 - very large).

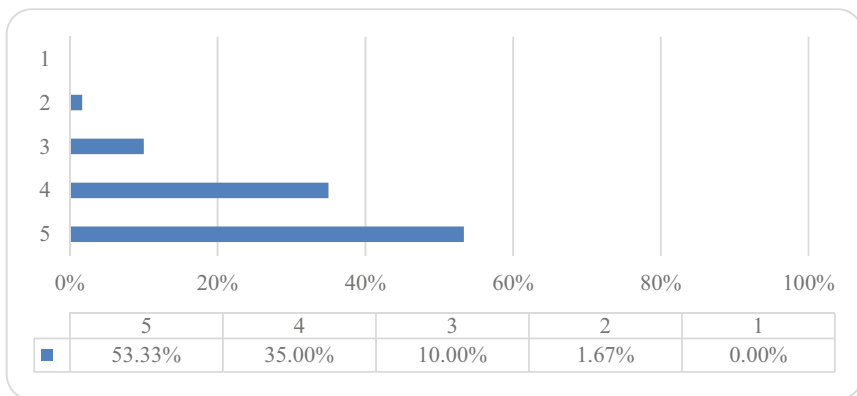


Fig. 8. Student understanding about teaching methods

Q7: To what extent do you consider that the teaching methods used in the course/seminar have helped you to understand the problems faced by people working in the field? (Fig. 9) (Likert scale: 1 - very small, 5 - very large).

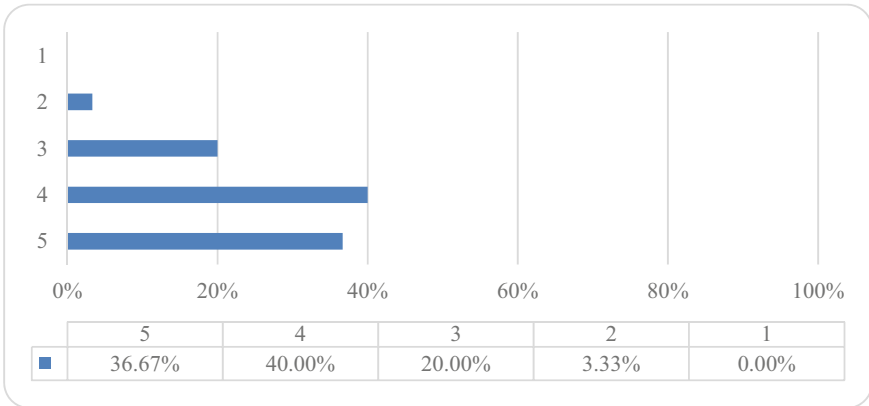


Fig. 9. Student understanding about people working in the field

Q8: To what extent do you consider that the teaching methods used in the course/seminar have helped you to gain knowledge about creating digital libraries/depositories? (Fig. 10)

(Likert scale: 1 - very small, 5 - very large).

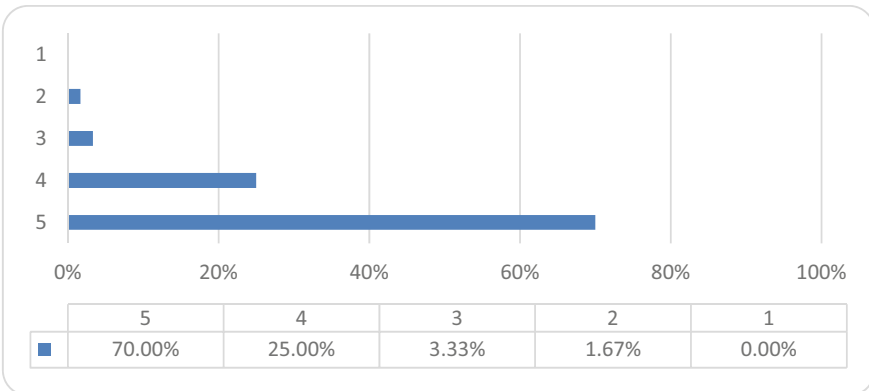


Fig. 10. Student understanding about creating digital repositories

Q9: To what extent do you agree that you have been more involved in the activities of this course/seminar compared to activities from other courses/seminars? (Fig. 11)

(Likert scale: 1 - very small, 5 - very large).

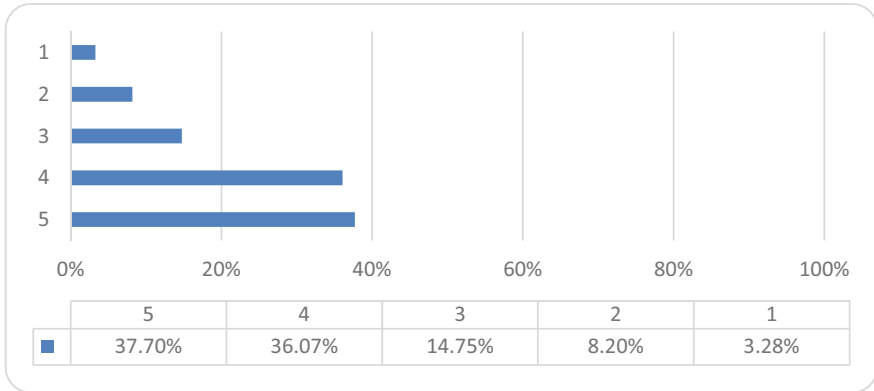


Fig. 11. Student understanding about involving in PBL

5 Conclusions

Research on PBL in teaching has provided valuable insights and conclusions. PBL is an instructional approach that focuses on students actively engaging in solving real-world problems. Several key findings and conclusions have emerged from studies on its effectiveness, which we also verified by the impact of our own implementation of PBL in teaching:

Improved Problem-Solving Skills: PBL enhanced students’ ability to identify, analyze, and solve complex problems. By working collaboratively on authentic scenarios, students developed critical thinking, creativity, and problem-solving skills.

Active Engagement and Motivation: PBL promoted active learning, as students took responsibility for their learning and drove the problem-solving process. This approach increased student motivation, engagement, and intrinsic interest in the subject matter.

Deeper Understanding and Knowledge Retention: PBL encouraged deep learning by connecting new knowledge to existing concepts and real-world contexts. Students developed a holistic understanding of the subject matter, facilitating knowledge retention, and transfer to future situations.

Qualitative research demonstrated the need to change the classical learning method by applying interactive, intuitive methods to engage the student more actively in the teaching process. Especially in the field of LIS, this method was much more appreciated considering the dynamics of changing technology and the mentality of students. The model and activities can be implemented to other courses. Following the results of our scientometrics analysis, one of our reasons for applying PBL in the course was to see if Digital Media students would appreciate the PBL approach.




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Teaching Healthcare Students to Deal with Information Sources: Implementing the HUMAN Framework

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Abstract. This study summarises an evaluation of the HUMAN framework for instructing healthcare university students in information literacy, specifically focusing on preventing plagiarism. The objective was to impart knowledge to these students regarding proper work practices when utilizing information sources and to improve their motivation needed to deal with the problem of plagiarism. To this end, we developed and provided students with self-study materials, exercises, and a workshop implemented in a classroom with 30 participants. We evaluated the impact of the instruction through an analysis of the outputs generated by the students and a follow-up questionnaire. Results indicated a considerable positive effect of the instruction. While students appreciated the video presentation, they desired additional examples depicting the framework's application to specific scientific texts.

Keywords: Plagiarism · information literacy instruction · higher education · healthcare students · HUMAN framework

1 Introduction

Our study aimed to evaluate the usability of a selected teaching method for introducing information sources on a specific topic to a specific target group. In our approach, the topic included plagiarism prevention and the approach involved referencing in the text and in a list of literature, as well as evaluation of information sources in students' seminar works, theses, and scholarly publications. For this purpose, we focused on the bachelor's degree study programs of paramedic practice and midwifery at Masaryk University. More specifically, we used the HUMAN framework, which we assumed had a potential to help improve both the competencies and motivation of our practically oriented students. The study proved both the educational and motivational effect of the teaching method and its potential portability to instruction of other target groups.

As Czech law requires at least a bachelor's degree to practice the profession of midwife and paramedic [1], there is a growing need to provide students with not only field-related knowledge and practical skills but also research and academic writing skills, including proper use of information sources. University departments often fail to find a way to integrate these topics in their classrooms as their students prioritize the former [2]. This problem is particularly acute in practice-oriented fields such as healthcare. Nevertheless, it seems that the importance of information literacy (IL) instruction has been gradually acknowledged by faculties who reported to have experience with various teaching methods and even with a successful cooperation with academic libraries [3, 4].

Yet, existing IL publications rarely focus on midwives and paramedics [5]. These study fields are not incorporated within higher education systems worldwide and, in some instances where they are included, the number of students in such programs is not extensive. Focusing on IL, we can see some similarities in other non-medical healthcare specializations – nurses – that are significantly more often addressed. The Association of College & Research Libraries (ACRL) defined recommended IL competencies for nurses [6], which include determining one's own information need, identifying potential sources of relevant information, evaluating selected information and their sources, and using the information effectively and ethically. Some of these competencies are more connected with academic writing, while others are essential for evidence-based healthcare (e.g., credibility evaluation). Participants of a Delphi study among Australian and New Zealand university staff perceived skills in proper work with information sources as essential in the paramedic practice curriculum [5]. Similarly, Smriti [7] argued that dealing with plagiarism in nursing and other healthcare studies was essential in relation to academic integrity and ethics.

In spite of a declared relevance of IL skills for healthcare students, research showed that nurses' IL often did not reach the level recommended by professional associations for students [8] and practicing nurses [9]. Moreover, some studies proved low competency levels on source evaluation [4, 10]. A systematic review and meta-analysis by Fadlalmola et al. focusing on nursing students reported that more than half practiced plagiarism (paraphrasing without referencing was the most common form) despite relatively high knowledge and declared attitudes against plagiarism. On the other hand, educational interventions against plagiarism were usually positively received by students [11].

Because we could not address the topic on the curriculum level, we resorted to innovating a preexistent course by implementing a new teaching method. For these purposes, we decided to modify the HUMAN framework introduced by a team from Technische Hochschule Ingolstadt at ECIL 2021 [12]. The framework has been previously successfully piloted with practically oriented engineering students [12] and in a practically oriented international management course [13].

2 HUMAN Framework and Original Study

The HUMAN framework was developed to address the problems of students of science, technology, engineering, and math (STEM) and economics subjects: they were often overwhelmed with the correct use of sources. They were particularly overwhelmed when confronted with the distinction between general and specific subject knowledge, evaluation of sources in unusual formats (raw data, source codes, journalistic texts, and other),

and the overflow of digital information [12]. This lack of “source literacy” often led to unintentional plagiarism and required a didactical approach from a perspective that was not exclusively normative, one that combined IL with content usually covered by writing centers [12]. On this premise, Baldarelli [12] developed a new concept based on the BEAM model designed by Joseph Bizup in 2008 for academic writing in the humanities [14]. This new concept encouraged analyzing academic sources according to their function in the text by no longer categorizing them as primary, secondary, and tertiary, but as rhetorical components of scientific argumentation. The original BEAM categories were accordingly expanded and renamed in German as *Hintergrund* (background), *Untersuchungsgegenstand* (research object), *Methode* (method), and *Argumentationsstütze* (argumentation support). Each category described a function of the source to which specific media types, like textbooks, handbooks, journal papers, or their sections (such as introduction or discussion) were usually connected. A new category was designed specifically for STEM and economic studies, *Normativen Rahmen* (normative frame), that encompassed a unique technical literature like patents and standards. The resulting HUMAN acronym gave the new framework an apt and memory-friendly name. The resulting HUMAN framework is visualized in Fig. 1.

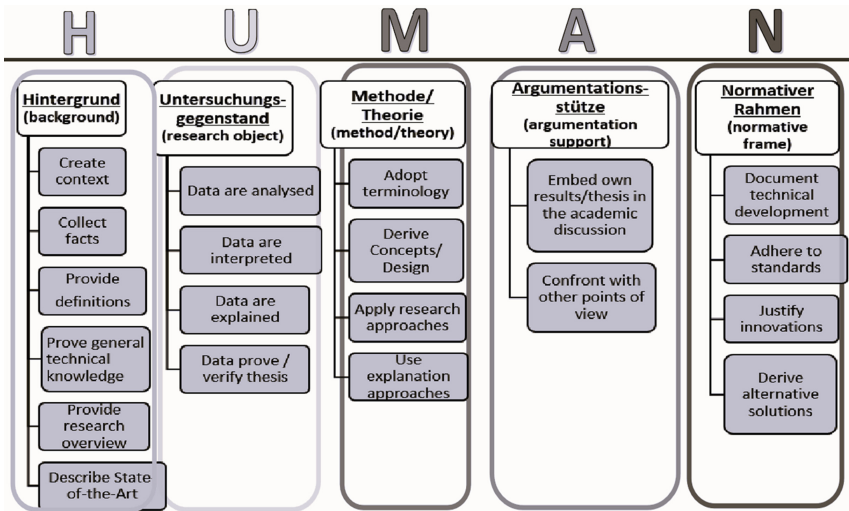


Fig. 1. The HUMAN framework: function of sources [12]

The authors initially implemented the HUMAN framework in courses in the summer of 2019. A think-pair-share worksheet for familiarisation with the new categories and a set of discussion materials were designed [12]. In the following step, Treffer [13] embedded the HUMAN Framework in a preexistent, interactive, and trackable e-learning module, splitting it into two modules about research in scientific databases. Treffer evaluated two new modules with a mixed-methods approach as part of an economics pilot course: two seminar groups of consecutive years with a similar setting had to absolve pre- and post-test, Moodle activities, and a final written examination. One group got the old

learning module without the HUMAN Framework, and the other new learning modules with an improved learning media design and the inclusion of HUMAN. The results showed that the improvement from the pre- to post-test of the HUMAN-group is slightly higher than that of the other group, especially in source evaluation and citations. The performance increased in the post-test of the group with HUMAN were more significant (13.74%) than in the group without HUMAN (9.00%). Particularly striking was the improvement in understanding the sources (24.76% vs. 10.14%) [13]. Furthermore, the analysis of the final written examination showed that students of the HUMAN-group used sources of higher academic quality in their bibliographies [13].

As for future uses of the framework, with the post-pandemic return to on-site lessons, a new exercise has been developed for the upcoming semester. In this lesson, students of the study program Artificial Intelligence should individually analyze a dissertation's bibliography: their task is to identify different types of media and determine their function according to HUMAN, depending on their location in the text (introduction, central part, or discussion).

3 Description of IL Course and Evaluated Module

In 2019, many departments of Masaryk University underwent a revision of their study curricula. Management of the midwifery and paramedic practice study programs (Faculty of Medicine, Department of Health Sciences) perceived the need to improve the IL skills of their students, hence decided to include two IL courses among the compulsory subjects. As they lacked the subject matter experts, they asked the Department of Information and Library Studies to provide the instruction. As part of the course preparation, they defined the most needed topics based on students' weaknesses: basics of academic writing, searching for information in a library catalogue and professional databases, correct referencing of used sources, and processing and interpreting quantitative data. Moreover, they pointed out that some teachers did not address IL competencies in written assignments; for example, they did not enforce correct handling of sources and did not prosecute plagiarism.

This was a starting point of cooperation between the departments, and we teachers of the courses had minimal awareness of the students' needs, interests, and competencies. Therefore, we used general instructions in selected IL topics in 2020. The following year, we significantly changed the concept of the covered topics based on gained experience. We simplified the content, added new content based on requests and newly identified information needs (e.g., examples of work with reference managers or citation styles), and supplemented the online asynchronous course with regular online meetings. Despite increased teacher and student satisfaction, we still perceived insufficient student motivation and acceptance of the provided instruction.

Hence, we decided to implement the HUMAN framework into the instruction in the spring semester of 2022. The course module in which the methods was intended to be used focused on correct work with information sources in an academic text, use of different citation styles, creation of bibliographic records and, most importantly, exploration of different reasons why to refer to sources in academic texts. For this purpose we translated the original framework (see Sect. 2) to the Czech language as *východiska*

(background), *předmět výzkumu* (research object), *metodologie* (method), *argumentace* (argumentation support), and *normativní rámec* (normative frame), and adapted it for the thematic area of healthcare (e.g., by including healthcare-specific information sources, such as electronic health records and clinical reports). Except for these minor changes we kept the framework in its original form and did not add or remove any categories. Then, we created self-study material consisting of a video presentation (about four minutes long) explaining the framework, followed by an assignment and an online workshop where we intended to discuss the process of solving the task, and looked in detail at the students' most common mistakes.

The assignment for students consisted of three steps:

1. To familiarise themselves with the HUMAN framework through video.
2. To read an assigned article that tutors had selected from a medical journal regarding previously established conditions: reasonable length (i.e., not exceeding eight pages), Czech language, and the presence of all five types of sources according to the HUMAN framework.
3. To list sources used in the article, including their type (i.e., whether it is a monograph, an article, or a textbook), then divide them into five categories according to the HUMAN framework (background, research object, method, argumentation support, and normative frame), and provide a brief commentary for each category, explaining what role these sources play in the text and how and why the authors use them.

The students were asked to submit their outputs as text files no later than three days before the workshop so the tutor could evaluate them beforehand and choose problematic parts to focus on during the online event.

4 Methodology

To evaluate the educational impact of the HUMAN framework, we used a combination of data collection methods: an anonymous questionnaire filled out by the students right after the online workshop and a teacher analysis of students' outputs. The combination of quantitative and qualitative approaches ensured the research's reliability and provided the researchers with more complex data.

The questionnaire combined aspects of self-assessment and feedback on the teaching method. It consisted of ten questions focusing on different aspects of the use of the HUMAN framework, namely the students' declared ability to work with literature sources in an academic text before and after participating in the course; their subjective rating of the HUMAN model, both in general and in the specific context of the course; and their feedback on specific features of the course, such as an amount and a form of the study materials provided, the form of the assignment, and the overall perceived impact of the course. The questionnaire contained two types of questions: seven close-ended Likert scale multiple-choice questions, and three open-ended questions, encouraging the students to elaborate on their previous answers and provide additional comments.

The qualitative data were retrieved from the assignments submitted by students. The tutor analyzed the outputs before the workshop as a part of the preparation for the event. The text sheets submitted by the students were coded and compared to the sheet with correct answers, particularly for common patterns and recurring errors.

5 Results

A total of thirty students enrolled in two study programs of the Faculty of Medicine of Masaryk University – paramedic practice and midwifery – participated in the course. The group consisted of twenty-two women and eight men. It was quite heterogeneous regarding age and educational experience; all students were uniformly enrolled in the second year of their bachelor studies and, with one exception, had no previous academic degrees. Out of thirty students, twenty-seven filled out the form, hence the 81% return rate ($n = 27$).

As demonstrated in Fig. 2, the perceived impact of the teaching method proved to be considerable. Before the lesson, almost 70% of the students ($n = 17$) assessed their ability to work with literature sources as rather poor or very poor. In contrast, only one student considered their ability as rather good. In comparison, after completing the course, all but one student rated their ability as rather good or nor good nor poor, while the rank very poor has been abandoned completely. The average increase was 1.3 steps on a five-point scale. The improvement is statistically significant ($t = 9,976$; $p = 0.000$).

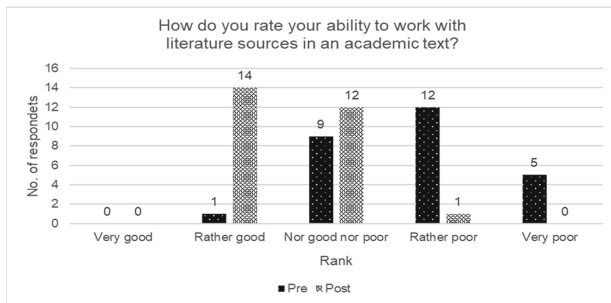


Fig. 2. Students' self-assessment in work with literature sources in an academic text

In response to the question of to what extent did students consider the HUMAN framework to be an appropriate tool for learning to work with literature sources, 60% of the students ($n = 16$) rated it as a very good or rather good learning tool in general, and 70% ($n = 19$) awarded the same rating to the usability of the tool in the specific context of the given lesson. Nevertheless, a considerable part of the class was more critical of the model, as 40% of the students ($n = 11$) considered the model a rather poor learning tool in general, and 28% ($n = 8$) were not happy with its use in the class. We did not find a statistical relationship between self-assessment (both before and after the instruction) and evaluation of the HUMAN framework.

The amount of provided study materials (both theoretical, i.e., the video, the text documents, and the guidelines for the assignment; and practical, i.e., practical examples of the use of the model) was considered optimal by most of the students, even though a third of them ($n = 9$) would appreciate more practical examples (see Fig. 3).

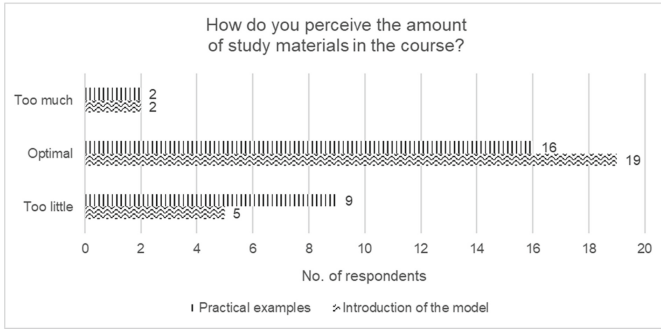


Fig. 3. Perceived number of study materials in the course

Only about two-thirds of the students ($n = 17$) took advantage of the open-ended questions and provided further comments. Five students explicitly appreciated the presence of the video presentation, while three students acknowledged an opportunity to put the newly acquired knowledge into practice by working on the assignment. On the other hand, requests for more examples of the application of the model in specific scientific texts were common. Moreover, four students pointed out that the work on the assignment was complicated because some of the primary sources expected to be analyzed were no longer available in full text; hence, they could not verify some of the required information and confidently place the source in the appropriate category.

Analyzing the students' outputs showed interesting discrepancies between different HUMAN categories. While categories of background, methods, and normative framework proved to be easily identifiable, as the students were relatively consistent in assigning sources to them, categories of the research object and argumentation support were less clear. While some sources belonging to one of the former categories showed up to a 100% correctness rate, others were assigned to the correct category only by as few as 20% of the students. Possible reasons for this phenomenon are described further in the discussion section.

6 Discussion

The findings of this study indicated a statistically significant improvement in the participants' self-perceived ability to work with information sources. These findings were in line with those from the research of Treffer [13], suggesting that students working with the HUMAN framework manifested better results than those learned by traditional methods. However, it is crucial to note that unlike the previous study, which was conducted as an experiment and thus was able to demonstrate differences between the experimental and control group, our study lacked this opportunity. Despite these limitations, our findings still held significance in highlighting the potential benefits of utilizing the HUMAN framework in improving students' self-perceived ability to work with information sources in a healthcare studies context. The alignment of our results with Treffer's research further reinforced the idea that incorporating this innovative approach in educational settings could yield positive outcomes.

Nevertheless, as much as the results of our study showed a successful adaption of the model to the healthcare study context, they also pointed to its several weak spots. Although most participants considered the HUMAN framework a suitable learning tool and considered the amount of provided study materials optimal, more than a quarter of the participants had certain reservations about using the model in the lesson. The explanations provided in the questionnaires pointed out two prevailing reasons. First, the study materials did not sufficiently explain the framework's principles and its categories. Even though the participants explicitly appreciated the video presentation by, for some of them, the video was not the optimal form and they would probably appreciate a different media format. Second, some participants perceived the assignment too difficult due to the fact that in some cases it was not possible to access full-text versions of the used sources and, therefore, information about their media type could not have been verified. These findings highlighted the importance of providing learning materials in various forms and ensuring the findability and availability of full texts of the sources cited in the assessed article.

Similarly, the imbalance between the understanding of the functions of individual HUMAN categories (with background, methods, and normative framework on one side and research object and argumentation support on the other side) may suggest that the fine line between affirmatory and critical work with primary sources is not as evident to practically oriented students with less academic proficiency. This finding implies the need for a more thorough and comprehensible explanation of the different functions of primary sources in the academic text, which can be done in several ways – e.g., by replacing the flipped classroom strategy with a synchronous instruction with an opportunity to clarify any misconceptions on-site, by providing more practical examples of the use of the sources in different contexts, and so forth.

7 Conclusion

This paper aimed to evaluate the impact of using the HUMAN framework in IL instruction with a focus on students of healthcare study programs and thus contributed to a scarce discussion about teaching IL in the context of healthcare. In order to achieve this goal, we successfully adapted the HUMAN framework previously developed by Baldarelli et al. [12] to address the specific needs of STEM and economics students for the context of two specific study programs of Masaryk University – paramedic practice and midwifery. The evaluation results showed that the HUMAN framework was very well adaptable to healthcare and potentially other study contexts as well, provided that the specific needs of the students of the given fields were taken into account. These findings not only contributed to the sparse body of knowledge about IL teaching in healthcare fields but also opened the door to further research on the use of the HUMAN model in other contexts.

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Teaching Students to Navigate Externalist and Internalist Approaches in the History of Science

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Abstract. History of science, and its attendant specializations of medicine and technology, pose a significant obstacle to the evaluation of information. The salient concern is the internalist versus externalist approaches in published scholarship. Depending on student’s choice of topics, they confront a complex landscape of publication that influences, if not determines, the veracity of their comprehension and understanding of how research and publication appear in history of science. Describing a hypothetical model, exercises are offered that introduce undergraduates to a disciplinary domain that revolves round two opposed methodological perspectives.

Keywords: Disciplinary information practices · history of science · externalist vs. internalist · undergraduate history education

1 Introduction

Information literacy supports higher education learners in becoming conversant in scholarship, including “sources of evidence, methods, and modes of discourse” [1, p. 20]. Grounded in their own expert practices, academics often have difficulty identifying challenges faced by students [2] including engaging with disciplinary information. Drawing from research on publishing practices, this paper identifies specific information challenges encountered by students studying the history of science and outlines learning activities that enable them to successfully navigate history of science scholarship.

History of science, including history of medicine, and history of technology, are sub-disciplines of history [3]. Engaging with these fields can present information challenges for students encountering publications in these scholarly specializations [4]. Pursuing published research in history of science and its attendant specializations requires students to ascertain the dualistic *externalist* and *internalist* approaches in history of science. An externalist approach is concerned with larger contexts, such as social, political, and cultural issues and phenomena, whereas the internalist approach is concerned less with context outside of the phenomena itself [5, 6].

The externalist versus internalist debate among historians in these fields results in two different approaches to forming publications [7, 8]. Examining these approaches

informed the development of an educational model that can be used with undergraduates to focus their attention on the interpretation of the externalist versus internalist debate. Novice students' ability to navigate this problematic space is crucial for their learning in these specializations. Students understanding the difference between both approaches can inform their information seeking, interpretation, and ability to produce responsive and valid history of science research projects.

Hypothetically, this model could be used to introduce undergraduates in an introductory history of science course to both approaches through an examination of scholarly articles from a spectrum of history journals. The journals may include humanities and social science journals not generally associated with historical scholarship per se but publishing historical research. *Historical Abstracts* and *America: History and Life* databases provide target databases for full text, and peer-reviewed articles in English, French, or German. Utilizing a template of questions, students categorize journal articles according to the externalist/internalist paradigm. Students further embed their categorizations within the context of historiographic best practices explicating the choices they made. Knowledge of externalist and internalist approaches equips history of science students to identify information aspects critical for assessing the scholarship.

2 History of Science and Disciplinary Culture

This hypothetical exercise necessitates students acquiring an effective knowledge of history of science journal scholarship, without which the internalist and externalist approaches cannot be effectively ascertained. To accomplish this, the undergraduate students are guided through a series of learning activities (see Table 1). First, students are exposed to a systematic introduction to the publication of history of science scholarship by examining the disciplinary alignment of academic journal publishing. Academic disciplines perforce privilege publishing dissemination via specific journals that provide disciplinary alignment to their specific specialization. History of science research supports disciplinary specialization that is characterized by segmenting historical research according to specific subfields that privilege the spectrum of sciences, such as astronomy, chemistry, geology, geography, mathematics.

Table 1. Learning Activities

Learning activity	Description
Introduction	Examine the disciplinary alignment of academic journal publishing within history of science scholarship
Disciplinary Cultures	Explore history of science literature and identify 1) disciplinary, 2) sub-disciplinary, 3) inter-disciplinary, and multi-disciplinary configurations

(continued)

Table 1. (continued)

Learning activity	Description
Selection Grid	Complete worksheet listing journal characteristics and relevance to research interest
History Journal Characteristics (Exercise 1)	Locate articles relevant to research interest and identify characteristics of journals publishing each article
History of Science Journals (Exercise 2)	Identify salient characteristics of history of science journals and their disciplinary specializations
Internalist vs. Externalist	Determine if their own work aligns with an internalist or externalist approach

Prior to encountering history of science journals, students explore and navigate among the various permutations characterizing the specialization by learning to identify and explain these disciplinary cultures using the following disciplinary configurations identified by [4].

- **Disciplinary** - A highly defined approach with specific methodological and technical characteristics. Specialized nomenclature and consensus-driven protocols and procedures. *Examples* - History, Philosophy; *Journal Examples*-- American Historical Review; Revue Historique
- **Subdisciplinary** - A highly specialized approach within a disciplinary framework with specific objectives, utilizing unique methodologies and techniques. *Examples* - History of Science; History of Education Quarterly
- **Interdisciplinary** - Two or more disciplines come together to examine a topic or set of topics and meld into a permanent relationship. *Examples* - Historical Sociology, Historical Anthropology; *Journal Examples*-- Journal of Interdisciplinary History; Cultural & Social History
- **Multidisciplinary** - Two or more disciplines providing unique perspectives to explore phenomena, while retaining their singular characteristics. *Examples* - Latin American Studies, American Studies; *Journal Examples*-- Journal of Canadian Studies; Middle Eastern Studies.

Students further justify their choices by using the following grid, placing their topic, journal titles, and identifiable journal characteristics, and why the article is pertinent to their research topic (see Table 2).

The purpose of first introducing students to disciplinary alignments of history journals is to sensitize their information searching and comprehension of how scholarly journals publish, frame, and privilege perspectives and theoretical approaches, unique to their purpose and intellectual prerogative.

Exercise 1. Before introducing them to the internalist versus externalist approaches, students are acquainted with disciplinary characteristics of various scholarly journals

Table 2. Examples of Topics & Disciplinary Segmentation

Topic	Journal	Characteristic
Evolution	Journal of History of Biology	Specialized in biological sciences
19 th science	American Historical Review	Broad issues in history
Civil war surgery	Journal of American History	Broad issues in history
Plate tectonics	Earth Sciences	Specialized in earth sciences
Totalitarian regimes & science	Journal of Modern History	Broad issues in science and history
Newspapers and public exposure science	Social Studies of Science	Sociological aspects of science
Evolution	Journal of History of Biology	Specialized in biological sciences

publishing history of science subjects. Students search *Historical Abstracts* and *America: History and Life* databases specific to published scholarship in historical studies. Selecting a topic of interest, students search both databases, capturing a global geographical reach of journal research on their topic. Their search results will expose them to the plethora of various disciplinary journals from which to select relevant articles. Using a grid, students are asked to answer the following questions:

- 1) What is the journal's purview: periodization, expansive or specialized?
- 2) Which subjects do they broach generally?
- 3) Identify and discuss the methodologies, theories, and scope of the journals.
- 4) Is history of science, broadly, or tangentially, broached in the journal?
- 5) What are the characteristics of journals identified as history of science, and how do they differ from other history journals?

Often, a key aid to ascertaining a journal's purview is to access the front-page that describes the journal's specific focus and intent. After determining the journal's purview, students explain how and why the journal's focus is critical for their respective projects. Students are introduced to journals that may not identify themselves as history of science focused but publish history of science subjects. This further exposes the students to the challenge of information searching in history of science.

The learning outcome for the exercise is that students will be able to search for relevant articles in the target databases and determine the pertinence of their results based on the related journal's focus of non-history of science journals and history of science journals.

To sensitize students to various history of science journals, the next phase is to introduce the journals they will encounter in their information seeking, determination, and relevance to their topics.

Exercise 2. After exposure to determining disciplinary journals and their respective foci, students examine a spectrum of journals specific to history of science. Students again

search the target databases for their topics, identifying and triaging relevant articles. The students must identify history of science journals, their specialization, as well as any journal not identified as history of science, but relevant to their respective topic.

These journals can be general or specialized journals in history of science. A grid is used to further articulate these journals, from general to specifically focused subdisciplinary history of science journals. Students are introduced to the specialized journals publishing on history of science, medicine, or technology (see Table 3).

Table 3. Examples of History of Science Journals

Journal	Characteristics
Annals of Science	General—covers all sciences
Isis	General—covers all sciences
British Journal for the History of Science	General—covers all sciences
History of Science	General—covers all sciences
Journal for the History of Astronomy	Astronomy—all aspects, specialized
Journal of the History of Biology	Biological sciences—all aspects, specialized
Ambix	Chemistry, Alchemy—all aspects, specialized
Earth Sciences History	Earth Sciences—all aspects, specialized

The questions students examine are:

- 1) What is the journal's purview: periodization, expansive or specialized?
- 2) What subjects do they broach generally?
- 3) What is the scope of the journals and what methodologies and theories are represented?
- 4) What are the characteristics of journals identified as history of science, and how do they differ from other history journals?

Students again ascertain a journal's purview by accessing and discussing the front page that describes the journal's specific focus, and intent. Additionally, students identify subdisciplinary, interdisciplinary, or multidisciplinary characteristics within the journal's purview; this is especially relevant to ascertain the internalist and externalist approaches.

3 Dynamic Tension: Externalist Versus Internalist Approaches

After students have completed these exercises in information discernment, they confront the imperative to grasp salient differences between the internalist and externalist approaches in the history of science. For students encountering the externalist vs. internalist approaches in their information search they use their ability to discern and apply their knowledge of disciplinary research and journal publishing. Most historical research and publishing in discrete fields, such as history of science, or history of medicine, history of technology, have evolved within accepted theoretical, methodological, and best

practice consensus. Often, journals have published articles that emphasize internalist preoccupations and research agendas. The internalist versus externalist perspective and orientation to discrete fields, including history of medicine or education, can be defined as:

- 1) *Internalist*: pertains to the analysis of historical phenomena within the disciplinary confines that determine only those factors that can be examined within the protocols established that are not influenced by factors or conditions that originate outside the phenomena under examination. *Example - History of an ophthalmological surgical technique pioneered during the early 20th century in Scotland.*
- 2) *Externalist*: pertains to the examination of historical phenomena within an expanded disciplinary approach that privileges internal *and* especially external factors and influences that impact upon the object of research. *Example - Political considerations of advances in U.S. rocketry during the Space Race of the 1950's.*

Both approaches to historiographic examination are valid, and both entertain suites of methodological and theoretical innovations and perspectives. Often the internalist approach addresses an audience that is versed in the specific subject without obvious issues emanating from phenomena existing beyond its purview. In contrast, the externalist approach highlights and examines biographical, social, political, religious, or economic forces that further contextualize the object of research.

As illustration, history of medicine journals will publish research that privileges evolution of surgical techniques, or administration of pharmaceutical interventions, as opposed to enlarging the focus to include larger societal, political, or religious issues influencing these objects of research. Alternatively, history of science education may emphasize various instructional techniques over time in a specific course, or program, without considering non-pedagogic circumstances influencing implementation and programmatic execution. Other disciplines, such as anthropology, art history, literary studies, philosophy, political science, sociology inform externalist approaches [9, 10].

Increasingly, history of science is interdisciplinary and multidisciplinary; incorporating various insights to include global history of science, postcolonial perspectives, scientific languages, print history, spatial and discourse studies to elucidate the production of knowledge [11]. These disciplinary perspectives add and extend the examination of science embracing a rich and broad frame of reference, including theoretical and methods. The difference between internalist and externalist approaches further engenders a continuing dialogue and debate among historians of science. Students navigating this dualistic distinction attain the skills to differentiate and verify both approaches, while maintaining acknowledgment of the value of both (see Table 4).

Other topics could include a wide range: precise development of chemical techniques, history of paleontological classification, history of scientific communication; history of science popularization, warfare and science, pharmaceutical discoveries, religious beliefs, and science, and so forth. In each case scenario, students grapple with the topic, the article, the journal, and the internalist/externalist divide.

Table 4. Examples of Topics for Presentation and Discussion

Topic	Internalist	Externalist	Reason for Choice
Space Race	?	?	?
Medical Illustration	?	?	?
Galileo & Inquisition	?	?	?

4 Conclusion

Internalist and externalist approaches pose significant and consequential difficulty for students' information seeking. This divide is bridged by exposing students to a definitional and pragmatic application to this bifurcation when searching for and identifying articles on the history of science. A thorough immersion in disciplinary journal publishing through concerted exercises engenders cognizance of both approaches in history of science. While a pilot test will be necessary to verify the utility of this model, this method may lead to robust comprehension and deployment of requisite skills in the effective evaluation of scholarly articles within the context of seeking information.

Too often, the students are confronted with this literature without understanding the complexity of how history of science is framed. This approach constitutes a significant step to ameliorating that obstacle. This prototype is the first to propose and advance an efficacious approach to identifying and differentiating the internalist /externalist divide in history of science for undergraduate students. Further, this proposed approach can be applied to other discrete fields, such as history of geography, history of education, and so forth.

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Challenges to Information Literacy Online Learning in Higher Education: Libraries, Archives, and Museums Digital Strategic Convergence

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Abstract. This paper aims to synthesize debates and perspectives around the influence and impact of the digital transition. It discusses the impacts of the COVID-19 pandemic and the idea that digital maturity implies the development of a strategy to deal with complexity and a hybrid thinking to create the digital future of cultural institutions. As such, the paper is both critical and reflective. Two aspects are highlighted: a) competences, strategies and practices of information literacy in the area of digital convergence of libraries, archives, and museums; and b) forms of innovation in library and information science (LIS) Education and in new collaborative lines of action. It presents epistemological and pedagogical formats developed by Universidade Aberta and Universidade Nova de Lisboa (Portugal) with the objective of updating skills in information and digital literacy for professional profiles of emerging markets.

Keywords: E-learning LIS education · information literacy · digital literacy · digital convergence · COVID-19 cultural impacts · Portugal

1 Introduction

A dynamic debate about digital literacy education is profoundly important for Library and Information Science (LIS) education. The debate will address increasingly urgent organizational challenges and tensions between the dynamics of competition and cooperation and evolving scholarly innovation practices while maintaining needed quality and diversity. One growing area of critical reflections is related to the need of digital convergence between cultural institutions. New approaches are being developed by higher education institutions and memory institutions with implications to information literacy training.

The international debate around the convergence of cultural institutions/memory institutions can be characterised by some important issues. These issues include ways

to conceal different descriptive traditions, metadata schemas [1, 2], and different contexts and professional boundaries [3] of the various types of institutions involved [4, 5]. Another key element is collaboration and convergence of resource sharing in repositories of cultural, artistic, natural, and scientific heritage [6–11]. Such collaboration and convergence would be built on linked open data and semantic data integration. Another issue is related to the technological development of digitalization practices resulting from the COVID-19 pandemic [12], the development of metadata exchange schemes (Dublin Core, aggregation and transfer protocols (OAI-PMH)) and the creation of European support cooperation paths [13]. Biknell [14] referred to the information practices of users who preferred being able to see all items from a single access point. The work developed by the Network of European Museum Organisations (NEMO) [15] mentioned the various formats of digital engagement and innovative approaches to digital learning and education. Of note are the Open Access policies for content mediation, education, storytelling, and engagement with remote cultural institutions' visitors. This Network also identified different scenarios for creative interactions with digitised collections in the context of digital learning, including reuse of open data or citizen co-curation.

The relationship between digital convergence and Libraries, Archives and Museums' (LAM) institutional change is reflected within LAM research but central questions relating to institutional change processes in LAM institutions need in-depth study [16]. Based on the works of Duff et al. [4], Robinson [17, 18] and Vårheim, Skare and Lenstra [16] we can find two main themes: the motivations for institutional convergence and the outcomes for institutions. The themes are based on understanding that staff of LAM institutions are in essence information professionals who could, in theory, work interchangeably in any of these institutions. While staff learning from other professions and the co-development of new methods of work is considered essential, it is necessary to study what cross-disciplinary skills are developed through convergence [17, 18].

Synergies of cross-professional interaction and cross-learning were rarely found before 2020. This reality changed with the COVID-19 pandemic's tremendous impact on the Cultural and Creative Sector (CCS) and the need to find solutions and develop recovery plans at a European level. In addition to policy measures issued from governments at different levels, many different initiatives have been launched as a response to the pandemic crisis. The EU created the Creative Unites platform to facilitate knowledge exchange and to create a common space to co-create and upload contributions and find shared solutions. The pressure to reach audiences in alternative manners impacted cultural institutions [19]. LAM discovered digital platforms and social media through which they organised virtual visits and live-streamed performances.

Through these intra- and cross sectorial collaboration and development efforts LAM identified other needs about which the institutions need to be aware. These needs include:

- are development of a new digital skills set [19];
- digital maturity assessment [20];
- the development of a critical and reflective strategy to deal with complexity and a hybrid thinking to create the digital future of cultural institutions [21, 22];
- reinvention of the offerings of the cultural agents and actors [23];
- awareness of the existence of a gap of digital competencies within cultural professionals [7, 24];

- empirical research on typologies of convergence and a consistent use of clear terminology [11].

Recently, the Creative FLIP Project [25] reported new scenarios for cultural dimensions based on digital transformation, such as the need to develop policies and legal frameworks as well as cultural offer(s) related to the emerging Metaverse. This Report also refers to Artificial Intelligence and related impacts on cultural policy and production as well as digital audiences. Of special concern are the effects of related practices on society and health as a transversal issue for cultural policy makers.

The guiding elements should be science-based, value-driven, collaborative, and urgent. The elements should consider behavioural patterns and co-creation settings and new initiatives based on evidence and expertise as a result of investing in dynamic systems of collaboration.

This paper aims to synthesize perspectives around the influence and impact of the digital transition in the forms of innovation in LIS education and in the new collaborative lines of action, presenting the epistemological and pedagogical formats under development in Portugal. The resulting courses proposals will be implemented in 2023/2024 academic year.

We start by introducing cultural heritage information and the need for an information literacy program that we consider fundamental to the digital convergence of libraries, archives, and museums. The second part intends to give some insights about the pedagogical theory of a new approach developed by Universidade Aberta and Universidade Nova de Lisboa and its relevance for information literacy education of LAM professionals in online settings. This paper finishes with some final remarks on different expected impacts of digital convergence in the cultural sector in Portugal.

2 Digital Convergence of Libraries, Archives, and Museums and LIS Education

2.1 Cultural Heritage Information Practices and New Forms of LIS Education

In the last fifteen years competences' changing needs have led researchers to turn their attention to the convergence of educational programs in library and information science (LIS), archival studies, and museum studies, studying the nature and duration of relationships among LAM programs and faculty [26, 27]. Unfortunately, the examples are still scarce [7]. Digital resources like the Europeana Collections project have played a significant role in creating mutually beneficial situations both to cultural organizations and management competences focussing on aggregating, storage, seeking, using, facilitating, distributing, curating, sharing, and engaging on cultural heritage information.

Cultural heritage information is defined as the legacy of physical artifacts and intangible attributes of a group or society that are inherited from past generations, maintained in the present, and bestowed for the benefit of future generations with impact on different areas of life and society [28]. Heritage information is generally also linked to the digital humanities umbrella and digitisation, preservation, repositories, metadata, and visualisation, each field reinforcing each other.

Many authors pointed out that it is necessary to explore the pedagogy available within this area, refining the identified information practices [29–31] and covering information literacy skills associated to cultural sustainability as the fourth pillar of sustainable development [32]. The actual European debate is also influenced by the European Skills Agenda 2020 and the views of CHARTER - European Cultural Heritage Skills Alliance to create a resilient and responsive sector.

2.2 The Need for an Information Literacy Program on the Digital Convergence of LAM

Information literacy is highly relevant to all three LAM institutions. Both the work on information literacy and other LAM-related literacies exemplifies how LAMs contribute broadly to strengthening different kinds of literacy in society. It is important to raise LAM professionals' awareness of the need to develop new skills and education programs [33], creating meaningful information literacy learning experiences founded on critical theory and theories of transformative learning [34].

Traditionally, information literacy has been applied on user training activities in LAM. These training activities aimed, to a considerable extent, at improving librarians' informational and digital competences using three forms of lifelong learning: formal, nonformal, and informal. Understanding these activities and forms of training are crucial for understanding how they are related to the different roles those institutions play in society [33].

Nowadays, with so many problems affecting information (misinformation, disinformation) LAMs are viewed as institutions in which knowledge about society is held in trust. Eckardal et al. [33, p.154] states the importance of developing a literacy-end strategy:

“To this end, establishing literacies, including their different narrower institution-specific forms, as a guiding concept of relevance for all LAMs provides a solid foundation for framing and communicating their social role as sites and facilitators of learning and education alike.”

The strategy should promote an integrated professional development based on principles and practices tied to information competences, addressing problem solving, and promoting confidence in the processes of digital transition. The boundaries between LAM sectors are disappearing due to this new literacy context.

3 LIS Higher Education Strategies to Consolidate LAM Digital Convergence in Portugal

3.1 Collaborative Lines of Action: Universities Portugal – Connecting Knowledge

Universities Portugal unites the sixteen Portuguese public universities and aims to place Portugal in the international market, showing the country as a good destination to start or continue higher education. *Universities Portugal* aims to increase the visibility and attractiveness of Portugal as a destination for higher education and research, in interaction with companies through enhancing the country's commitment to knowledge. It also

intends to position higher education and research as exportable services and an important part of a competitive economy. It demonstrates that Portuguese universities are open to internationalization and innovation offering training courses that are more suited to international demand. It also aims to reinforce the capacity of the diplomatic network in disseminating the Portuguese language and higher education and research in Portugal, promoting collective internationalization strategies by involving Portuguese universities and other stakeholders.

In the Lisbon region, one of the safest and most economical capitals in Europe, the *Lisbon Region Consortium of the Universities Portugal - Connecting Knowledge Project* is based on a common strategy for the international promotion of universities in the Lisbon region, aiming to reinforce the visibility of institutions and offer training and increase student recruitment. This Consortium brings together five of the most distinguished Universities, positioned in the main international rankings, that include the Universidade Aberta (UAb) and the Universidade Nova de Lisboa (NOVA University of Lisbon).

Established in 1988, UAb, is the only public distance education university in Portugal and offers higher education (first, master, and PhD degrees) and Lifelong Learning study programs. In the last 20 years, several IL courses have been developed targeting teacher librarians' information literacy levels and needs.

NOVA FCSH (Faculty of Social and Human Sciences of the NOVA University of Lisbon) was established in 1978 and relies its strategy on the development of innovative experiences of formal and non-formal education offering both face-to-face teaching and, more recently, distance education (e-learning and b-learning). Its Digital Education Action Plan (2021–2027) aims to deepen research and innovation in the field of digital humanities and digital literacy.

3.2 Online Learning

The Virtual Pedagogical Model of UAb (MPV) is based on four cornerstones [35]:

- student-centred learning,
- flexibility,
- interaction, and
- digital inclusion.

These principles guide the organization of instruction, planning, the design, and management of activities for the students, the type of materials to develop, and the nature of the assessment of competences. Because of the European Higher Education Area (Bologna Process), at the heart of the MPV, is the student as an active individual, builder of his own knowledge, engaged in and committed to his learning process within a learning community. Learning happens both through self-learning or independent learning strategies and through dialogue and interaction with peers, and resorting to cooperative and collaborative learning strategies. Independent learning is achieved through autonomous learning on the part of the student based on activities, materials, bibliography, and guidance provided by the teacher. Collaborative learning results from working together with other students and sharing experiences and perspectives, common goals, and working processes negotiated in the group. The student has an active role in

managing the pace and time of realization of the activities, in monitoring the learning outcomes, in establishing work goals, and in building learning communities modelled by the students themselves.

The second principle is flexibility as students can learn regardless of distance and time constraints. That is especially suited to UAB's potential students, adults with professional and familiar responsibilities who are active citizens in society. One of the strengths of MPV is the possibility that students have of accessing contents and learning activities, or completing the desired tasks, in a flexible way, without the need for coexistence in time or coexistence in space with teachers or peers. Being the MPV an asynchronous model it enhances flexibility, since communication and interaction happen when it is convenient for students, giving them time to read, process information, reflect, and then interact.

Interaction is the third principle in the process of teaching and learning in this model. Interaction happens not only between student and contents, and student and teacher but also between students through discussion groups within each virtual class. The value of written interaction is also very important because, when combined with an asynchronous mode of communication, it allows students to extend their critical reflection skills while sharing resources, activities, and knowledge with their peers.

The fourth principle is digital inclusion, perceived as making access available to adults who want to frequent a program in a higher education institution but have not yet developed skills in the use of Information and Communication Technologies.

Since online education requires specific skills on the part of the students, all certified programs at UAB include a free, but mandatory, introductory module, where new students may acquire skills related to interpersonal communication, teamwork, decision making, task management, collaboration work, and sharing knowledge, before starting the course in which they are enrolled.

All the above-mentioned characteristics of the MPV are especially appropriate for an adult population, already integrated into professional contexts, allowing a better conciliation between family/personal and work life. These characteristics are equally suitable for teaching and developing information literacy skills.

Indeed, and according to Crisp [36], offering online learning opportunities that are appealing, accessible, and with quality for adult students has never been as competitive or important as it is now. As more students opt for methods of acquiring skills using technologies, availability, accessibility, the online teaching-learning model is the focus of teachers and other educational agents.

We can highlight feedback as a fundamental strategy in distance learning among the learning strategies used by UAB in its teaching activities. The presence of the teacher is of paramount importance for the success of students' learning, as they often feel isolated and unaccompanied. Thus, when the teacher develops and applies strategies that encourage collaborative work, feedback, and debate in forums, the student feels more accompanied and part of the class group, regardless of the location or time zone where they are. Indeed, the student learns not only when he analyses resources, conducts activities, and works individually, but also when he interacts with other colleagues, in group work or in a discussion forum or when he/she receives comments, guidance, and tips from teachers. Feedback constitutes a basic strategy as it offers students the

possibility of reviewing their learning considering three main questions: ‘Where do I need to go?’ (that implies having the intended learning objectives in mind); ‘How am I now?’ (that implies involving students in their self-assessment); ‘What do I have to do to improve?’ (that implies that the student plans the next learning steps) [37, 38].

3.3 Courses Proposals

After carrying out a diagnosis of digital convergence and literacy needs for memory institutions in Portugal, as mentioned in the introduction to this paper, two courses were structured in 2022. One was the “Specialization Course in Culture and Digital Communication for Libraries, Archives and Museums” and the second was the “post-Graduated Course in Digital Information Management for Libraries, Archives and Museums”. The main aim of these programs was developing, updating, and consolidating knowledge and skills in Information Science suited to emerging professional profiles and the needs of the work market [39].

Table 1. Curricular structure of the “Specialization Course in Culture and Digital Communication: Libraries, Archives, and Museums”

1 semester
Digital Information in Libraries, Archives and Museums (10 ECTS)
Literacy and Digital Competencies (10 ECTS)
Digital Marketing and Integrated Communication (10 ECTS)

The “Specialization Course in Culture and Digital Communication for Libraries, Archives and Museums” provides advanced training in a set of topics of great relevance to information literacy and digital professional practices (Table 1). In the context of today’s digital society, the organization of digital information constitutes a decisive field of action as the information explosion that we experience daily requires a selection and evaluation effort that requires the intervention of specialists in the area. These specialists, therefore, have a key role in everything related to the organization, provision, and dissemination of digital resources, with increased responsibilities in the management of organizational structures in the information area. Therefore, the specific objectives of this Specialization Course are to

- develop, update, and consolidate knowledge and skills in Information Science suitable for emerging professional profiles;
- conceive, plan, and manage new services in libraries, museums, and archives, suited to the development of the Information Society in Portugal;
- plan and execute communication and digital marketing activities;
- and identify literacy levels and characterize informational needs and skills in digital contexts.

In order to offer an even more comprehensive course, the two higher education institutions have also put together a “post-Graduated Course in Digital Information Management: Libraries, Archives, and Museums” (Table 2) that share some of the already mentioned specific objectives but has five more:

- to manage data curation practices in libraries, museums and archives;
- to carry out research activities in libraries, museums and archives;
- to train for evidence management and performance assessment in an organizational context;
- to manage multiliteracy, open access and bibliometric projects and programs; and
- to raising awareness of the active citizenship participation of libraries, archives and museums in digital and sustainability transition policies, at national, regional and local levels.

The option to focus on multiliteracies was taken considering the moment of digital transition in which organizations and professionals find themselves.

Table 2. Curricular structure of the “post-Graduated Course in Digital Information Management: Libraries, Archives, and Museums”

1 academic year	
1st semester	2nd semester
Information Science: a general perspective (10 ECTS)	Research Methodologies in Libraries, Archives and Museums (10 ECTS)
Digital Transformation in Libraries, Archives and Museums (10 ECTS)	Management and Organizational Behaviour (10 ECTS)
Digital Marketing and Integrated Communication (10 ECTS)	<u>One of the following (10 ECTS each):</u> Performance and sustainability assessment in libraries, archives, and museums Literacy and digital and skills Public information policies and funding opportunities

3.4 Relevance for LAM Professionals and Expected Impacts in Cultural Sector in Portugal

At the end of those post-Graduated courses, we intend to have trained LAM professionals who are attentive to social and technological transformations and changes with a direct influence on their activity. They will have the capacity to reflect and intervene appropriately in diverse information literacy contexts, with skills to conceive, integrate and evaluate local development projects. In a broader sphere of action, in the scientific area of the course, they are expected to.

- have the ability to interact with peers and the public in an attitude of availability, collaboration, and sharing of information practices and knowledge;

- be able to reflect on the practices developed in a professional context, based on the learning carried out; and
- be ready to intervene properly when inserted in organizational structures in the area of information, participation, and public debate [40].

4 Conclusions and Final Remarks

This cooperative experience in higher education in the LIS scientific field represents a strategical focus on the link between knowledge management and information and digital literacy in Portugal. The innovative side of the collaboration, taking into account the identified needs, both nationally and internationally, is the focus on teaching literacy based on digital convergence and transitions, within the scope of the LAMs. As far as it was possible to ascertain, there is no similar strategy in Portugal.

- It intends to promote: vision, strategy and planning for LAM convergence skills management and quality literacy and digital professional practices;
- strong commitment towards information and digital literacy in cross-disciplinary expertise;
- LAM-LIS community-based debate for discussion concerning heritage information practices recognition by different stakeholders;
- information behaviour area research related to other domains and practices [41, 42] focusing on different roles in societal crisis, legitimation sustainability, and democracy challenges;
- The role of multiliteracies in the digital transition.

We hope this will be an example of the outcome of a dynamic system of collaboration between higher education institutions and the cultural sector.

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Information Literacy of Polish Ph.D. Students: The Learning Outcomes Approach

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Abstract. Students are arguably one of the most-researched populations, including in the context of information literacy (IL). Although Ph.D. students' IL is not studied as frequently, it's crucial for the efficiency and validity of their research and future career prospects. We will discuss the development of an ILDoc questionnaire dedicated to researching IL of Ph.D. students. The first step was to refer to well-known and verified tools such as ILSES, IL-HUMASS, PKIM, and ALFINVES. The other step was to include the learning outcomes approach in the questionnaire. The CAWI questionnaire was used between September 2022 and January 2023 among Ph.D. students from five Polish universities. 294 responses were collected. Using EFA and CFA, we identified 14 core variables that reflect four theoretically consistent factors. Based on the findings, we propose that these identified latent factors could form the basis for determining the variables in the SEM analysis.

Keywords: Doctoral students · information literacy · learning outcomes · Ph.D. students · research competences

1 Introduction

The growing accessibility to information resources and tools for organizing them has made studies on information literacy increasingly crucial across various social groups. One such group of particular interest is young people, specifically doctoral students, as their professional effectiveness in future years is highly influenced by their information literacy.

Information literacy of young people is of particular interest, as it determines their professional effectiveness in the coming years. This group includes doctoral students – young researchers whose efforts focus on generating new knowledge based on properly acquired, aggregated and organized information. For doctoral students, information skills, that is, the ability to develop strategies for acquiring information and selecting, synthesizing and using it for scientific purposes, seems particularly important. These skills will influence the efficiency, effectiveness and relevance of their research. In addition, individual self-efficacy seems equally important. The sense of effectiveness and success, which to some extent also depend on information competency, may have an impact on the development of a scientific career and a placement in the scientific community.

Information literacy studies can be based on a variety of concepts and models. Models usually use a set of indicators to help determine the possession or lack of specific attributes required to be considered informationally competent and the level of such competency. Given the multiplicity of models, tools and recommendations, as well as the fact that they are tailored (or not) to multiple (sometimes very different) study groups, it seems necessary to develop a specialist tool to measure the information literacy of doctoral students in a structured way. The existence of gaps may suggest deficiencies or inadequacies in the process of training doctoral students. Such gaps may also be the result of some external conditions over which students have little control (access to technology, legal and economic environment, etc.). In either case, awareness of shortcomings should be used for corrective action, which may be important for the further development of the next crop of young researchers. The paper proposes a proprietary research tool and describes the results of a survey conducted using that tool among doctoral students at five Polish universities.

2 Literature Review

Research and education in information literacy have a long-standing tradition in higher education. This tradition encompasses the development of guidelines, principles, and frameworks, such as those proposed by Christine Bruce, Sylvia Edwards and Mandy Lupton [1], Association of College and Research Libraries [2] or Society of College, National and University Libraries [3] standards. These have been applied at all levels of higher education, including BA, MA, and Ph.D. studies.

Students are arguably one of the most researched populations in the context of information literacy (IL) [e.g., 4]. However, significantly fewer studies focus on doctoral students, indicating a gap in research. Hence, we recognized the need to describe the information literacy of doctoral students and, as a first step, to develop and test the reliability and validity of a tool specifically designed to assess their competence at this level of study. We took into consideration the diversity of disciplines, referencing the educational process' approach according to the Bologna Process, analyzed in three perspectives: knowledge, skills, and attitudes. Particularly, the ACRL standards include not only working strictly with information resources but also with information skills needed for research activities, which is a fundamental element and goal of doctoral studies [5].

Knowledge about information literacy in doctoral students is partial. In the literature, we can find materials from individual countries or universities, for example, Nigeria [6],

Pakistan [7], Vietnam [8], or Slovenia [9]. There are also reports of studies of information literacy of doctoral students in various fields (biology [10]; engineering - [7, 9]; psychology [11]; medical sciences [12]) or interdisciplinary studies [13], international comparative studies, including Spain, Cuba and Mexico [14], Nigeria and South Africa [15], Poland and Germany [16], Poland, France and the USA [11]. Some studies focus on educational offer for doctoral students [17, 18]. These analyses often lead to recommendations for designing such courses [19] which, as a result, improve IL training.

The information competencies of doctoral students and their educational needs in this area differ from those of students at lower levels of education. For example, Zuza Wiorogórska [11] pointed out that this group has a greater need for IL related to research competencies (see also Steinerová [5]), including evaluation and management of information, copyright, and Open Access. It also turns out to be important to link IL training with the specifics (terminology, information resources) of the discipline [11], as well as the continuity of the IL improvement process throughout the course of the study, not only in the initial years [12]. Many authors note the need to improve advanced skills, in searching, evaluating information, and synthesizing information [5, 10, 20], despite relatively high self-assessment [21].

Various techniques and tools are used to study information literacy in academia. The need to check their reliability and validity was pointed out by Andrew Walsh [22] and Khalid Mahmood [23] - the latter focused particularly on scales for self-efficacy information literacy assessment. After all, the quality of the tools affects the quality of the results. Some authors have reported positive results on reliability and validity tests of the tools they use [9, 24, 25].

Among the most popular questionnaires for self-assessment and self-efficacy of information literacy, validated in different populations (which allows for comparability), are Information Literacy Self-Efficacy Scale known as ILSES [26] and Information Literacy-Humanities and Social Sciences known as IL-HUMASS [27, 28]. Regarding doctoral students, Information Literacy for Research questionnaire, abbreviated to ALFINVES from Spanish [14], and Personal Knowledge and Information Management, known as PKIM [29] questionnaires are notable.

ILSES, being chronologically the first and having been tested for reliability and validity, was originally used in a teacher study [26]. It has also been utilized in studies on students across various fields in Pakistan [24] and Iran [25], as well as in Belgium [12], among others. The second most popular is the IL-HUMASS self-efficacy self-assessment questionnaire, developed in Spain [27, 28] and used in studies primarily of students in the humanities and social sciences [20, 30], in various countries (see, e.g., [31]).

The ALFINVES questionnaire [14] was developed with reference to IL-HUMASS, partly by the same team of researchers, originally used in a study of LIS doctoral students at four universities in 3 different locations (Spain, Cuba, and Mexico). Successively used again, in other populations, in Cuba [32, 33] and Mexico [34].

The second of the tools targeted at doctoral students is the Personal Knowledge and Information Management Scale (PKIM) by Marzena Świgoń [35, 36] used in her own research on Polish and German students [16, 37], as well as among students in Pakistan [38].

In conclusion, due to the needs of doctoral students identified in the literature regarding information literacy training, which are different from those characteristics of students at lower levels, the need to develop an adequate tool was recognized. The above-described provides baseline (validated) and comparative material, allowing the preparation of a tool that meets the specifics of the study population.

3 Methodology and Research Organisation

The objectives of the study can be divided into two types - methodological and descriptive. In terms of methodology, we wanted to create a research tool dedicated to assessing the information literacy of doctoral students; and to validate this tool. We also tried to describe the information competences of doctoral students of selected Polish universities.

To achieve the methodological goals, we have created a questionnaire examining the IL of doctoral students (hereinafter referred to as ILDoc for short) based on the previously mentioned, widely known and repeatedly tested scales: ILSES, IL-HUMASS, PKIM and ALFINVES. It should be noted, however, that only ALFINVES is a scale dedicated to a subgroup of doctoral students. To broaden the perspective of IL, we added items from the Community of Inquiry Framework [39] in the version dedicated to PhD students, as well as the Digital Literacy Self-Efficacy Scale [40].

We started with content analysis and categorization of the content of items of individual scales. We identified a total of 179 items. The first expert evaluation was carried out. Items that received at least one positive indication (121 items) were then classified to the next stage of evaluation. On that basis, we created 22 categories, referring to the stages of the research process and scientific communication: knowledge about authors, and sources in a given field; specialized terminology; the use of various types of sources; use of personal sources; information retrieval; search strategies; information evaluation; analysis and synthesis of the literature on the subject; writing; using statistical programs; creating reference lists; summarizing; oral presentations; Internet communication; information sharing; creating own databases; using libraries; critical assessment of one's own competences; ethical principles in scientific work; cooperation with the scientific supervisor; general scientific competence; and others that do not fit into any of the categories.

Then, based on the expert knowledge of the team members, individual 121 items were assessed in terms of matching the information competences required and taught within doctoral schools, as well as research work at the level of preparation for a doctorate. Items were ordered according to the overall score and re-analyzed. In the case of duplicates (items referring to the same competence, but formulated differently), one item was selected or a new item, referring to a given competence was formulated. Ultimately, 25 variables were established.

The selected 25 variables were then mapped based on the ACRL Framework for Information Literacy for Higher Education to ensure that important areas of competence of PhD students were not missed. In the next step, each of the variables was formulated as 3 items regarding knowledge, skills, and social attitudes (in relation to the learning outcomes).

The variables were then ordered again according to the stages of the information process in research practice. We decided that the statements included in the ILDoc

questionnaire will be assessed on a Likert scale of 1–7, where 1 means “strongly disagree” and 7 “strongly agree” (as is the case with ILSES).

The questionnaire was subjected to a qualitative pilot. Interviews were conducted with doctoral students of the University of Warsaw (Warsaw), Jagiellonian University (Cracow), Nicolaus Copernicus University (Toruń), University of Warmia and Mazury (Olsztyn), University of Gdańsk (Gdańsk). During the interviews, members of the research team presented the respondents with a preliminary version of the questionnaire and then asked them to assess the comprehensibility of the questions, their order, and their adaptation to the practice of studying and conducting research by doctoral students. The respondents’ comments were then analyzed and entered into the questionnaire. It was then translated into English and transferred to a web form.

Subsequently, positive consent for the study was obtained from the Rector’s Committee for Ethics in Research at the University of Warsaw (application 158/2022).

The CAWI (Computer Assisted Web Interview) technique was used due to its applicability in the case of a dispersed group such as doctoral students. The survey was conducted between September 2022 and January 2023 among Ph.D. students from five Polish universities (as mentioned above). The selection of universities was dictated by a pragmatic approach in which we focused on easy access to the sample. Due to the important context of systemic changes, we chose only research universities where we knew a unique perspective of doctoral schools. The population of doctoral students at Polish universities is about 12,000, therefore the required number of people to take part in the survey amounted to 261. 294 responses were collected from students of various disciplines using snowball sampling - the survey was distributed via peers from selected institutions. Data were analysed using internal consistency reliability tests, exploratory and confirmatory factor analysis, as well as structural equation modelling.

4 Results

In order to identify the underlying constructs of information literacy related to doctoral students, we reduced the dataset to a more manageable number of variables by conducting Exploratory Factor Analysis (EFA) on the 25 composite variables included in our initial mixed-component model [41]. Since there are several theoretical models that have been empirically verified in similar scholarly contexts, primarily involving students and faculty members, we also performed a theory-driven factorization using Confirmatory Factor Analysis (CFA) [42] to validate the reduction and evaluate the model as a coherent structure dedicated to the self-evaluation perspectives of doctoral students on intertwined information literacy factors. However, before conducting the EFA, we assessed the factorability of the 25 items. The overall Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy came out to be 0.922, with no individual item KMO values falling below 0.8. Bartlett’s test of sphericity yielded a highly significant result, $\chi^2(300) = 2794$, $p < .001$, suggesting that the correlations among items were adequately large to perform factor analysis [43].

The EFA was conducted using oblique Promax rotation, a widely-used rotation method that allows for correlations between factors [44]. The analysis revealed four latent factors based on parallel analysis, a popular method for determining the number

of factors to retain [45]. Eleven items were discarded for not meeting the loading threshold of 0.5 on any factor, which is considered an adequate threshold for our sample size [46] (Table 1).

Table 1. Descriptive statistics and Exploratory Factor Analysis

<i>ILDoc survey items (N = 294; $\alpha = 0.842$; $\omega = 0.846$)</i>		\bar{x}	<i>SD</i>	<i>Factors loadings</i>
Factor 1: Information access ($\alpha = 0.801$; $\omega = 0.806$)		5.909	0.597	3.884
IL8	Expert knowledge	5.938	0.790	0.725
IL25	Supervisor cooperation	6.129	0.943	0.657
IL23	Research process	5.794	0.832	0.632
IL24	Research methodology	5.791	0.988	0.620
IL1	Information sources	5.707	0.764	0.612
IL2	Discipline terminology	6.098	0.707	0.519
<i>15.4% of variance explained</i>				
Factor 2: Information retrieval ($\alpha = 0.671$; $\omega = 0.660$)		5.027	0.940	3.096
IL6	Technology trends	5.499	0.940	0.693
IL9	Advanced search	4.542	1.585	0.672
IL14	Resource access management	5.500	1.030	0.537
IL3	Hidden internet	4.567	1.636	0.512
<i>12.4% of variance explained</i>				
Factor 3: Reference management ($\alpha = 0.769$; $\omega = 0.768$)		5.996	0.813	2.088
IL16	Reference styles	5.774	1.050	0.945
IL15	Reference management	6.219	0.724	0.746
<i>8.4% of variance explained</i>				
Factor 4: Information analysis ($\alpha = 0.675$; $\omega = 0.674$)		6.116	0.715	1.631
IL4	Statistical software	6.101	0.816	0.756
IL22	Visualization	6.131	0.830	0.580
<i>6.5% of variance explained</i>				

Note. Applied rotation method is promax and number of factors determined by parallel analysis. Factor loadings (>0.5), factor reliability (Cronbach's alpha and McDonald's omega) and percentage of variance explained by each factor of information literacy.

Source: developed by authors based on study data.

The ILDoc survey, comprising 14 items, was used to assess information literacy among doctoral students ($N = 294$). The overall reliability of the questionnaire was

good, with a Cronbach's alpha of 0.842 and a McDonald's omega coefficient of 0.846. Through Exploratory Factor Analysis (EFA), four factors were identified, each grouping a subset of the items. The questions/variables were measured using a 1–7 Likert scale, and each question was specified by three items, representing knowledge, skills, and attitudes related to information literacy self-evaluation of doctoral students. These items were used to create the composite variables listed below, which were then included in the EFA.

Factor 1: Information Access ($\alpha = 0.801$, $\omega = 0.806$) consisted of six items: IL8 (Expert knowledge, $\bar{x} = 5.938$, $SD = 0.790$, factor loading = 0.725), IL25 (Supervisor cooperation, $\bar{x} = 6.129$, $SD = 0.943$, factor loading = 0.657), IL23 (Research process, $\bar{x} = 5.794$, $SD = 0.832$, factor loading = 0.632), IL24 (Research methodology, $\bar{x} = 5.791$, $SD = 0.988$, factor loading = 0.620), IL1 (Information sources, $\bar{x} = 5.707$, $SD = 0.764$, factor loading = 0.612), and IL2 (Discipline terminology, $\bar{x} = 6.098$, $SD = 0.707$, factor loading = 0.519). Information Access relates to a doctoral student's ability to identify, locate, and access relevant information, experts, and resources within their discipline. It encompasses knowledge of key authors, institutions, and terminology, as well as an understanding of the research process, methodology, and the importance of supervisor cooperation. It highlights the significance of being well-versed in one's field and being able to efficiently navigate and use various sources of information. This representation is in line with the ACRL Framework for Information Literacy for Higher Education, which emphasizes the importance of identifying and accessing information from diverse sources [2]. In particular, the "Information Creation as a Process" and "Research as Inquiry" frames highlight the need for understanding the research process, methodology, and locating experts within the discipline [2].

Factor 2: Information Retrieval ($\alpha = 0.671$, $\omega = 0.660$) included four items: IL6 (Technology trends, $\bar{x} = 5.499$, $SD = 0.940$, factor loading = 0.693), IL9 (Advanced search, $\bar{x} = 4.542$, $SD = 1.585$, factor loading = 0.672), IL14 (Resource access management, $\bar{x} = 5.500$, $SD = 1.030$, factor loading = 0.537), and IL3 (Hidden internet, $\bar{x} = 4.567$, $SD = 1.636$, factor loading = 0.512). This factor focuses on a doctoral student's skill in searching for and extracting information using advanced search techniques and tools. It involves being aware of and adapting to technology trends, utilizing advanced search strategies, managing resource access, and navigating the hidden internet (resources not indexed by standard search engines). This dimension emphasizes the importance of being proficient in various search methods and tools to retrieve relevant information effectively. The importance of advanced search techniques and tools, as well as staying up-to-date with technology trends, is emphasized in the "Searching as Strategic Exploration" frame of the ACRL Framework [2]. This notion is also supported by various studies, such as those by Mokhtar, Majid, and Foo [47] and Julien and Barker [48], which discuss the significance of effective information retrieval skills in the context of higher education and research.

Factor 3: Reference Management ($\alpha = 0.769$, $\omega = 0.768$) comprised two items: IL16 (Reference styles, $\bar{x} = 5.774$, $SD = 1.050$, factor loading = 0.945) and IL15 (Reference management, $\bar{x} = 6.219$, $SD = 0.724$, factor loading = 0.746). This factor pertains to a doctoral student's ability to organize and manage references and citations.

It includes understanding and applying reference styles, as well as creating and maintaining a database of sources and texts. This dimension highlights the importance of standardization and organization in managing scholarly references, which is crucial for maintaining the integrity and credibility of academic work. Proper citation and reference management are essential to maintain the integrity and credibility of academic work, as discussed by the “Scholarship as Conversation” frame in the ACRL Framework [2]. The importance of reference management skills for students and researchers in higher education settings is underscored by the need to acknowledge and credit the sources of information used in their work, thereby demonstrating intellectual honesty and ethical behavior [49]. Furthermore, proper citation practices facilitate the tracking and verification of the sources, fostering transparency in research and scholarship [50]. Effective reference management also allows researchers to create a systematic and organized approach to managing bibliographic information, making it easier to locate and retrieve sources during the research and writing processes [51]. Ultimately, these skills contribute to the quality and rigor of academic work [52, 53], while also promoting a culture of responsible and ethical research practices in higher education.

Factor 4: Information Analysis ($\alpha = 0.675$, $\omega = 0.674$) contained two items: IL4 (Statistical software, $\bar{x} = 6.101$, $SD = 0.816$, factor loading = 0.756) and IL22 (Visualization, $\bar{x} = 6.131$, $SD = 0.830$, factor loading = 0.580). This factor addresses a doctoral student’s ability to analyze and interpret data using statistical software and visual representation techniques. It involves working with statistical software, creating and interpreting visual information such as graphs, tables, and diagrams. This dimension underscores the importance of data analysis and visualization skills for effective communication and understanding of research findings. Data analysis and visualization skills are crucial for effective communication and understanding of research findings. The ACRL Framework’s “Information Has Value” frame stresses the importance of recognizing the value of information and using it effectively to create new knowledge [2]. Literature such as Börner, Maltese, and Balliet [54] and Sosulski [55] discusses the importance of data visualization and analysis in the research process (Table 2).

Table 2. Fit indices

Index	Value
Comparative Fit Index (CFI)	0.996
Tucker-Lewis Index (TLI)	0.994
Bentler-Bonett Non-normed Fit Index (NNFI)	0.994
Bentler-Bonett Normed Fit Index (NFI)	0.972
Parsimony Normed Fit Index (PNFI)	0.726
Bollen’s Relative Fit Index (RFI)	0.962
Bollen’s Incremental Fit Index (IFI)	0.996
Relative Noncentrality Index (RNI)	0.996

Note. Chi-square test for factor model $X^2 = 79.210$, $df = 68$, $p = 0.166$.

Source: developed by authors based on study data.

Based on these results, we can conclude that the four factors identified in the EFA represent different aspects of information literacy among doctoral students. The items grouped under each factor exhibit good reliability and demonstrate distinct dimensions of information literacy self-evaluation.

In this study, a confirmatory factor analysis (CFA) was conducted to further examine the factor structure of the questionnaire. The results showed a satisfactory model fit, as indicated by the fit indices. The Comparative Fit Index (CFI) was 0.996, the Tucker-Lewis Index (TLI) was 0.994, and the Bentler-Bonett Non-normed Fit Index (NNFI) was 0.994, all of which were well above the recommended threshold of 0.95 [56]. The Bentler-Bonett Normed Fit Index (NFI) was 0.972, Bollen's Relative Fit Index (RFI) was 0.962, and Bollen's Incremental Fit Index (IFI) and Relative Noncentrality Index (RNI) both stood at 0.996. These values also exceeded the suggested minimum value of 0.90 [57], demonstrating an acceptable fit for the model. Additionally, the Parsimony Normed Fit Index (PNFI) was 0.726, which is considered acceptable given that values above 0.50 are generally deemed satisfactory [58]. Lastly, the chi-square test for the factor model was not statistically significant ($X^2 = 79.210$, $df = 68$, $p = 0.166$), further supporting the model's adequacy (Table 3).

Table 3. Factor covariances

			Estimate	S.E.	z-value	p
IAC	↔	IRE	0.705	0.057	12.475	<.001
IAC	↔	REM	0.704	0.050	14.176	<.001
IAC	↔	IAN	0.498	0.072	6.882	<.001
IRE	↔	REM	0.621	0.061	10.137	<.001
IRE	↔	IAN	0.594	0.061	9.798	<.001
REM	↔	IAN	0.422	0.068	6.224	<.001

Source: developed by authors based on study data.

The factor covariances analysis in the CFA demonstrated significant associations among the four factors in the study, which represent distinct dimensions of information literacy among doctoral students. The strong positive association between information access and information retrieval suggests that students who are better at accessing relevant information sources are also more adept at retrieving necessary information (0.705, $p < 0.001$). This relationship is consistent with the findings of studies conducted by Gross and Latham [59] and Julien and Barker [48], which emphasize the interconnectedness of information access and retrieval skills as significant components of information literacy. A strong positive relationship between information access and reference management indicates that students with superior information access skills are also more proficient in managing references (0.704, $p < 0.001$). This result highlights the importance of effective reference management as a key aspect of information literacy and that mastering reference management skills is essential for students and researchers in higher education settings [2, 60]. The positive association between information access and information analysis suggests that students who are skilled in accessing information sources are also

more capable of analyzing the information they gather (0.498, $p < 0.001$). This relationship supports the findings of Kurbanoglu, et al. [26], who showed a structure of IL where skills similar to our information analysis factor are critical components of information literacy and might be closely related to the ability to access and evaluate information sources. The positive relationships between information retrieval and both reference management and information analysis (0.621, $p < 0.001$; 0.594, $p < 0.001$) suggest that doctoral students who excel at retrieving information also feel more proficient in managing references and analyzing the retrieved data. These relationships align with the work of Eisenberg and Berkowitz [61], who underscore the importance of integrating information-seeking, allocation and organization, and evaluation skills in the context of information literacy education. The positive association between reference management and information analysis indicates that students who are skilled in managing references also exhibit greater competence in analyzing information (0.422, $p < 0.001$). This finding is connected to conclusions made by Fourie [62], who sets reference management and information analysis as interconnected skills necessary for conducting high-quality research and scholarship.

In summary, the significant associations among the four factors in the CFA highlight the interrelated nature of information literacy skills among doctoral students. These relationships support existing literature on the importance of developing and integrating various dimensions of information literacy to produce well-rounded and competent researchers in higher education settings.

5 Discussion

Various techniques and tools are employed to study information literacy in academia, typically examining the fundamental competencies of students regardless of their educational level. However, the specific nature of the IL self-assessment of doctoral students is noteworthy. This distinctive feature sets doctoral students apart from other students and aligns them more closely with faculty members.

An original questionnaire for self-assessment of information competences of doctoral students was created as a part of this study. The advantage of our approach is that the research questionnaire is based on the analysis of several most important, robust tools for self-assessment of information competences, including IL-HUMASS, ALFINVES, ILSES and PKIM. Additionally, we bring a new perspective on the issues of measuring the competencies of doctoral students.

The final version of the IL-HUMASS questionnaire contained 25 items grouped into four categories (information retrieval, evaluation, processing and communication/dissemination) and three self-report dimensions (motivation, self-efficacy and favorite source of learning). It allows for a mixed analysis involving two quantitative dimensions (motivation and self-efficacy) and one qualitative dimension (preferred source of learning). We divided the competencies of doctoral students into Information access, Information retrieval, Reference management, and Information analysis, adapting the areas of self-assessment to the information and communication processes carried out by doctoral students.

The ILDoc questionnaire tool has been tested. Using factor analysis, we identified 14 core variables that reflect four theoretically consistent factors. Based on the findings,

we propose that these identified latent factors could form the basis for determining the variables in the SEM analysis. The presented approach provides valuable insights into the key factors that shape the information literacy of Ph.D. students in Poland. In addition, the proposed tool refers to three areas of self-assessment of competences: knowledge, skills and attitudes, which allows for a deeper analysis.

The robust correlations we have found in our model among the factors of Information Access and Reference Management (0.704), Information Access and Information Retrieval (0.704), and Information Retrieval and Reference Management (0.621), suggest that the information literacy skills of doctoral students are more akin to faculty perspectives than those of undergraduate or graduate students. This is likely because doctoral students, being immersed in research-intensive environments, are expected to have advanced research skills, as supported by Pinto, Fernández-Ramos, Sánchez, and Meneses [14]. The marked covariance between Information Access and Reference Management suggests that doctoral students proficient in handling various channels of information are also adept at managing these references effectively. This observation relates to De Meulemeester et al.'s [12] findings, where medical students' information literacy skills improved significantly post the information literacy training program. De Meulemeester, et al. inferred that proficiency in one of these skills potentially enhances the other, underlining the interdependence of these abilities. Given the very narrow perspective of the reference management factor of doctoral students' IL, it could be intriguing to examine it as an endogenous factor to consider in Structural Equation Modeling analysis. It would be worthwhile to validate the hypothesis that self-evaluation of competencies in Information Access, Information Retrieval, and Information Analysis could explain the acceptance of reference management tools among doctoral students.

The high correlation between Information Access and Information Retrieval in our study implies that doctoral students adept at accessing information also demonstrate proficiency in retrieving it. This aligns with the ILSES's emphasis on locating and accessing resources and formulating search strategies. Additionally, the notable correlation between Information Retrieval and Reference Management reflects the ILSES components of interpreting, synthesizing, and utilizing information, as well as communicating the information. These skills are integral to maintaining academic integrity and producing high-quality research [26]. The notable correlation between Information Access and Reference Management in our study aligns with the emphasis on information search and processing skills in the IL-HUMASS survey. According to Pinto [27], information-search skills incorporate the utilization of various information sources and the application of information-search strategies, which correspond with our emphasis on Information Retrieval. Similarly, the IL-HUMASS's focus on information processing skills, including schematizing and abstracting information, using database and reference managers, and handling statistical programs, aligns with our emphasis on Reference Management and Information Analysis.

Further research is suggested to examine the applicability of our questionnaire across different countries and educational systems. The results highlight the necessity for a nuanced, level-specific methodology for measuring information literacy, particularly for doctoral students who are intertwined with teaching students, lifelong learning and academic research.

6 Conclusions and Implementation

ILDoc questionnaire and scale is a promising research tool for studying information literacy among doctoral students across varied disciplines. However, its application was restricted to a limited sample from Polish doctoral schools, signaling the need for a larger, more diverse sample in future research to increase generalizability.

The scale we have prepared could influence the modification of doctoral school curricula and, more specifically, broaden the range of skills acquired that are necessary for the research process. Additionally, it could be advantageous to reframe our conceptual model by considering Reference Management as an outcome variable in SEM analysis. Hypothetically, the self-evaluation of competencies in Information Access, Information Retrieval, and Information Analysis might explain the acceptance and usage of reference management tools among doctoral students. Verifying this hypothesis would help illuminate the interconnectedness of these competencies and further clarify their respective influences.

Comparing Polish doctoral students with students from other countries could offer a rich cultural perspective. We also recommend further refinement of the tool, adding new components or modifying existing ones to keep it relevant and effective. This iterative process is critical to maintain the relevance and effectiveness of the tool in a constantly evolving academic landscape.

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Fostering Development of Information Literacy Skills in Early School-Age Children

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Abstract. The fundamental aspect of acquiring knowledge is rooted in information, making the concept of learning essential to information literacy. Often, young children are encouraged to explore beyond their textbooks to gain a deeper understanding of various subjects, phenomena, or terms. Consequently, in order for individuals to actively engage in the world overflowing with information and to navigate the vast sea of information effectively, it is crucial to develop information skills from an early age. This research aims to examine the foundational knowledge of children in their early school years regarding information and its sources, as well as their proficiency in basic information literacy skills. Additionally, it seeks to explore whether the Super 3 program can impact the enhancement of information skills.

Keywords: Children · elementary school · information literacy · super 3 · action research · survey

1 Introduction

Functioning in modern society is inseparable from the availability and utilization of information that plays a pivotal role in our daily lives. Information is intricately linked with the acquisition of knowledge, forming a symbiotic relationship. In order to navigate and thrive in today's world, individuals must have access to relevant information and be able to effectively utilize and interpret it. Whether it is for making informed decisions, staying up-to-date with current events, engaging in meaningful discussions, or pursuing personal and professional growth, information is the key that unlocks knowledge and empowers individuals to actively participate in society. Therefore, the importance of information cannot be overstated in our interconnected and information-driven world. When someone is informed, what he/she knows is changed. The basis of this understanding lies in Buckland's concepts of information as a process, and information as knowledge [1]. Information is the basis of learning which lies at the heart of information literacy. Recognizing information need, accessing information, evaluating, and using it ethically, lies at the core of information literacy [2]. Information literacy is also promoted as an approach to learning, or a way of learning. The idea of informed learning was developed to direct attention toward those interpretations of information literacy that involve using the information to learn [3]. One of the common tasks for children at

early school age is to investigate about a subject, phenomenon or a term beyond a textbook. Children at that age begin to develop independence, but they are aware they still need parents' assistance especially when they obtain information from unknown sources [4]. Learning during childhood primarily relies on experiential factors to a significant extent. Children at early school age are mainly inexperienced in autonomous information searching. They recognize that they are unable to accomplish a task by themselves so they ask their parents or siblings for help. Therefore, in order for an individual to be able to participate promptly and actively in the information-rich world, it is necessary to start developing information skills as early as possible/from early age.

2 Theoretical Background

Information literacy has become a fundamental skill in the contemporary world. Though its definition may vary, the core elements remain consistent across a number of sources. According to the widely cited definition provided by American Library Association [2], information literacy encompasses several key components, such as identifying information needs, accessing relevant information, evaluating credibility and quality of information, and utilizing it ethically and responsibly. Firstly, information literacy involves recognizing and understanding one's information needs. This entails being able to identify gaps in knowledge or areas where information is required to accomplish a specific purpose or goal. Secondly, it encompasses the ability to access information effectively. This includes knowing how to search for and locate information from various sources such as libraries, databases, websites, or other repositories. Thirdly, information literacy involves critically evaluating the information obtained. This entails assessing reliability, accuracy, objectivity, and currency of the information, considering the context in which it was produced, and discerning potential biases or limitations. Ultimately, responsibly and appropriately utilizing information is also a very important component of information literacy. It involves understanding copyright laws, intellectual property rights, and ethical considerations surrounding the use, attribution, and dissemination of information. According to the American Association of School Librarians, (AASL) information literacy is also a sort of literacy that does not only include library skills and the application of specific skills and strategies, but also the ability to use information from numerous sources [5], that is highly important for the school environment. Information literacy is the key to achieving success in an environment permeated by information technologies, as well as a prerequisite for productivity in a democratic society [6]. Recognizing information literacy as a vital skill in the information age, the Association of College and Research Libraries (ACRL) acknowledged its significance as early as 1989 [7]. Building upon this insight, it becomes evident that fostering and enhancing information literacy should be a continuous endeavor spanning from early childhood through primary and secondary education, all the way to university-level education. To ensure that individuals possess proficient information skills, it is crucial to initiate information literacy instruction from an early age. By adopting a conceptual teaching approach, students can be introduced to fundamental concepts that can be applied across a broad range of situations and contexts [8, p. 79].

2.1 Children in Early School Age

Childhood is generally understood as the phase of life between infancy and adolescence, encompassing a range of developmental milestones. However, the specific age range associated with childhood can vary across cultures, disciplines, and research studies. Sometimes, childhood is marked as indeterminable. “Childhood is very mobile and changeable, various societies within various time frames expressed distinctive ideas of childhood which have been reconstructed over again with the creation of a new image of child” [9, p. 268]. In the Republic of Croatia, where this research is conducted, the Croatian National Curriculum for Early and Preschool Education defines childhood as a process rather than a fixed time span, constantly influenced by the specific context of a given space, time, and culture. It varies according to different conditions and cultural settings in which it unfolds. Consequently, just as there is no universally applicable concept of a child, there is no universally defined notion of childhood [10]. During this life stage, children are actively engaged in education which plays a pivotal role in their personal development. When children begin formal education, they enter a stage commonly referred to as middle childhood, often considered the age of reason, as it signifies their preparation for elementary school [11]. According to UNESCO, childhood is a period of remarkable brain development for children, and it represents a crucial window of opportunity for education [12]. This is the phase when children exhibit the highest curiosity towards their surroundings. In simpler terms, it is childhood, which signifies the initiation of acquiring and assimilating information that will aid them in their future education. Early school-age children gain a lot of knowledge from “hands-on” experiences [13]. During that period, it is possible to explain to children and to begin to develop their awareness of an information source as well as their understanding that the quality, truthfulness, and benevolence of information may vary. Children in Croatia enter school at age of 7. At this age, school children usually do not encounter the term *information* and are not aware of its meaning. Before the age of six, children are in the stage of intuitive thinking, which means that they may find it difficult to understand abstract concepts and complex explanations. According to Piaget, children from ages 7 to 11, children are in the concrete operational stage of cognitive development. This involves mastering the use of logic in concrete or tangible ways, which makes it difficult for them to grasp abstract concepts and complex explanations [14].

3 Information Literacy in the Early School Age

Information literacy deals with all information that reaches an individual, regardless of the source of the information, or regardless of the communication channel through which it was received. Due to its complexity, digital literacy has become the widely accepted umbrella term that encompasses many diverse activities and possesses multiple designations [15]. Because the contemporary world driven by the use of ICT demands having information skills, it can never be too early to start with its development. “Early years children are familiar with many forms of media in the home but these are frequently used only for entertainment, without any attention to their information-providing potential. Comics, for example, are looked at for fun, television is watched primarily for cartoons, and computer-based technology is chiefly employed for games.” [4] Children at the early

school-age very often interact with information technology and they apply some kind of information literacy skills. However, they are not aware how to use information for a specific purpose of education. Information systems mostly designed for adults are not supportive for children's information seeking [16]. Due to their complexity most models and standards of information literacy, refer only to adults.

The Super 3 model of information literacy, designed for preschool and early school-age children emphasizes the acquisition of three essential information skills: planning, implementation, and evaluation. Derived from the Big 6 framework this simplified model, aims to facilitate the development of information literacy in young learners. Specifically, the three stages are typically described as follows: plan, do, and review. [17, 18].

4 Model Super 3

The development of information skills among a selected group, should follow the established models of information literacy development. When it comes to children at early school age, it is recommended to use a simplified model of information literacy, such as the Super 3 model created by Michael B. Eisenberg and Robert E. Berkowitz. The model is designed for children of preschool age up to the third grade of elementary school, but also for people with developmental disabilities. It combines the elements or skills listed in the Big6 model that need to be developed in order for a person to be considered information-literate. The model consists of only three elements related to planning, doing and estimating. *Planning* means defining the task and the strategy for searching necessary information. During this process it is necessary to answer the following three questions: What should I do to satisfy my information need? What will it look like if I do a very good job and obtain answers to my questions? and What do I need to know to satisfy my need and do my job well? [18, 19]. Only after answering these questions, does an individual move on to the second step, which is *doing*. During the second step, users are invited to perform activities that will help them find the necessary information. This may include reading, writing, drawing, retelling, and other activities that will help them meet their information needs. This step includes three steps from the Big6 model, namely the location of and access to information, the use of the information itself, and finally the synthesis that entails organizing and presenting it. The last step of the model is *to review* and it refers to the assessment or evaluation of what has been done. In addition, it refers to the self-assessment of the entire work done in the previous two steps, which entails evaluating relevance and adequacy of the previous steps as well as satisfaction with the results obtained. The aforementioned step of the Super 3 model marks the already mentioned evaluation, assessment of the effectiveness of the model, as well as the relevance of the work done in relation to the predetermined goal [18, 19].

5 Information Literacy Research Using an Action Research Approach

Action research is a valuable tool that allows individuals and organizations to make informed decisions based on real-world data. With its emphasis on collaboration and co-creation, action research is particularly effective in improving the quality of practices and

procedures in education and another domain [20]. Learning information literacy skills through action research can be highly effective and beneficial. Action research involves creating authentic situations where students can apply and develop their information literacy skills in real-world contexts. This learning method allows students to actively engage in the process of information research, asking questions, finding relevant sources, analysing information, and applying it to specific situations. Through such a hands-on approach, students gain a deeper understanding and the ability to apply information skills in various contexts. Action research also enables students to develop critical thinking, evaluation skills, and independence in gathering, assessing, and applying information. By solving real-world problems and facing challenges, students become active participants in their own learning and develop the skills necessary to navigate successfully in the digital age. Administering questionnaires before and after action research allows tracking changes in students' knowledge, skills, and attitudes.

6 Methodology

The research proposal obtained a positive review by the Ethics Committee of the Faculty of Humanities and Social Sciences in Osijek KLASA 602-04/22-04/79, URBROJ: 2158-83-06-23-3 and is in accordance with the Ethical Code of Research with Children. The authors obtained written consent from parents allowing children to participate in this research. This research utilized a multimethod approach, combining both qualitative and quantitative methods, such as a semi-structured interview, a survey, and action research. The research was conducted in "Franjo Krežma" Elementary School in Osijek, Croatia in May 2023. The research aimed to investigate the foundational factors that contribute to the development of information literacy in children during their early school years, specifically focusing on their initial information literacy skills. The study aimed to identify the essential prerequisites necessary for children to acquire and enhance their information literacy abilities during this important developmental stage.

The research was based on the following questions:

- RQ 1. Do children at early school age understand the meaning of the term information?
- RQ 2. Do children search for information independently?
- RQ 3. What sources of information do children use?
- RQ 4. Has there been a shift in the comprehension of information and information resources before and after the action research?

6.1 Sample

The sample consisted of children of early school age, eight-year old children who attend the second grade of elementary school. Altogether 16 children participated in the research, ten girls and six boys.

6.2 Instruments

Instruments used for the present research included action research, interview, and questionnaires. The authors designed, and created videos, a website, worksheets, and paper

props. These materials were informed by the Super 3 model and tailored specifically to the present research needs. The survey questionnaire was specifically designed and customized to suit the children's age group and it was printed on paper.

In-depth interviews were conducted with children several days before the implementation of the action research and again a few days after it. Before the action research took place, children were asked about where and from whom they seek information, whether they search for information independently, and what information means to them. During the interview conducted after the workshop, they were asked if they liked it where they seek information, what information means to them, and if they remember the steps recommended to follow in the Super 3 workshop.

A questionnaire was administered before and after the completion of the action research to monitor progress. The questionnaire administered before the action research consisted of 6 close-ended questions: Are you a boy or a girl? Is the blue whale a mammal? Does the blue whale live in a lake, a sea, or a river? Is the blue whale the biggest animal in the world? Is the blue whale as long as a bus, a car or a basketball court? Are you looking forward to participating in this workshop? The questionnaire administered after the workshop (action research) contained 9 close-ended questions: When you are interested in something, where will you look for information? Will you research or search for information by yourself in the future? What are the steps that the Super 3 does? Will you use the Super 3 steps when you get interested in something in the future? Is the blue whale a mammal? Does the blue whale lives in: a lake, sea or a river? Is the blue whale the biggest animal in the world? Is an adult blue whale is approximately as long as: a bus, a car or a basketball court? Are you satisfied with this workshop?).

The action research, specifically the information literacy workshop, was designed for the purposes of this study based on the Super 3 model. The workshop topic was chosen by the authors. The materials used for the workshop (e.g., cardboard glasses) were devised and created by the authors, the glasses were used to motivate children to explore the topic. A video was created to explain the procedure of the workshop in an engaging and accessible way.

6.3 Research Procedure

The action research took place at Franjo Krežma Elementary School in Osijek at the beginning of May 2023. The research was based on the information literacy workshop titled "Super 3 and Whales". The workshop lasted for one hour and twenty minutes and was organised for the second graders. During the workshop, children were seated into groups of four. To stimulate motivation, students were asked to brainstorm everything that is found in seas and oceans. Based on the obtained responses, answers, children were introduced to the workshop topic which was related to research on blue whales. They were asked to fill out an initial questionnaire, which was followed by playing an animated video Super 3 and whales, designed specifically for the research purposes. The video provided a brief explanation of how to collect information with the help of three steps according to the Super 3 information literacy model. Participants commented on the animated video, and at the same time determined the three steps stated by the hero Super 3. Students were then given S3 paper glasses which allowed them to find the

desired information more easily. They also received paper shells containing questions that they were asked to answer. The questions were about the life of the blue whale. Together with the research leader and their teacher, children browsed books (encyclopedias about animals, manuals, lexicons, picture books) and the Internet in search of basic information about the blue whale. While exploring the Internet, they came across a website specifically designed for the purpose of this research (<https://ambitious-sparrow-cgmhqb.mystrikingly.com/>). The content of the website aimed to teach/show children that not everything they find on the Internet is true and accurate. They were instructed to think carefully and in case they noticed something they were not sure about or seemed suspicious, they were advised to check it with adults, in books, and in several places on the Internet. After finding the answers, the participants made group posters, a puzzle, and a mind map. They were also asked to write a poem. The aim of these tasks was to develop presentation skills and presentation of information, to practice navigating the space and present the information obtained. The last step was the assessment of the work done or the task solved and the personal assessment of the work. If participants were satisfied with their work and managed to follow the steps correctly, they received star stickers, praise and ratings from the leader and other classmates. Finally, the children and the leader repeated the steps presented by Super 3. The final activity involved the leader reading a picture book titled *The Blue Whale* by Jenni Desmond. After the workshop, participants completed the final questionnaire, and received personalized diplomas and special gifts as a sign of gratitude for the participation in the research.

7 Findings

The answers to the first three research questions were obtained through interviews conducted before the action research and the questionnaire. The answers to the fourth research question were obtained through the questionnaire, action research, and interviews following the action research.

RQ1: What do children of early school age know about the concept of information?

Most children do not know what information is or they understand it, but cannot explain its meaning. Almost no one could answer the question “What is information?” or “Do you know what is the information”,

They answered: (P2): “No.” Or, for instance (P1) “I know, but I cannot explain.”

One respondent did provide an explanation of information by saying the following: (P4) “Information is the thing that you find out.”

RQ2: Do children search for information independently?

Children lack the ability to independently search for information and often have limited knowledge on how to conduct searches on their own. They often need help assistance of their parents in searching for information on the Internet when they want or need to find out something what you don’t know. To the question: “When you are interested in something, how do you find the answer to your question?” only one child

gave an answer and explained that they search independently. Other children mostly stated that they do not search for information on their own.

(P4): “When I go to search, I click on that application, and then I get things that I have already researched before, and then it’s a little bit thin, and then I click on that. Or, I type in something I’m interested in about Rome. And then I type in the first two letters, and maybe it will show something, and I click on that. It could be a video, there could be pictures, it could be something that’s written”.

(P2): “I ask my father.. Sometimes Mom. I don’t (seek) alone”.

RQ3: What sources of information do children use?

Children usually use personal sources of information (mother, father, grandfather, teacher or siblings), books and internet. When seeking for information almost all children use the help of an adult as direct sources of information or as intermediaries.

To the question: When you have a question, where do you seek for answers? children gave answers as following:

(P1): “I mostly ask Mom.”

(P3): “In books” and “Mom helps me”.

(P4): “When I’m curious about something, I ask my Mom or Dad, or I read in a book”.

(P2): “I search on the Internet”.

(P7): “I ask parents”. (By myself) I do not (seek).

(P8): “Sometimes I ask my mom, sometimes I do it myself, and sometimes I ask my sister”.

RQ4. Has there been a shift in the comprehension of information and information resources before and after the action research?

Understanding of information and information resources evolved significantly before and after the implementation of action research. After the workshop, children explained the meaning of information successfully.

Furthermore, after the workshop, almost all children individually were able to list several information sources to the question “Where can you search for information?” Children answered:

(P1): “On a mobile phone, tablet, with the help of parents and books”.

(P2): “Through the internet, from books, asking older people, mom, dad, teacher”.

(P3): “On the internet, we can ask parents, in books”.

(P4): “In books, encyclopaedias, from parents, grandparents”.

To the question: What is information? children answered:

(P1): “Information would be, for example, when you want to find out something and then search for it”.

(P2) “When we want to find out something, we go to the Internet to search for it”.

(P3) “Information... like when we want to search for something”.

(P4) “Information is when you inform someone or share something with them that they did not previously know”.

(P5): “Information is like something that we know, for example, when someone says something that they don’t know, but we know the answer to it”.

(P6): “Information would be, for example, when the coach tells me that the training has been changed to another day of the week, and I ask them which day and at what time, and they tell me, for instance, Friday at 4 o’clock”.

8 Discussion

The findings of this study shed light on children’s knowledge and behaviors related to information literacy. The first research question explored children’s understanding of the concept of information. The results indicated that most children did not have a clear understanding of what information is or struggled to explain its meaning. Only one child provided a simple explanation that information is something you find out. This highlights the need for explicit instruction and guidance on the concept of information to enhance children’s comprehension.

The second research question focused on children’s ability to search for information independently. The findings revealed that children generally lack the skills and knowledge to conduct independent information searches. They heavily rely on the assistance of their parents or other adults when seeking information, particularly through the use of the internet. Only one child expressed the ability to search independently, while others admitted relying on their parents or not seeking information on their own. This emphasizes the importance of developing children’s information literacy skills to enable them to search and locate information independently.

The third research question explored the sources of information children typically use. The results demonstrated that children predominantly rely on personal sources such as parents, siblings, teachers, and books when seeking information. The internet was also mentioned as a source, although it was often accessed with adult assistance. This finding suggests that children need guidance in diversifying their sources of information and developing critical evaluation skills to determine the reliability and credibility of different sources.

The fourth research question examined the shift in children’s comprehension of information and information resources before and after the action research. The results indicated a significant improvement in children’s understanding after participating in the workshop. They were able to explain the meaning of information more successfully and demonstrate a broader awareness of various information sources. This suggests that the intervention had a positive impact on enhancing children’s comprehension of information and their ability to identify and access different sources.

Overall, these findings highlight the importance of implementing information literacy programs and interventions targeting children at an early age. By providing explicit instruction, modelling effective information-seeking behaviors, and encouraging independent exploration, children can develop the necessary skills to become confident and critical consumers of information. Teachers, parents, and school librarians play crucial roles in fostering information literacy skills and guiding children in navigating the vast and diverse information landscape.

9 Conclusion and a Proposal of a Framework

To empower individuals with the ability to effectively analyse, evaluate, and use information, it is essential to equip them with the necessary skills. By doing so, we enable individuals to become independent learners, fostering thus critical thinking, creativity, and innovation-skills that are crucial in today's information age. Therefore, prioritizing the development of information skills across all levels of education becomes crucial as it allows learners to engage in independent exploration across various school subjects. Raising awareness among parents is vital to encourage independent exploration in children from an early age, rather than providing ready-made answers or seeking information on their behalf. It is important to emphasize that action research provides an opportunity for continuous monitoring of student progress. This can enable educators and researchers to assess the effectiveness of information literacy teaching methods and adapt them to meet students' needs. In summary, employing action research as a method for learning information literacy skills offers students practical experience, promotes critical thinking and independence, and makes them active participants in their own learning. This approach plays a pivotal role in helping children develop key skills necessary for navigating an information society successfully. The topic of information literacy in early primary education has received little attention until today. Hence, there is an urgent need for further research in this specific area. In conclusion, early school-age children often lack information skills, but action research and information literacy programs have proven effective in addressing this gap. Parents, teachers, and school librarians all play crucial roles in fostering information literacy skills in children. By encouraging independent exploration, modelling effective information-seeking behaviors, and integrating information literacy into the curriculum, we can empower young learners to become critical thinkers, confident consumers of information, and active participants in an information-rich society.

Prioritizing information literacy in early primary education is crucial to better equip young learners with the skills needed to navigate the vast amount of available information. Based on the present research, it is possible to adopt draft guidelines—a framework for designing, planning, and implementing a library information literacy program for early school-age children. This framework can assist librarians and other information specialists in introducing information literacy programs for young learners, as proposed in Table 1.

Table 1. Proposal for a Framework for Creating Guidelines for the Design, Planning and Implementation of the Library's Information Literacy Program for Early School-age Children

Task	-to encourage and systematically work on the development of information skills in early school children with the aim of preparing them for further participation in the educational process -to learn about the basics of the concept of information, sources of information, searching and searching for information, evaluation of i and presentation of information, as well as sources of information in order to be more active participants in society and education in general
Target group	-children of early school age, i.e. the age of 8 or 9
Objectives of the program	-to enable children to properly develop their information skills and prepare them for lifelong learning ahead of them, with free access to information, as well as to all sources and media -to train children to independently solve a problem they encounter, as well as to make them information literate individuals
Cooperation/partnership	-apart from children's librarians, the guidelines can be used by any participant in the educational process. Cooperation with other institutions is necessary for a quality information literacy program for early school children. Librarians should cooperate with schools
Financing	-funding of the program can be received through the central institution's budget, the library, or with the help of investors and state donations or from private, legal and/or independent persons who want to support children's growth and development
Moderator and participants	-an information literacy program for early school children should be implemented by an information specialist in accordance with the regulations and the Curriculum for School Education leaders of the program should be trained information specialists who should convey their knowledge in an interesting way to early school children -a leader should possess skills for working with children, emphasized communication skills, as well as adaptive skills, and it is desirable to be creative
Materials	-in designing educational programs for children, it is important to select age-appropriate and diverse materials, and cater to their interests and needs –the materials should be available in various formats, including digital and printed, as well as toys, games, and online resources - by prioritizing quality and cultural inclusivity, we can select materials that align with these principles, thereby enabling us to offer captivating and impactful learning experiences for children -when selecting a topic or research problem, it is important to prioritize the principle of relevance or interest for children

(continued)

Table 1. (continued)

Room	-the space for an information literacy program for early school children should be designed with their age in mind. This includes adapting furniture to their height to create a sense of belonging and comfort. The layout should encourage circular communication, allowing for active participation from the participants. -o promote information skills, the space should be free from distractions or unrelated information. -It is advisable to consider displaying relevant posters or materials related to the workshop theme, ensuring the arrangement complements the learning environment
Implementation time	-workshop timing should be adjusted to accommodate early school children and their obligations. It is recommended to design a workshop within a shorter time span, ideally ranging from 60 to 90 min. This duration aligns with their attention span and allows for focused and engaging learning experiences. To ensure effective learning, it is beneficial to implement a workshop on multiple occasions throughout early school education. This approach provides reinforcement and opportunities for children to apply and build upon the skills they have learned over time
Motivation	-during the program implementation, it is essential to consistently encourage and motivate children to active participation. This can be achieved through various motivational materials and inspirational sayings that instill enthusiasm and a sense of accomplishment. It is crucial to provide children with access to high-quality sources of information to support their learning. Assist them in searching for information, selecting appropriate sources, and evaluating the credibility and reliability of the information they find -to provide this guidance throughout the entire process of information searching to foster critical thinking and information literacy skills
Evaluation	-after each workshop, it is important to evaluate the program to assess its limitations and benefits -this evaluation helps identify areas for improvement and enhance the success of subsequent workshops -collect feedback from participants, assess learning outcomes, review participant engagement, reflect on facilitation techniques, and analyse program logistics


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Developing Online Research Skills in a Lower Secondary School: The Viewpoint of Students

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Abstract. This study explored lower secondary school students' perspectives on learning online research skills. The aim was to investigate how the students experienced an intervention based on the Guided Inquiry Design model and whether their learning experiences, classwork, and challenges correlated. Data were collected via a questionnaire and analyzed quantitatively. Most learning in online research skills occurred during the first intervention course. Even more than online research skills, students reported learning about subject content and working practices. The students reported that their classroom work had been good and that they had not faced any major problems. Correlation analysis showed that classwork was linked to learning experiences. A negative correlation was found between classwork and perceived challenges. The study suggests that the Guided Inquiry Design model works with students and holds promise in enhancing students' learning experiences, including the acquisition of online research skills and subject-specific knowledge.

Keywords: Information literacy instruction · guided inquiry · online research · students · lower secondary education

1 Introduction

Today's society requires competences in asking questions and seeking answers, finding information, interpreting, and evaluating sources. We need to be able to identify what is real and reliable and also to be able to use information ethically ourselves. We need *online research skills*, which can also be referred to as *information literacy skills* [see 1, p. 15]. It is important to note that despite growing up in an age of digital media, today's youth do not inherently possess these skills, as evidenced by various studies [2–4].

Teaching online research skills creates challenges also for teachers and their traditional instruction practices, as they have to guide students to work independently in an ever-changing information environment beyond their control, namely, the Internet [5–8].

Pedagogical models have been developed to help teachers guide students through information literacy assignments. Guided Inquiry Design (GID) is one of the most established of these frameworks [9]. It provides detailed guidelines for teachers to guide students through the inquiry process. The process is divided into eight key phases, emphasizing preparations before information gathering [9].

Studies show positive effects of implementing pedagogical models like GID, with enhanced skills for students and support for teachers [10–12]. Ideally, these skills are integrated into instruction over a long period of time [11]. Experts suggest that information literacy and related skills should be taught as a school-wide curricular process, emphasizing collaborative culture [5, 9, 13].

In my dissertation [1], I investigated how lower secondary school teachers developed their instruction practices of online research skills after having been introduced to the GID framework [9] and examined the short- and long-term effects of the intervention on students. It was a longitudinal study: the same students were followed from 7th to 8th grade. During these two years, the students participated in three teaching intervention courses that focused on different subtasks of online research: information search, evaluation, and use. The control group received standard instruction based on the curriculum. The results showed that the intervention had a positive effect, but this effect observed immediately after the intervention did not last until the following year [1]. Therefore, it is important to investigate how the students themselves experienced the intervention and how they reflected their own working and learning after the intervention courses.

There are some intervention studies related to teaching of online research skills (or information literacy skills) in lower secondary schools. They have been shown to be helpful for students [14–17] and researchers have recommended that existing pedagogical models should be utilized in teaching information literacy and related project work, to help students to develop their skills [18]. However, only few follow-up studies have been published, and long-term benefits of interventions have rarely been investigated. Furthermore, even fewer have measured online research skills as learning outcomes. Some have measured subject content learning or factual knowledge [16].

Students' experiences of the interventions have hardly been researched at all [19]. Experiences have mainly been mapped out at the university level [20]. This study provides lower secondary students' perspectives on the topic. In this paper, the focus is on how the students themselves experienced the intervention that focused on online research skills and their own actions during the intervention courses.

The research questions are:

1. What new competencies did the students feel they achieved during the intervention?
2. How did the students describe their own work during the intervention?
3. What kind of challenges did the students report that they encountered during the intervention?
4. Is there a correlation between the students' learning experiences, classwork, and challenges?

2 Material and Methods

2.1 Participants and Procedure

The study took place at a Finnish lower secondary school. Altogether, 58 students and three teachers participated in the study. Data collection began in the fall of 2015 when the students entered seventh grade at the age of 13 to 14 and ended in the spring of 2017 when they completed their eighth grade at the age of 14 to 15. The intervention group comprised of three parallel classes consisting of 35 girls and 23 boys.

The intervention was implemented across three courses during the 2015 autumn term (course 1), 2016 spring term (course 2), and 2016 autumn term (course 3). The intervention was designed and carried out by a Finnish language teacher, but she collaborated with two history teachers on the second intervention course.

Although the courses were part of the school's regular curriculum, the teachers modified them to prioritize information literacy skills as a key learning objective. They were introduced to GID at the beginning but were free to incorporate it into their teaching practices as they saw fit. The teachers focused on two essential principles of GID: emphasizing the initial stages of the inquiry process and allowing students more freedom to choose topics that interested them. Inquiry logs were provided to help students keep track of information sources [9, p. 83–84].

In intervention course 1, students created a brochure on best practices in social media. In course 2, students worked on a source-based presentation and a fictional text, both relating to the Finnish Civil War. In course 3, each student prepared and delivered an argumentative speech. The primary objectives were for students to learn how to search for information on the web, critically evaluate sources, and utilize information effectively for a given task. The details of the teaching intervention are outlined in [21].

2.2 Data Collection

The data was collected between 2015 and 2016. The questionnaire surveyed students' learning experiences, classwork, and challenges during the intervention courses. Figures 1, 3, and 4 show what kind of statements were used to investigate the three variables. Concerning learning experiences, a 5-point scale from "I didn't learn anything" to "I learned a great deal" was used. A 3-point scale from "I didn't do this" to "I did exactly like this" was used for the students to assess their classwork. Challenges were surveyed with a 5-point scale that ranged from "Very easy" to "Very laborious". The questionnaire was administered after each intervention course, altogether three times.

2.3 Data Analysis

The data was analysed using quantitative methods. Concerning learning experiences, classwork, and challenges generally, descriptive statistics were employed. To determine the relationship between these three variables, a Spearman's rank-order correlation was computed. SPSS version 28 was used for statistical analyses.

3 Results

3.1 Learning Experiences

The results show that on average, the students felt that they had learned all the requested topics a little or some (see Fig. 1). Altogether, students reported learning the most about subject content and working practices (working in pairs/independently).

Concerning online research skills (searching information; choosing and evaluating information sources; using information sources), the students reported most learning during the first intervention course (see Fig. 2). An exception was "using information sources", that was learned most in the third course.

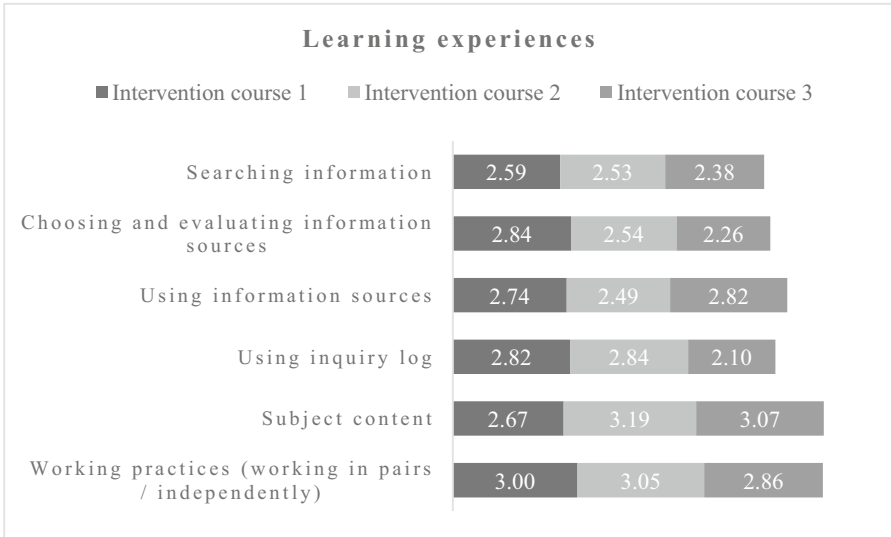


Fig. 1. Learning experiences. Chart showing course averages: 1 = I didn't learn anything; 2 = I learned a little; 3 = I learned some; 4 = I learned a lot; 5 = I learned a great deal.

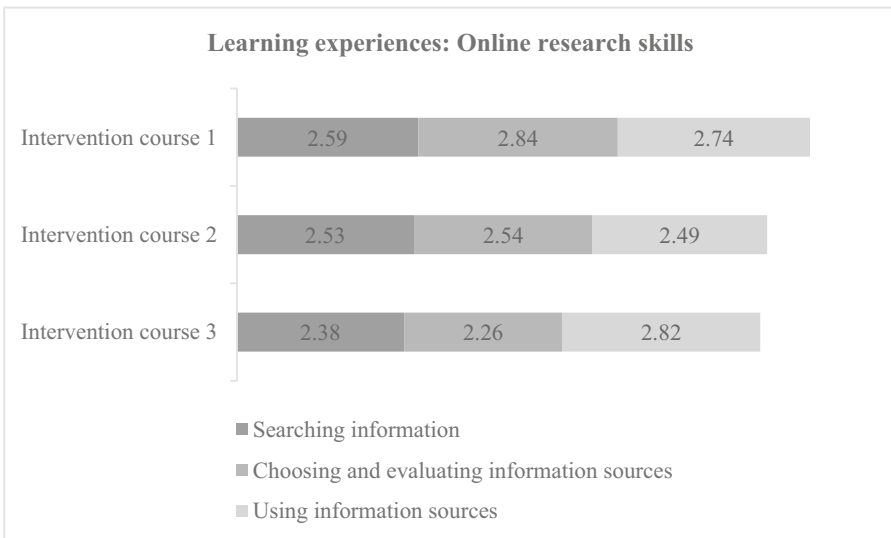


Fig. 2. Learning experiences: Online research skills. Comparison between intervention courses.

3.2 Classwork

According to the students, their classwork was quite exemplary. They felt that they had worked actively and followed the teacher's instructions well (see Fig. 3).

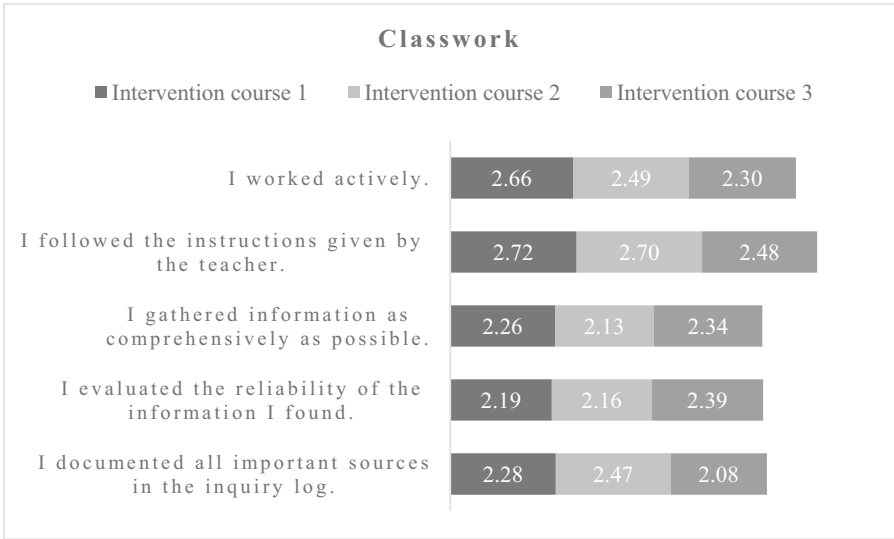


Fig. 3. Classwork. Chart showing course averages: 1 = I didn't do this; 2 = I did it partially; 3 = I did exactly like this.

However, there was a trend towards greater passivity across the board: according to the students, they were most active in the first course and least active in the third. This was also reflected in how well they followed their teacher's instructions. The use of the inquiry log was highest in the second intervention course. And, in the third intervention course, students were most active in gathering and evaluating information.

3.3 Challenges

The students did not report about any major problems during the intervention courses (see Fig. 4). Generally, most difficult for them was planning the work and using the inquiry log. The most challenging individual task was giving the speech. It also emerged that finding suitable sources online caused problems in the second course.

3.4 Correlations

A Spearman's rank-order correlation was run to determine the relationship between the variables that were surveyed: classwork, learning experiences, and challenges.

The findings show that classwork was significantly associated with learning experiences. The correlation coefficients were as follows:

- intervention course 1 $r(53) = .31, p = .020$,
- intervention course 2 $r(52) = .27, p = .046$, and
- intervention course 3 $r(35) = .48, p = .003$.

In other words, if the student did as instructed, he/she got a positive learning experience from it. He or she felt that they had learned.

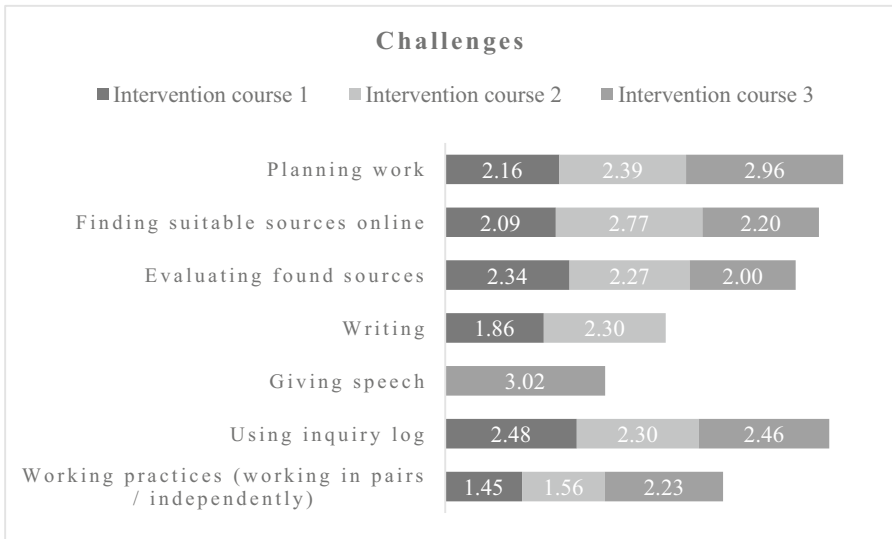


Fig. 4. Challenges: Chart showing course averages: 1 = very easy; 2 = fairly easy; 3 = in between; 4 = fairly laborious; 5 = very laborious.

Similarly, emphasizing the importance of classwork, a negative correlation was found between classwork and perceived challenges. If the student did as instructed, he/she faced only a few challenges. And conversely, when the classwork was less exemplary, more challenges occurred. The correlation coefficients were:

intervention course 1: $r(53) = -.33, p = .014$,

intervention course 2: $r(52) = -.38, p = .005$, and

intervention course 3: $r(35) = -.53, p < .001$.

Concerning the potential relationship between learning experiences and challenges, the results indicated that there was no significant correlation between them in either direction. Although a negative correlation was observed, it did not meet the threshold for statistical significance. Thus, the presence or absence of challenges did not appear to have a significant impact on learning experiences. The correlation coefficients were as follows:

intervention course 1: $r(53) = -.05, p = .738$,

intervention course 2: $r(52) = -.20, p = .148$, and

intervention course 3: $r(35) = -.23, p = .173$.

As the analysis results show, the findings were consistent across all three intervention courses.

4 Discussion

This study yields several noteworthy findings. My dissertation indicated that teachers can utilize the GID model as a source of inspiration and successfully incorporate certain aspects of it into their pedagogical approaches [1]. The present study, with the data collected from student surveys, suggests that the model works on students, too, and holds promise in enhancing students' learning experiences, including the acquisition of online research skills and subject-specific knowledge. Additionally, students' responses indicated that they were largely able to follow the instructions. Finally, it is worth noting that the students did not report any significant obstacles or challenges throughout the intervention. These findings collectively suggest the potential efficacy and feasibility of the GID model as an educational tool. This is in line with, for example [10].

Although students reported learning more about subject content and working practices than online research skills, it is not a negative outcome as the idea of the GID is to teach information literacy skills along with the subject content and it is important that the subject content is also learned [9]. The importance of different working methods is also emphasized in the GID [9].

Upon close examination of online research skills, the students reported that they learned the most during the first intervention course. Although the differences between the courses were not significant, they were noticeable. This might have been due to the novelty of the intervention [see e.g., 22]. However, there was one exception, namely using information sources that was most learned during the third course. It is possible that using information sources in oral assignments was something that the students were not so used to beforehand, compared to written source referencing.

In terms of classwork, there was a trend towards greater passivity across the board. According to the students, they were most active in the first course and least active in the third. This was also reflected in how well they followed their teacher's instructions. However, the use of the inquiry log was highest in the second intervention course, possibly because it was the most extensive and demanding assignment. Additionally, in the third intervention course, students were particularly active in gathering and evaluating information, possibly motivated by the assignment: the speech.

Regarding challenges, there are a couple of points to note even though the students did not report about any major problems. Generally, students found planning the work and using the inquiry log most difficult. In the second course, finding suitable sources online was challenging, possibly due to the complexity of the topic (the Finnish Civil War). According to the students, the most difficult individual task was giving the speech. However, perhaps it was more exciting than difficult.

The study examined also the association between classwork, learning experiences, and challenges. Correlation analysis showed that classwork was associated with learning experiences. This finding can be interpreted as a natural outcome: when students followed instructions, they learned and got a positive learning experience, as, of course, intended.

Similarly, it was not surprising to find a negative correlation between classwork and perceived challenges. Good classwork was associated with fewer challenges, whereas lower quality classwork was associated with more challenges.

There was no significant correlation between learning experiences and challenges in either direction. Whether the students faced challenges or not, it had no effect on learning experiences.

5 Conclusions

Students' experiences of interventions related to teaching of online research skills (or information literacy skills) have rarely been researched. This study fills that gap by examining the perspective of lower secondary students after an intervention based on the GID model [9]. The results indicate that the model was effective from the students' perspective and positively contributed to learning outcomes in terms of both online research skills and subject-specific knowledge. Based on the results, I can recommend the model to teachers as a support for information literacy instruction and as a source of ideas. Students have the potential to adopt and benefit from it. However, it is noteworthy that previous research indicates that lasting learning outcomes require long-term and continuous practice [1].

This study shares the limitations of self-assessment tools. Self-assessments are inherently subjective and people may underestimate or overestimate their skills when evaluating themselves [23]. Similarly, one cannot assume that the responses would be completely objective either when the students were asked to report about their learning experiences, classwork, and challenges.

The data were collected and the intervention was conducted a few years ago. However, the data related to students' experiences are still relevant. In a world where information is abundant, pedagogical models developed for information literacy instruction, such as GID, are even more important than ever before, and the experiences gained from them are valuable.

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Visualizing Online Search Processes for Information Literacy Education

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Abstract. Online searching happens today mostly on personal devices and through personalized accounts. Information Literacy and online searching education suffer from the invisibility of online searching behaviors, which makes process-oriented feedback virtually impossible in class. Thanks to the instructional deployment of insights and technologies developed in a research project, we designed and delivered a class session based on the visualization of the students' search processes, involving 535 secondary school students and 16 teachers. The analysis of the data collected via a post-session survey that included both quantitative and qualitative items along with feedback from the teachers provides initial evidence of the effectiveness of this novel approach.

Keywords: Online searching behaviors · information literacy education · secondary school · process-oriented feedback

1 Introduction

Nowadays, the web is where we most often search for information, and generalist search engines, along with social networks, are the access point and filter that leads us in the overwhelming ocean of digital documents. One key challenge for current Information Literacy (IL) education is understanding how young people search online and interact with search engines. While algorithms grow more and more complex and efficient, research suggests that online search practices can take many different forms depending on topic, situation and searcher's expertise. IL education programs can only be effective if they are based on a strong understanding of how people search, access, and select information – actions that are now mostly performed online, on mobile devices, and in relation to the many requirements of daily life.

When teaching IL and online search, teachers grapple with a compelling difficulty: while search results can be made tangible as a report or a presentation, the search process remains often confined to individual screens and hidden to the teacher's eye [1]. Research evidence also indicates that users are often unaware of their own actual search process, and post-search accounts are mostly inaccurate [2]. This prevents teachers to capture

“teachable moments” [3] and to provide effective process-oriented feedback, which is important for the development of self-awareness and self-regulatory skills [4, 5]. The invisibility of the search process also hinders learning from peers, as search behaviors cannot be compared and discussed.

The goal of this paper is introducing search stories visualizations as an instructional tool for online search education and providing evidence about their impact.

2 Literature Review

Experience suggests that, given a search task, several routes to an adequate solution can be found; accordingly, research evidence indicates that different approaches to online information searching exist, even when following searching checklists and recommendations [6].

The type of information being sought, as well as the personal cultural and demographic background, have an impact on how we search [7]. Online searching can fall into two categories depending on its goal: *navigational search*, concerned with locating a specific website or source, and *informational search*, focused on retrieving information to answer a question or meet a need [8, 9]. User expectations (both in-situ and general) influence Online Searching Behaviors (OSB) and satisfaction [10]. In particular, perceived task difficulty influences OSB, usually leading to more searches and longer dwell time on Search Engine Results Page (SERP) [11, 12]. It is important to point out that the perception of difficulty is dynamic and can generate OSB changes even within a single search session [13].

According to Tsai [14], gender differences are observable in behaviors and procedures, but not in metacognition. Individual differences in reading search engine results could be framed in terms of styles, differentiating economic and exhaustive evaluators [15]. Motivation is of course key in determining the effort and time that a user is willing to invest in searching, and the perception of the task’s complexity is also relevant. Users’ prior knowledge and experience shape expectations and understanding of the task, often leading to more effective search strategies. Recent studies demonstrated that prior knowledge, experience, motivation, and the perceived task difficulty influence online searching behavior [16]. In addition, people demonstrate preferences for some kind of sources, also in relation to the situation and the task at hand [17].

Considering the topic domain of the search, Tatcher [18] found that experts employ different cognitive strategies than novices, and perform longer sessions, with more domains visited and queries that include more domain-specific keywords [19, 20]. Domain expert searchers rely more on semantic cues (i.e., related to the content), while novices are more influenced by surface features (e.g., colors, layout, images, etc.) and employ different credibility assessment processes [21].

Searchers’ basic skills also play a role in online searching. For example, learners differ in how they select keywords or to identify relevance and credibility cues in web pages depending on their reading skills [22]. Digital skills also play a role in online searching behaviors [23], at least for closed tasks [24]. Of course, subjects that combine domain expertise and web expertise seem to be best equipped for web search [25]. The specific features of the search engine also affect search outcomes [26], and this is

even more relevant as we consider the rapid and ongoing development of web search interfaces.

To wrap-up, online searching appears as a nuanced and heterogeneous domain. Online searching behaviors vary depending on the kind of task at hand, and they significantly affect the quality of the outcome [27]. Recent meta-analyses indicate motivation, prior knowledge, and task complexity as some of the key predictors of online searching behavior [28, 29].

However, in such a complex landscape, it is unlikely that a one-size-fits all prescriptive approach to IL education can be effective. Information Literacy models like SCONUL's Seven Pillars of IL, the Big Six or the ACRL competency Standard offer a sound and stable set of principles for the development of skills – but they have little say about the starting point of the learning journey, or about how IL is played out in the many faceted practice of these days. A more in-depth understanding how young people use internet searches is crucial for the development of effective IL education and teacher education programs [30].

3 Previous Research

The *Late-teenagers Online Information Search* (LOIS; www.loisresearch.org) project provided the operational background for this study. This section presents the project's technical infrastructure and overall methodology.

3.1 The LOIS Project

Funded by the Swiss National Research Foundation, LOIS investigated the online searching behaviors of young people in the age group 16–20. The core idea of the project was to develop techniques to capture and analyze the actual non-academic, non-lab searching behaviors of the participants and try and identify different online searching patterns or styles.

In Spring 2021 invited 227 young volunteers to participate in the study, and, thanks to an *ad hoc* browser extension, we were able to capture their navigation actions while they solved four pre-defined online information tasks, as the one presented in Fig. 1. Participants were able to work on the online searching task whenever and wherever they wanted, and used their own devices, including their own profiles (e.g., their Google account). Data was complemented with a profile survey, task-related pre- and post-survey, and a final psychometric assessment.

We called *search story* the digital record of the actions that a user performed to solve an online searching task. The raw list of time-stamped URL was automatically cleaned (e.g., removing automatic page refresh) and annotated (e.g., tagging search engines and other websites). After removing incomplete search stories and stories of users who did not complete surveys or questionnaires, the main LOIS dataset contains 595 valid search stories [31].

Your friend Anna is worried because her younger sister has decided to become a vegan. Anna thinks that this could be a good choice from an ethical point of view, both for the body and the environment – but her sister is only 13! Isn't it too soon? Besides, her sister suffers from asthma and this health condition makes her weaker. Opinions are divided: some argue that vegan food is healthy, others do not. What is the truth? Would a vegetarian diet be healthy for a 13-year-old girl? What advice would you give Anna? And on what would you relay?

Fig. 1. Sample search task scenario









3.2 Visualizing Search Stories

Making sense of such a large dataset was not an easy endeavor, and we devised a multi-method approach. Along equation modeling, cluster analysis and textual statistics, we developed a simple Python script to generate search stories visualizations, in order to make them human-inspectable. This allowed researchers to identify common online searching patterns, that were then used to feed other analyses.

The basic set of rules for generating search story plots is rather easy:

1. Each plot contains all the navigation actions of a user solving an online search task, (i.e., a full *search story*).
2. Each graphic element represents an individual navigation *action* (i.e., one click).
3. Colors code information about each action (see Table 1)
 - a. *domain type*: if the action is a search action (i.e., a click on a search engine page) or a result action (a click on any other web page)
 - b. *status*: if the domain of a result action is *new*, *revisited*, or *the same* as the previous action; if the query of a search actions is *new*, *revised*, or *repeated*.
4. A search action coming after a result action starts a new *episode*. Each *episode* corresponds to a new line in the plot.

Table 1. Action colors in search story plots. To enhance legibility, search actions are plotted with black border and result actions are plotted with grey border.

Color / border		Type and tag
Dark blue / black		Search New
Light blue / black		Search Same
Pale blue / black		Search Seen
Pink / black		Search Refined
Ocra / grey		Result New
Yellow / grey		Result Same
Light yellow / grey		Result Seen
Black / none		System action

We developed two types of plots (Fig. 2): (a) *Box plots* represent actions as squares, focusing on their sequence; (b) *Bar plots* add time, coded in the horizontal dimension of each block. The script generated both graphic files and interactive HTML visual plots, which integrate the exact dwell time and URL or query of each action.

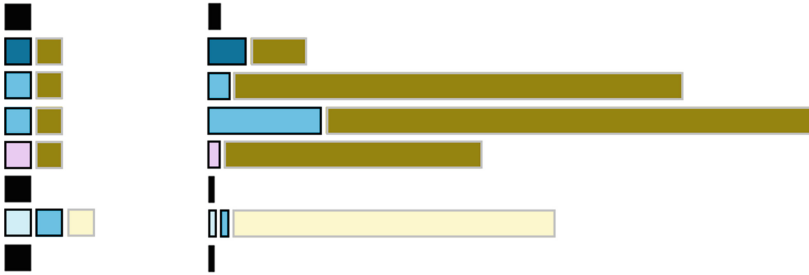


Fig. 2. The same search story plotted as box plot (left) and bar plot (right)

3.3 Identifying Online Searching Patterns

Visual plots allowed the qualitative identification of specific online searching behavior patterns. For example, Individual episodes can be of different types, including search-and-click (Fig. 3, episode 6), search-and-refine (episode 2), search-and-stop (episode 4), multiple searches (episode 3).



Fig. 3. Sample box plot with multiple episodes



Fig. 4. Search story in which the user systematically refines search query strings

Observing the overall search story structure, other patterns could be identified, (e.g., when participants systematically refined their queries) (Fig. 4), saved documents apart for later review (Fig. 5), or made a long final search action at the end of the search story (Fig. 6).



Fig. 5. Search story with user selecting documents for later

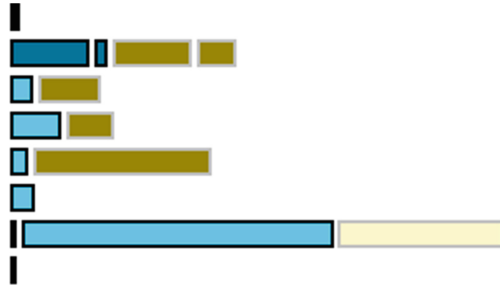


Fig. 6. Search story in which the user performs long review episode towards the end

4 Methodology: Using Search Story Plots for IL Education

The final challenge of the LOIS project was transforming the project’s methods, tools and results into a meaningful and effective IL activity, aimed at developing online search awareness and self-regulatory skills.

4.1 LOIS Class Session Design

The LOIS Class Session was structured in two phases, as illustrated in Fig. 7.



Fig. 7. The LOIS Class Session design

In the first phase (1 contact hour or at home), students engaged in 3 pre-defined online search tasks. Depending on the teacher’s choice, they could solve the tasks either at home or at school. Thanks to the LOIS system, their navigation actions were captured, and visual search stories generated.

The second phase (2 contact hours) took place one to three weeks after the first, depending on the class schedule, and was organized in four steps. Step 1 was devoted to the analysis of an instructor-selected sample of their own search stories in order to discuss some key topics (e.g., the use of queries, reading time, search strategies,

etc.). Interestingly, in each of the 29 sessions, students unswervingly declared that when they searched, they “write one keyword, read the results, select one and click” – a straightforward behavior that rarely appears in actual search stories. Students were then instructed to read the structure and colors of visual plots, so that they could independently analyze anonymized search stories. The visual plots were here used as stimulus for the discussion and to show that different ways of searching were possible. This was an opportunity to reflect on the students’ online searching behaviors and to identify common patterns or strategies, including changing keywords, revising websites, taking time to read, etc. The instructor made every effort to emphasize that (a) each of us has a preferred and “more natural” way of searching, (b) that different tasks and situations pose different information challenges, and that (c) no unique “best” way of searching exist.

Step 3 included the solution of a new search task, where students were challenged to apply one of the search behaviors discussed previously. In this step, students were able to individually select what the thought was more relevant for them and apply in a new context. The last part of the session (step 4) was devoted to exploring some of the topics emerged during the previous steps, including how search engines work (and if other search engines than Google exist), information quality assessment, etc.

After the session, teachers were invited to continue working on online searching with a set of instructional materials that was made freely available online: <https://loisresearch.org/lois-edu/>.

4.2 Session Assessment Design

Between November 2022 and March 2023, the LOIS Class Session was delivered in 29 lower and upper secondary school classes in Ticino, the Southmost Swiss Canton, which is Italian speaking. Invitations were sent through official channels of the Cantonal offices, and participation was voluntary. Overall, a total of 535 students aged 12–18 and 16 teachers were involved. The sessions were offered as an instructional activity, and not as part of a full research study. For this reason, the assessment data collected is minimal and only limited to the assessment and improvement of the session itself.

Each LOIS Class Session was evaluated through an online post-session questionnaire, which was administered in the last 5 minutes of the session. Students were able to access the questionnaire online with their smartphone or computer via a QR code. It was anonymized and included both closed and open items, namely:

1. Basic profile: Sex, Postal code, Average school grades, Generic assessment of online searching: “In general you think that finding information online is” [Likert scale from very easy to very difficult]
2. Session assessment
 - a. What did you learn in today’s session? [open answer]
 - b. Why did you like or dislike this session? [open answer]
 - c. If you were to solve again the search tasks you did in preparation of this session, what would you change? [open answer]
 - d. How useful did you find the session [Likert scale from 1 to 10]

Across the 29 sessions, we collected 314 full valid feedback surveys. As a complement, teachers were asked to provide brief feedback via email, stating how they found the session for their students.

5 Results

The impact assessment of the LOIS Class Session is presented first through quantitative data (the overall session assessment: item 2d above), analyzed with descriptive statistics and then through the qualitative analysis of open items, analyzed with textual statistics.

5.1 Quantitative Assessment

As indicated above, participants expressed the overall session assessment on a 10-point Likert scale, which provides ordinal data, not interval data. Nonetheless, calculating the average score on a Likert scale can provide a useful summary of responses. The research aims, the construct being tested, and the pertinent context should ultimately be taken into consideration when interpreting the average score [32], without any intention to draw inferences or generalizations.

Table 2. LOIS Class Session score data (Avg)

		Score	Mo	M	SD	N
By school grade	Very high	8.22	8	8	1.66	36
	Good	7.92	8	8	2.53	116
	Average	8.01	8	8	1.88	87
	Sufficient	7.38	8	8	2.17	48
	Insufficient	7.13	7	7	2.91	17
By sex	Male	8.01	8	8	1.86	138
	Female	7.87	8	8	2.52	160
	Undisclosed	6.79	10	7	3.70	16
By perceived difficulty	Very difficult	7.88	9	8	2.62	44
	Difficult	7.84	8	8	2.10	94
	Somewhat difficult	7.75	8	8	2.39	157
	Easy	9.15	10	9	0.99	13
	Very easy	9.75	10	10	4.38	5

The average session score across all classes is 7.89/10 (SD = 1.57), which indicates that students found the session useful. The average session score for different segmentations of the sample is presented in Table 2 (the score column), along with standard deviation (SD), Mode (Mo), Median (M) and sample size (N) for each segment.

The session score is higher for students with higher school grades (Fig. 8) and for those who find online searching an easy task in general (Fig. 9), indicating that the session design, which is rather dense, is more accessible for high-achieving students than for students with difficulties, which are possibly those who would benefit more from the session itself.

Gender differences are minor, with average session score for males 8.01 and for females 7.87.

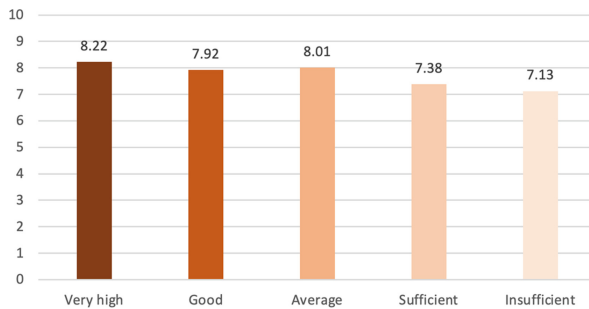


Fig. 8. Session score by school grade.

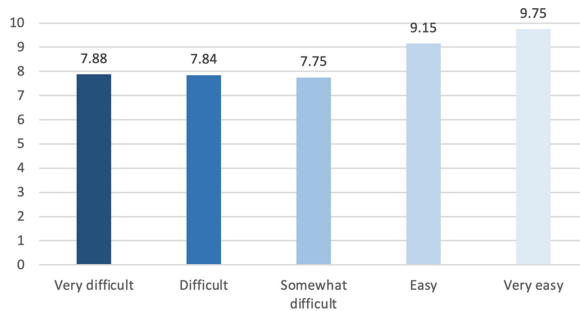


Fig. 9. Session score by perceived difficulty of online searching.

5.2 Qualitative Assessment

The content analysis of open answers was carried out with T-LAB, a software program for statistical textual analysis. The analysis of word associations on the answer to question 2a “What did you learn in today’s session?” reveals that the most often associated predecessors to the word ‘search’ (It. *ricerca*) are ‘learning’ (It. *imparare*), ‘different’ (It. *diverso*) and ‘method’ (It. *metodo*); the most frequent successors are ‘need’ (It. *bisogno*) and ‘reliable’ (It. *affidabile*). Through their answers, students say they have the impression to have learned to search (as different from just searching) using a different method, which responds to a need and that is useful to retrieve reliable information.

Word co-occurrence analysis on the same question identifies three semantic domains: (a) a better approach to search and find more reliable and in-depth information; (b) the

need to carefully check and assess if a website is reliable; and (c) a different method to find correct and safe information on the internet.

Such qualitative analysis reveals that, right after the session, students can identify specific learnings, the most appreciated being reflecting on the reliability of online information, and the increased awareness that searching online is not so easy or “natural” as one might think.

How these learnings would affect online searching in practice can be explored by analyzing answers to question 2c “If you were to solve again the search tasks you did in preparation of this session, what would you change?”. Interestingly, some students highlighted things they have learned in the session and at the same time declared that they would not change anything regarding their future search behavior. Others identified new behaviors they would like to enact, namely:

1. A more careful analysis of Google’s search result page, so that they actually chose the link they follow.
2. More thorough check of the reliability of online documents.
3. Changing the search strategy or method and go more in-depth.
4. Taking more time to read and check links and websites.

5.3 Teachers’ Feedback

The feedback provided by the teachers was very positive. They appreciated the innovative approach to online searching, and in particular the possibility to reflect with the students on their own search process. All of them remarked the importance of IL education, in particular in relation to online searching. Some reflected on how they could integrate online searching activities in their subject matter classes.

6 Discussion and Conclusions

The goal of this study was to provide an initial assessment of an innovative technology-supported approach to online searching education, as a component of IL education. Based on the research results and tools of a research project, the LOIS Class Session illustrated above was based on visualizing online searching processes to allow their analysis and to stimulate self-awareness and critical thinking in relation to online searching behaviors.

Of course, the study suffers from many limitations. First, its sample: while not negligible, it was not randomized and only included schools based in Ticino, (i.e., within a single peculiar school system). Also, due to the conditions in which the study was carried out, only a post-session self-declaratory assessment was possible. Our data and result do not consider actual online searching skills measured by performance and the session impact on students’ long-term behavioral changes. Concerning the analysis, even while computing the average score on a Likert scale can give a summary of responses, this study’s disadvantage is that Likert scales only provide ordinal data, not interval data. The average session scores should be interpreted accordingly. Finally, while we know that many personal, social and cultural factors influence online search behaviors in a non-linear way, our assessment only considered sex, school grades and perceived online searching difficulty. We expect a more fine-grained research-oriented approach

to unveil a more nuanced and complex set of variables that come into play in learning to search online.

The specific design of the session should be given consideration. As mentioned above, the session was very compact, and visual plots were used for whole-class discussion. However, it is important to acknowledge that alternative instructional approaches can also leverage the power of visualizations and process-oriented feedback to enhance student learning. For instance, rather than condensing the content into a single session, it could be distributed across a larger number of shorter weekly classes, providing students with a more gradual and in-depth exploration of the subject matter. Another avenue worth exploring could be the incorporation of group work or peer learning activities, which can foster collaboration and active engagement.

It is noteworthy that in the classes included in this study, one to three weeks passed between the completion of online tasks and the subsequent analysis of the visual plots. Reducing this time gap, perhaps by generating plots “live” during the session itself, would have a profound impact. By offering immediate feedback and enabling students to visualize their progress in real-time, the overall session experience would be significantly enhanced.

The evidence from both the quantitative and qualitative analysis supports the claim that the LOIS Class Session provided a positive and fruitful learning experience for students. Notably, students were not only actively engaged in the session but also expressed their ability to apply the knowledge and skills acquired to future online searches, underscoring the practical relevance of the session. Given the exploratory nature of this small-scale study, these findings are encouraging and call for further exploration into the development and implementation of visualizations and technology-based tools to support process-oriented feedback in IL education.

Based on these findings, future research endeavors should prioritize investigating different instructional designs and formats that leverage visualizations and process-oriented feedback. Comparative studies, for instance, could evaluate the effectiveness of longer-term classes versus condensed sessions, assess the impact of group work or peer learning on student outcomes, and shed light on the most promising methodologies for IL education. Moreover, the involvement of larger sample and diverse student populations would generate a more comprehensive and reliable understanding of the implications and generalizability of these approaches.

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Undergraduate Students' Information Literacy in Relation to Their ICT Proficiency and Psychological Characteristics

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Abstract. In this study we examined how aspects of Information and Communication Technology (ICT) use, psychological characteristics, and demographic parameters were related to students' level of information literacy (IL). Four hundred and ninety-eight undergraduate students took a forty-item IL knowledge test and completed questionnaires on ICT use (twenty-six items) and psychological characteristics (seventy items). Factor analysis was used to group the parameters. Students' IL was partly influenced by their year of study, but not by gender or type of study field. IL correlated best with the use of general software tools and confidence in general Internet uses. Of the psychological characteristics, self-concepts about learning and problem solving correlated most strongly with IL, followed by self-efficacy. Controlled external motivation was not related to IL. Suggestions for teaching practice include emphasizing the problem-based approach, autonomous motivation and appropriate timing, as well as focusing on deficient IL topics.

Keywords: Information literacy · higher education · ICT proficiency · psychological characteristics

1 Introduction

In recent years marked by the COVID19 pandemic, several challenges for students, teachers, and citizens alike have been brought to the forefront related to the use of ICT, in terms of accessibility, mastery of tools (considered ICT literacy), and mastery of information (IL). For example, the harmful consequences of the spread of misinformation became clear [1, 2].

At the university level, IL is described by several systems, including the Big Six [3], Seven pillars of IL [4], Six skills [5] by UNESCO, and multiple efforts by the Association of College & Research Libraries (ACRL). ACRL standards, used in our study [6], define IL as an intellectual framework for understanding, finding, evaluating, and using information. ICT literacy is addressed by the Digital Competence Framework for Citizens (DigComp 2.2, [7]), that provides examples of knowledge, skills, and attitudes for confident, critical, and safe use of digital technologies. DigComp covers information, communication, content creation, safety, and problem solving. As the name implies, the

information component is closely related to IL. Although students born in the digital age have naturally learned to use technologies, their mastery does not necessarily transfer to the IL domain [8, 9]. One study [10] suggested that digital nativity should be based on interaction with technology rather than age, as IL and individuals' ICT competencies depend on access, frequency of use, and skills.

IL played an important role during the pandemic. One study [11] found that IL, but not digital or media literacy, was positively associated with the detection of fake news. IL had a positive effect on students' intention to use digital technologies for learning [12]. In addition to the ability to find information, access to credible sources of information was cited as an important factor [13]. At the same time, the need for IL instruction was recognized for both students [14] and teachers [15] who had to select appropriate teaching methods. Active learning methods of teaching IL were already available for online learning [16].

Personal characteristics such as psychological and demographic variables may also play a role in determining failure or success in navigating the digital landscape. It has been found that students' IL is influenced by their information processing learning style [17]. Some gender differences have been reported, with male students overestimating their ICT skills and female students underestimating them [18]. In one study [19] female students scored higher in ICT and IL proficiency than male students. At the same time, another study [20] found that female students scored higher on the motivation scale. Researchers in a 2021 study [21] found that educational pathways affected students' research skills. Academic self-concept correlated positively with information seeking knowledge when coupled with high intelligence [22]. Several studies [23, 24] found that motivation significantly predicts students' IL outcomes. Academic motivation was found to play an important role in the development of IL competencies [25, 26]. Intrinsic motivation to know was positively related to IL self-efficacy [27], as was the use of metacognitive learning strategies [28]. Cognitive parameters such as deep learning strategies, self-efficacy in computer use, and computer mastery influenced students' level of IL [29]. Another study [30] found that high-level IL activities, such as summarizing information and communicating results, led to higher levels of student motivation and academic achievement.

Our study examined a group of 498 university students for their IL level, ICT skills (measured by frequency of software use and confidence using the Internet), psychological characteristics, demographic parameters (gender, type of study field, and year of study), and their relationship with students' IL. Psychological aspects studied included academic motivation (motivation to learn), self-efficacy (belief in ability to achieve goals), and self-concept (beliefs about oneself). We believe that identifying ICT and psychological concepts most closely related to IL as well as demographic differences could be helpful in planning future IL educational interventions in terms of focus, methods, and timing. Our goal was to answer the following research questions:

- RQ1: Is IL of university students affected by gender (male vs. female students), type of study field (natural sciences vs. social sciences), or year of study (does IL improve during study)?
- RQ2: Is IL related to how often students use software? For which tools? Are there differences between demographic groups in tool use?

- RQ3: Is IL related to students' confidence in using the Internet? For what purposes? Are there differences between demographic groups in confidence with the Internet?
- RQ4: Are student psychological characteristics such as academic motivation (autonomous/controlled, internal/external), self-concept for learning, self-concept for problem solving, general self-efficacy, and use of metacognitive learning strategies related to student IL? Are they related to students' software use and Internet confidence? Are there differences between demographic groups in psychological characteristics?

2 Materials and Methods

2.1 Test and Questionnaires

Information Literacy Test (ILT). A validated knowledge test [31] was used, that consisted of forty multiple-choice questions, each with four answer choices and one correct answer, covering five IL topics:

- identifying information needs
- information search
- information evaluation
- information use, and
- ethical and legal issues.

ICT Questionnaire. A twenty-six-item Likert-type questionnaire [9] was used to ask about two aspects of ICT literacy. In the first scale (labelled ICT-1), the frequency of software use was asked for sixteen types of software, with five response options:

- never
- less than weekly
- multiple times per week
- almost daily, and
- multiple times per day.

In the second survey (ICT-2), statements were made about confidence in using the Internet for ten purposes. The level of agreement ranged from 1, do not agree at all, to 5, do agree completely.

Psychological Questionnaire. A seventy-item questionnaire [32] was used, covering seven psychological aspects with statements rated on a 5-point Likert scale of agreement. The aspects were related to learning through two scales: (1) self-concept about learning, denoted by SC-L; and, (2) use of metacognitive learning strategies, denoted by LS. A third psychological aspect was self-concept about problem solving, denoted by SC-P. It was followed by self-efficacy (SE). –The final psychological aspect was motivation, measured on three scales: (1) internal – IM; (2) autonomous external – EM-A, and (3) controlled external motivation – EM-C.

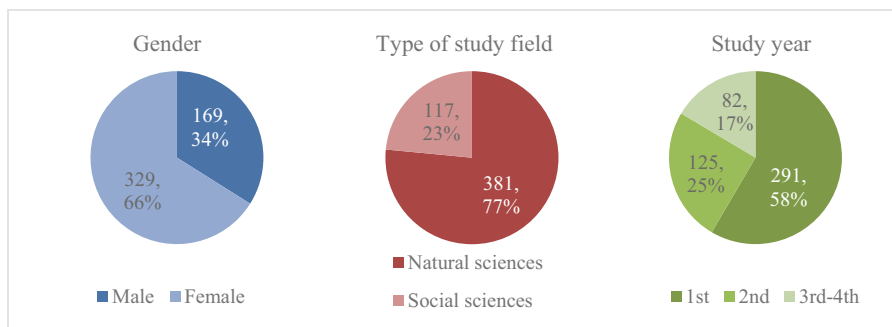
The validity of the instruments was tested using Cronbach α (Table 1).

Table 1. Instrument validity (N = 498)

Subject area	Test/Scale	Description	No. of Items	Cronbach α
IL	ILT	Information literacy	40	0.72
ICT	ICT-1	Frequency of software use	16	0.71
	ICT-2	Confidence in using the Internet	10	0.82
Psychological	SC-L	Self-concept about learning	10	0.80
	LS	Use of metacognitive learning strategies	15	0.67
	SC-P	Self-concept about problem solving	10	0.76
	SE	Self-efficacy	10	0.85
	IM	Internal motivation	13	0.84
	EM-A	Autonomous external motivation	6	0.71
	EM-C	Controlled external motivation	6	0.64

2.2 Test Group and Testing Protocol

Test Group. Four hundred and ninety-eight undergraduate students from six faculties at two universities and one independent school in Slovenia participated. The demographic parameters we collected were student gender, type of field of study (natural sciences, social sciences), and year of study (1st, 2nd, 3rd, or 4th). The composition of the test group is shown in Fig. 1.

**Fig. 1.** Test group composition by demographic parameters

Testing Protocol. The software used for data collection was 1ka survey system (1ka.si). Students completed the test and two questionnaires in one sitting under teacher supervision. Before testing, students' anonymity was ensured, consent for student participation was obtained, and the purpose of the study was explained to the students.

2.3 Data Analysis

The following statistical methods were applied to 498 valid responses:

- descriptive statistics (all scales)
- two-sample t-tests (demographic parameters)
- factor analysis (ICT items, psychological scales), and
- Pearson correlations (all scales, factors).

SPSS statistical software was used for the analyses.

3 Results and Discussion

3.1 ILT and Demographic Parameters

Students were moderately successful on the ILT test ($M = 67.30\%$, $SD = 12.29\%$). Results for the different demographic groups are shown in Fig. 2. There were no statistically significant differences between genders ($MD = 0.26\%$), between natural sciences and social sciences majors ($MD = 1.75\%$), or between first and second year students ($MD = -0.31\%$). Third to 4th-year students were significantly more successful ($MD > 5.25\%$) than first and second year students.

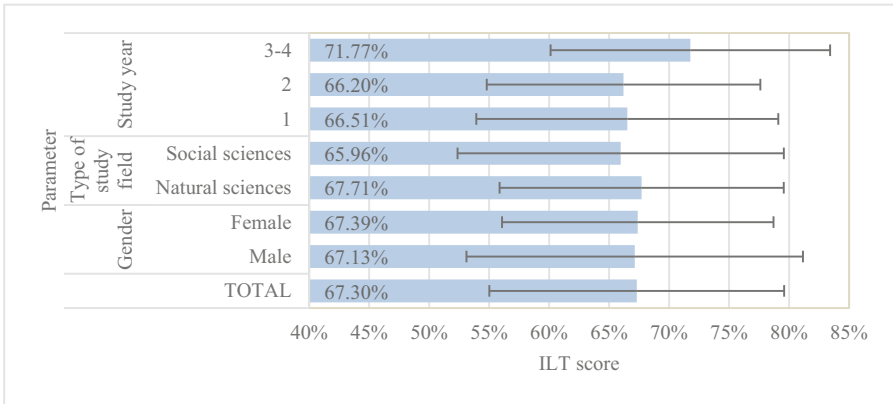


Fig. 2. ILT scores by demographic parameters (N = 498, whiskers - SD)

3.2 ICT Scales and Relations to ILT

Frequency of Software Use (ICT-1). Correlation of ICT-1 with ILT was low ($r = 0.10$).

Item Analysis. Figure 3 shows a ranking of the frequency of sixteen software uses, with search engines and social networks topping the list while programming and web design were the least common. Most tools related to educational use ranked in the middle.

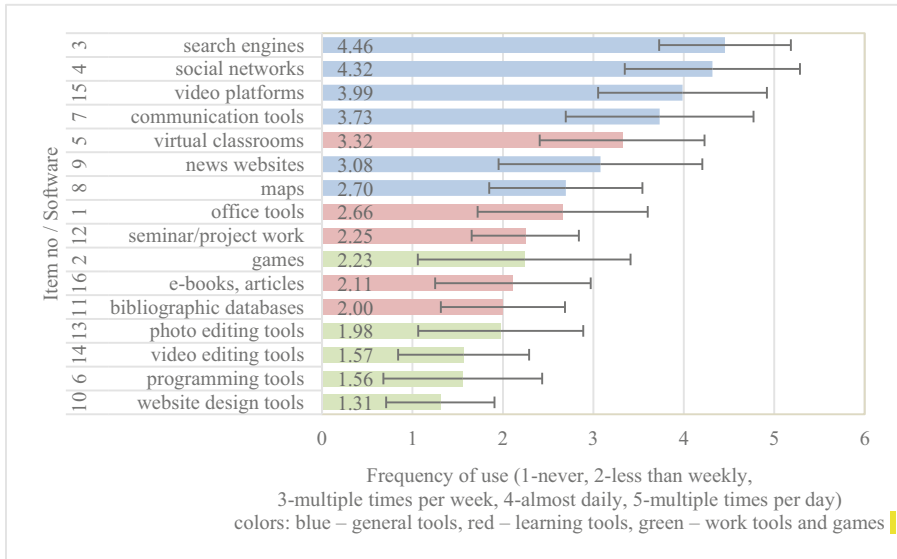


Fig. 3. Frequency of software use (N = 498, whiskers – SD, factors are colored)

Table 2. Software use: correlations with ILT; factor loadings

Item no	Item description	r (ILT)	Factor 1	Factor 2	Factor 3
3	search engines	0.12	0.686	0.090	-0.003
7	communication tools	0.19	0.611	0.051	0.135
15	video platforms	0.05	0.609	0.216	-0.073
4	social networks	0.09	0.597	-0.111	-0.092
9	news websites	0.10	0.535	0.016	0.202
8	Maps	-0.02	0.461	0.059	0.358
11	bibliographic databases	0.07	0.010	0.051	0.775
12	seminar/project work	-0.09	-0.140	0.040	0.663
1	office tools	0.12	0.184	0.180	0.505
16	e-books. Articles	0.08	0.205	0.272	0.478
5	virtual classrooms	-0.02	0.402	-0.091	0.415
14	video editing tools	-0.04	0.103	0.718	0.248
10	website design tools	-0.01	-0.102	0.712	0.153
6	programming tools	-0.02	0.032	0.643	0.037

(continued)

Table 2. (continued)

Item no	Item description	r (ILT)	Factor 1	Factor 2	Factor 3
13	photo editing tools	-0.02	0.182	0.630	0.278
2	Games	0.03	0.019	0.498	-0.255
	r (ILT)		0.16	-0.01	0.08

Item correlations with ILT were low or nonexistent (Table 2), the highest being for communication tools ($r = 0.19$), which was also significant for office suites and search engines ($r = 0.12$).

Factor Analysis. Factor analysis of the items revealed three groups of software use (Table 2, colored in Fig. 3): 1) general tools (search engines, social networks, video platforms, news, and maps); 2) work tools (photo/video editors and programming tools) and games; 3) learning tools (office tools, virtual classrooms, bibliographic databases, e-books, and seminar/project work) Only the general software tools (factor 1) showed a significant correlation with students' IL ($r = 0.16$).

Demographic Groups. Male students used software significantly more frequently than female students and social sciences students used it more frequently than natural sciences students. Similarly, third to fourth year students used software more frequently than first and second year students.

Confidence in Using the Internet (ICT-2). Correlation of ICT-2 with ILT was 0.19.

Item Analysis. Figure 4 shows that students were most confident in using search engines, finding information without help, and using social media, while they were least confident in using scientific databases/forums and presenting their own work. Higher order IL activities such as summarizing information and communicating results have been associated with motivation and academic success [30]. All but two items of confidence correlated significantly with ILT (Table 3). The exceptions were the use of scientific forums and databases. The highest correlation was for three items: finding information, use of search engines, and use of social media ($r = 0.18$). Social media use has previously been positively associated with IL [16] and IL had a positive impact on social media literacy [33].

Factor Analysis. Factor analysis revealed three areas of Internet confidence (Table 3, colored in Fig. 4): 1) advanced (using forums, presenting work, solving problems, and learning software); 2) general (using search engines, social media, and finding information); and 3) specialized (using local/scientific databases). The general factor correlated best with IL ($r = 0.23$).

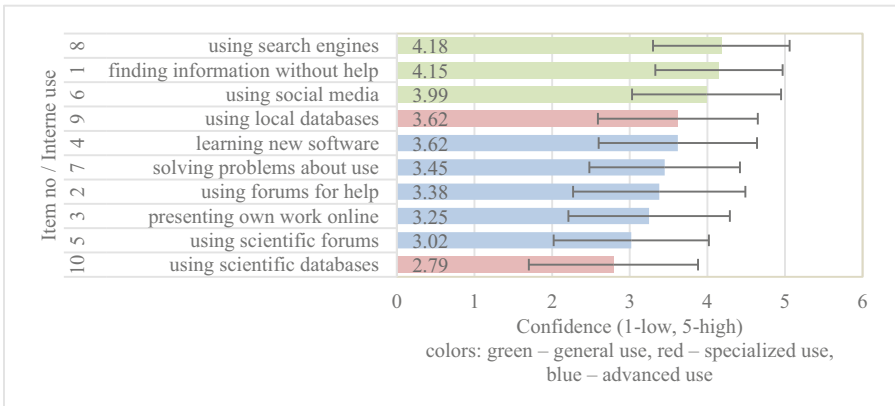


Fig. 4. Confidence in using the Internet by questionnaire items ($N = 498$, whiskers – SD, factors are colored)

Table 3. Internet confidence: correlations with ILT; factor loadings

Item no	Item description	r (ILT)	Factor 1	Factor 2	Factor 3
3	presenting own work online	0.10	0.782	0.191	-0.033
5	using scientific forums	0.06	0.726	0.051	0.268
2	using forums for help	0.12	0.643	0.273	0.067
4	learning new software	0.14	0.578	0.181	0.354
7	solving problems about use	0.17	0.576	0.359	0.181
1	finding information without help	0.18	0.280	0.628	0.073
6	using social media	0.18	0.199	0.785	-0.032
8	using search engines	0.18	0.105	0.792	0.280
9	using local databases	0.15	0.027	0.224	0.853
10	using scientific databases	-0.08	0.411	-0.025	0.709
	r (ILT)		0.16	0.23	0.04

Demographic Groups. Men were significantly more confident in their Internet use than women. This could be due to the fact that they often overestimated their ICT skills [18]. Students in the social sciences were more confident than students in the natural sciences. Again, the difference between the first and second year of study was negligible, but students' Internet confidence increased significantly in the third to fourth year.

Relation to Software Use. The overall correlation between software use items (ICT-1) and Internet confidence items (ICT-2) was 0.36. When the correlations between the items of the two scales were examined, some correlations emerged, which are highlighted in Table 4. In many cases, frequency of use was positively related to confidence (e.g. search engines, bibliographic databases, and social media).

Table 4. Notable significant correlations between ICT-1 and ICT-2 items

ICT-1 item no	Frequency of software use	ICT-2 item no	Internet confidence	<i>r</i>
11	bibliographic databases	9	using local databases	0.39
3	search engines	8	using search engines	0.28
4	social networks	6	using social media	0.27
13/14	photo/video editing	4	learning new software	0.24
16	e-books, articles	10	using scientific databases	0.23
3	search engines	1	finding information without help	0.22
6	programming	7	solving problems during use	0.20

3.3 Psychological Scales (PSY) and Relations to ILT

Scales Analysis. Figure 5 shows the mean values for seven psychological parameters. The values are closer to each other than in previous scales. Correlations among the PSY scales were high, with the highest between self-concept about problem solving and self-efficacy ($r = 0.66$), followed by the correlation between self-concept about learning and internal motivation ($r = 0.65$). Controlled external motivation was the exception with the highest correlation of 0.20 with autonomous external motivation. The correlations with ILT are shown in Table 5. Self-concept about learning and self-concept about problem solving correlated most strongly with ILT, although the correlation was low ($r = 0.25$ and 0.23 , respectively). Also notable was the correlation with self-efficacy ($r = 0.19$). No correlation was found between students' IL level and their use of learning strategies or controlled motivation. The influence of autonomous motivation was smaller. Other authors [34] provided ideas for increasing students' intrinsic motivation with IL sessions. Frequency of software use correlated best with self-concept for problem solving ($r = 0.24$). Confidence in using the Internet was most strongly related to the degree of self-efficacy and internal motivation ($r = 0.29$). A similar correlation was found for self-concept for problem solving ($r = 0.28$).

Factor Analysis. Factor analysis of the seven PSY scales revealed three factors (Table 5, colored in Fig. 5): 1) learning and autonomous motivation, 2) problem solving and self-efficacy, and 3) external motivation. Factors 1 and 2 correlated best with IL ($r = 0.23$ and 0.17 , respectively).

Demographic Groups. Some gender differences were found. Females had a significantly higher self-concept related to learning, autonomous external motivation, and use of metacognitive learning strategies, while males had a higher concept of problem solving. Students in the natural sciences scored slightly higher on self-concept about learning than their peers in the social sciences. An increase in self-concept of learning and use of metacognitive learning strategies was observed between the first and second year of

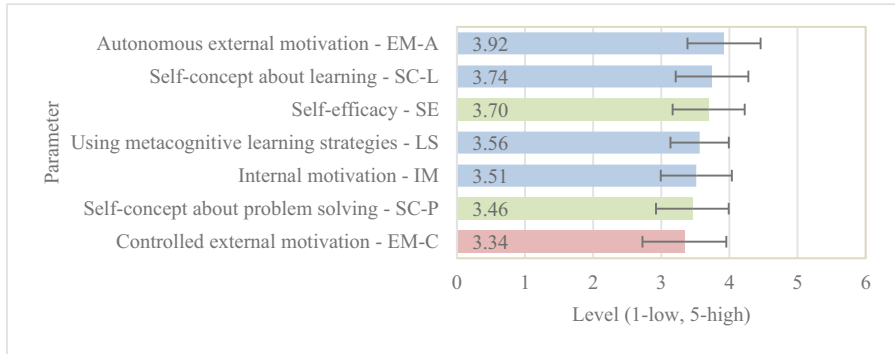


Fig. 5. Presence of psychological traits (N = 498, whiskers – SD, factors are colored)

Table 5. Psychological parameters: correlations with ILT and ICT; factor loadings

Param	Description	$r_{(ILT)}$	$r_{(ICT-1)}$	$r_{(ICT-2)}$	Factor 1	Factor 2	Factor 3
LS	Use of metac learning strat	0.06	0.11	0.17	0.828	0.084	0.054
EM-A	Autonomous external motiv	0.13	0.11	0.17	0.801	0.143	0.225
IM	Internal motivation	0.11	0.17	0.29	0.782	0.402	-0.002
SC-L	Self-concept about learning	0.25	0.05	0.14	0.724	0.332	-0.148
SE	Self-efficacy	0.19	0.14	0.29	0.377	0.814	0.006
SC-P	Self-concept about probl. solv	0.23	0.24	0.28	0.134	0.915	-0.102
EM-C	Controlled external motivation	-0.07	0.02	0.02	0.070	-0.078	0.980
	$r_{(ILT)}$				0.17	0.23	-0.07

study. The increase in self-efficacy and autonomous motivation occurred between the second and third to fourth years, while controlled motivation decreased. No significant differences in self-concept about problem solving were found among study years.

4 Conclusions

Our study, which included 498 students, yielded the following answers to the research questions. Implications are also listed below:

- RQ1: IL was not influenced by gender or type of study field. There was a significant increase in IL in the third to fourth years of study. The negligible difference between the first two years of study combined with the overall prevalence of general courses in the first year of study suggests that the second year of study may be optimal for the introduction of a IL course.
- RQ2: The weak correlation between overall frequency of software use and IL may suggest that students who use software more frequently do not necessarily have higher IL skills. For example, male students, social science students, and third to fourth year students all used software more frequently than other groups, but only the latter had higher IL. A higher than average correlation of IL with the use of communication tools, search engines, and office suites was observed. The use of general software was better correlated with IL than learning tools (including bibliographic databases), while work tools (e.g., editing/programming) and games showed no correlation with IL, which could be explained by the nature of the tools. Some other lower correlations might indicate inefficient use that should be corrected by targeted IL instruction.
- RQ3: Student confidence in the Internet use had a stronger effect on IL than software use. Similar to software use, males, social sciences students, and third to fourth grade students were more confident in using the Internet. IL was most frequently associated with confidence in finding information and in search engine use, but also with social media confidence. Frequency of use was positively related to self-confidence (e.g., search engines, bibliographic databases, and social media). On the other hand, students had low confidence in using scientific forums and databases and in presenting their own work. These correlated poorly with IL. In IL education, more emphasis should be placed on using reliable sources and not just general search engines, as well as on higher order activities IL such as summarizing information and communicating results.
- RQ4: Students' IL correlated best with their self-concepts about learning and problem solving, followed by general self-efficacy. The latter two factors were closely related, while self-concept about learning was related to autonomous motivation. Females had higher self-concept about learning, autonomous motivation, and use of metacognitive strategies, whereas males had higher problem-solving self-concept. This suggests that problem-solving approaches and other active methods that support metacognitive learning strategies should be used in IL instruction to accommodate both groups. Controlled motivation was not related to IL. While self-efficacy and autonomous motivation increased in the third and fourth years, external motivation decreased. IL instruction should primarily aim at strengthening students' autonomous motivation.

The main original contribution of this paper is the combination and comparison of several factors that potentially affect the IL of university students. Among the elements of ICT skills, psychological characteristics, and demographic parameters, statistical analyses were conducted to identify the factors that are best associated with IL and could serve as a guide to better understand and improve the IL educational process.

Our study confirmed previous findings about male students overestimating their ICT skills [18], as their significantly higher confidence in Internet use did not translate into higher IL compared to female students. Confidence in Internet use correlated with IL

more than software use. Similar to a previous study [20], we also found that female students had higher levels of motivation, in our case the difference was found in autonomous external motivation. When coupled with self-concept for learning, autonomous motivation was associated with IL, which is consistent with previous studies on the role of motivation in building IL competencies [25, 26]. Unlike in [28], the use of metacognitive learning strategies did not correlate with IL, which was surprising. It was also found that self-concept for problem solving was related to IL. Male students scored higher in this trait. No difference was found between years one and two in IL. To find an explanation, we could examine the variation of psychological parameters across years of study. It was found that learning traits (self-concept and metacognitive strategies) increase between the first and second years of study, while other traits (self-efficacy and autonomous motivation) increase later. Problem-solving concept remains the same. Further conclusions of this type could be drawn by further analysis of our data, which was not possible due to the limited length.

Limitations of this study include the varying sizes of demographic groups, and the limitation to one university/one country. Future research could examine students at different universities and cultural settings, individual aspects (themes) of IL, as well as different cognitive levels of IL. Some surprising results of this study could be further investigated and explored. Similar research could also be conducted at the secondary educational level.

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Instructors' Perceptions of an Information Literacy-Centered Professional Development Workshop

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Abstract. The teach-the-teacher model, in which librarians act in an educational developer role, has been one approach that librarians have used to integrate information literacy into academic curricula. While there has been some scholarship on this work, more evidence is needed to establish the effectiveness of this approach. In this paper, we examine the instructors' perceptions of a five-module teaching professional development workshop that promotes the transparent and equitable integration of information literacy into courses. Using pre- and post-workshop survey responses, we explore instructors' motivations for participating, self-perceptions of learning, the most valuable aspects of the workshop, and anticipated changes to teaching practice.

Keywords: Academic libraries · instructor development · equitable learning · inclusive learning; information literacy

1 Introduction

One avenue through which academic librarians may be able to have a significant impact, both in supporting student information literacy learning and shifting the teaching culture at their institutions is the “teach the teachers” model - taking on the role of educational developer [1–6]. The model has often been described as an alternative to the one-shot approach to information literacy instruction, which has been significantly criticized as an ineffective method for achieving the integration of information literacy into the curriculum [7, 8].

There are examples of librarians leading information literacy-centered instructor development initiatives, including workshops, courses, and faculty learning communities, and there are some indications that this approach does support changes in faculty teaching practices related to information literacy and research assignment design [9–11]. However, more evidence is needed to establish the effectiveness of this approach. Adopting the “teach the teachers” model as a more primary means of teaching information literacy would require a major shift in thinking and practice for many librarians [7,

9]. Many libraries have successfully built active information literacy programs centered primarily around one-shots. Teaching these sessions can provide librarians with professional reward [7] and high numbers of sessions can provide evidence to demonstrate the value of the library to administrators [8]. As a result, before librarians consider making the shift to a “teach the teachers” model, it is vital to better understand the effectiveness of these types of interventions and their impact on faculty teaching practices.

In this paper, we examine the instructors' perceptions of a five-module teaching professional development workshop that promotes the transparent and equitable integration of information literacy into courses. The workshop situates information literacy within a common academic practice – the research assignment – providing a framework for thinking about what equity means within the context of higher education and outlining teaching strategies instructors can use to make their research assignments more inclusive, equitable, and transparent.

2 Literature Review

Arguments in favor of librarians adopting a “teach the teachers” approach have a fairly long history. For example, Risë L. Smith made a strong argument that librarians need to stop teaching students and focus on teaching faculty in a 1997 conference paper [6]. Proponents of this approach have pointed out several potential benefits, including the ability to reach more students than librarians could teach on their own through one-shot sessions. The limited staffing in most academic libraries means that there is only a finite number of sessions that a library can provide. In addition, if primarily taught by the course instructor, information literacy would be better integrated into the content of the course, rather than appearing to students as something added-on [1, 5].

Despite these potential benefits, the approach has generally been considered to be outside of the mainstream. For example, in their article in favor of the approach, Cowan and Eva note that it may seem like a “radical idea” because it goes against the understanding that librarians should be the primary teachers of information literacy that is shared among many librarians [1, p. 164]. There are many reasons why librarians might be reluctant to adopt this approach. Librarians have frequently expressed concern about their training for and ability to effectively act as teachers [12, 13] and also have a tendency to demonstrate deference behavior toward faculty [12, 14]. Making the move to the educational developer role could create additional anxiety for librarians who feel they lack pedagogical knowledge or will not be accepted by faculty as peers [15]. In addition, librarians have been the primary agents in pushing forward the idea of information literacy and have adopted it as our area of expertise and our contribution to the educational mission [16, 17]. As a result, many librarians could be concerned about adopting an approach that seem to require them to hand over control over information literacy to faculty [15, 17].

While the “teach the teachers” model is not as popular as other instructional approaches to information literacy, there does seem to be increasing interest in librarians taking on the role of educational developer. Recently published articles [3, 18–21] describe the authors' experiences acting in an educational developer role and highlight the professional satisfaction that the librarians found in taking on the role. Along with

these examples, there is also evidence through research that librarians are capable of effectively acting in the educational developer role and deriving professional satisfaction from that role [3, 22].

While this evidence provides support for the potential of this approach, concerns that have been raised include the significant time it may take for librarians to design and implement such programs, the challenges of getting faculty to participate in these programs, and uncertainty about faculty willingness to take on the teaching of information literacy [9, 16]. However, there is still limited evidence on the effectiveness of the “teach the teachers” approach in supporting increased student information literacy learning or changing faculty teaching practices related to information literacy. A recent literature review on multiple examples of teach the teachers programing provides indications that this approach can be effective, but notes that our profession lacks concrete evidence of the effectiveness of this approach for long-term changes to teaching practice [9]. There is evidence from the educational development literature more generally that educational development does have the ability to result in long-term changes to faculty teaching practices [23], but this evidence is not specifically related to information literacy.

3 Methods

3.1 Workshop Overview

In this paper, we examine instructors’ perceptions of Meaningful Inquiry (MI), a five-module teaching professional development workshop offered by a team of librarians and a Writing Across the Curriculum coordinator that promotes the transparent and equitable integration of information literacy into courses (see Table 1). MI situates information literacy within a common academic practice – the research assignment – and provides a framework for thinking about what equity means within the broader context of tertiary education, considers what that means for teaching practices, and outlines teaching strategies instructors can use to make their research assignments more inclusive, equitable, and transparent. Upon completion of MI, participants should be able to (1) describe the potential relationship between students’ social identity characteristics, research assignments, and overall academic success, (2) describe the information literacy threshold concepts as outlined in the *Framework for Information Literacy for Higher Education* [24], (3) apply Decoding the Disciplines [25] and Transparency in Learning and Teaching (TILT) [26] to their teaching, and (4) identify practical ways in which they can design assignments to increase students’ motivation.

Table 1. The five Meaningful Inquiry modules

Module 1 – Equity Gaps, Student Success, and Academic Engagement
Module 2 – Research Assignments, Information Literacy, and Decoding the Disciplines
Module 3 – Meaningful and Why It’s Important
Module 4 – Strategies to Address Meaningfulness and Motivation
Module 5 – Structured Workshop and Participant Sharing

The MI workshop was first offered as a 2.5-day, face-to-face workshop at The Ohio State University in August 2019. A half day was devoted to each module (see Table 1), and the first four modules consisted of a mixture of lecture, individual reflection, paired or small group discussion, and large group discussion. The final module provided participants with time to develop a structured action plan (i.e., a plan for applying and implementing what they learned in the workshop to their teaching), and the facilitation team provided support for participants as they were working on their plans. A workbook was developed and was available in print or digital format for participants to work on reflection activities and record their thoughts and insights. We have offered the workshop in this format two additional times – in December 2019 and August 2022. Just over 30 colleagues have completed one of these in-person offerings.

Due to the COVID-19 pandemic, it became impossible to offer the workshop in its original format. The facilitation team sent a survey to our email list, and the overwhelming majority of responses indicated that potential participants were keen to have us convert the MI workshop to a completely virtual format. Because of the modular format of the face-to-face offering, MI translated well into an online environment. Using our university's learning management system (Canvas), we built the new online offering, which includes a mixture of short videos, individual reflection activities, group discussion boards, and a synchronous group discussion for each module held on Zoom. We have experimented with the timing of the workshop and have found that a 5-week session (i.e. one module per week) works well during the autumn and spring semesters with a condensed version – either 2.5 to 4 weeks – working well during the summer. We have offered the online workshop 6 times since the summer of 2020, and over 50 colleagues have completed the online workshop.

3.2 Data Collection and Analysis

For this paper, we analyzed data collected through pre- and post-workshop surveys administered to nine cohorts of participants between August 2019 and August 2022. Of the 81 instructors who completed MI, 61 (75%) agreed to participate in the research study. Fifty-six (92%) of the research study participants completed the pre-workshop survey, 50 study participants (82%) completed the post-workshop survey, and 45 study participants (74%) completed both the pre- and post-workshop surveys. The study participants that are included in the sample include tenured and tenure-track faculty, associated faculty, graduate teaching associates, and instructional support staff. Study participants spanned a range of disciplines, representing more than 20 departments across the university. While there were library employees who participated in the workshop and in the research study, their responses were removed prior to this analysis. More details about the sample can be found in Table 2.

Table 2. Sample information

	All	In-person	Online
MI participants	81	31	50
MI research study participants	61 (75%)	27 (87%)	34 (68%)
Completed pre-workshop survey	56 (92%)	24 (89%)	32 (94%)
Completed post-workshop survey	50 (82%)	26 (96%)	24 (71%)
Completed both pre- and post-workshop surveys	45 (74%)	23 (85%)	22 (65%)
<i>Disciplinary representation</i>			
No response	5 (8%)	3 (11%)	2 (6%)
Behavioral and social sciences	13 (21%)	6 (22%)	7 (21%)
Biological and health sciences	9 (15%)	3 (11%)	6 (18%)
Arts and humanities	16 (26%)	5 (19%)	11 (32%)
Professional disciplines	1 (2%)	0 (0%)	1 (3%)
Physical and computational sciences	7 (12%)	3 (11%)	4 (12%)
Academic support unit	10 (16%)	7 (23%)	3 (9%)

Note: Library colleagues who participated in both the workshop and the research study are included in these numbers. Their responses were removed prior to data analysis. The sample sizes reported in the findings do not include library colleagues

The following questions guided the analysis of the data:

- What motivates instructors to participate in Meaningful Inquiry? Do their motivations align with the goals of the workshop?
- Do the instructors perceive that their beliefs and/or knowledge has changed as a result of participating in this workshop? How did their understandings of information literacy, in particular, change?
- Which aspects of the workshop did the instructors believe were the most valuable?
- What kinds of changes to their teaching do instructors intend to make as a result of completing the workshop?

For each of the open-ended survey questions, we conducted a basic qualitative analysis to identify themes throughout the collected responses. Initial themes were identified by one member of the research team, and the other members of the research team identified the data and provided feedback on that initial analysis. We then performed a basic frequency analysis of the themes that were identified in the qualitative analysis to identify trends within the data. For forced-response questions, we performed a basic frequency analysis of the study participants' responses.

4 Findings

4.1 Motivation for Workshop Participation

On the pre-workshop survey, participants¹ were asked why they were interested in participating in the workshop, and 59 participants (97%) responded to this question. The majority of participants expressed a desire to improve their pedagogical knowledge, particularly in terms of designing research assignments, inquiry-based pedagogy, and inclusive teaching practices.

Fully three quarters of the participants indicated that their primary motivation for participation was to improve their teaching or pedagogical knowledge. Some of the responses were quite general and not specific to the topics of MI. Examples of these include "I want opportunities to improve my pedagogy that are guided by best practices and aren't just me randomly trying things out on my students," "I always seek to improve myself as a teacher and seek opportunities to do so," and "to deepen my own understanding, expand my capacity to enrich learning experiences in various settings, and be part of a community of practice at [Ohio State University]."

Of the participants who indicated that they were interested in improving their teaching, not quite 75% provided specific areas in which they wanted to improve, almost all of which were aligned with the goals of MI. One of the three sub-themes in this category was about participants' desire to improve their ability to design research assignments. Examples of these responses include "...to improve the quality of the research based assignments in my class..." and "I have several classes that I teach that incorporate research for audiences that are not science based and would like to make sure these assignments are well designed and benefit the students." Related responses indicate that participants would like to increase the quality of student work and improve students' overall success on these assignments.

Another sub-theme was related to the value placed on inquiry-based pedagogy and the development of students' research and critical thinking skills. In a few cases, participants spoke generally about placing value on these topics. One participant shared, "My research shows that educations & life outcomes are much improved with inquiry-based pedagogy. Inquiry is central to what we do in this academic culture & we should think about it." However, most participants indicated that these were areas in which they wished to improve. Examples of responses in this category include "I am not satisfied with how I teach these skills in my class and I'm hoping to develop new vocabulary and find resources to better instruct and guide students," "I'm wondering if there is a different approach to help them engage in inquiry in a way that will move them closer to the course goal - valuing inquiry and research in their own practice," and "I want to learn more about ways of supporting research skills for students." Although the spirit of what the participants were conveying was related to information literacy, none of the participants used the term information literacy in their responses.

The final key area of interest related to teaching improvement was about inclusive teaching practices and creating equitable learning environments. About one fifth of the

¹ In the remaining sections – 4 Findings and 5 Summary of Findings – the term "participant" refers specifically to the instructors who participated in the research study (n = 61).

responses in the teaching improvement category highlighted this as a specific motivation. In a couple of cases, participants indicated they wanted to understand and learn how to address educational inequities in the classroom, in the curriculum, and in education more generally. One response highlighted a specific commitment to anti-racist pedagogy. Other examples include “in order to improve myself as a person and as a teacher, I need to be made aware of my, undoubtedly existing, unconscious biases,” “I am hoping to strengthen my ability to support students from various backgrounds, particularly those from marginalized backgrounds,” and “I expect that the workshop will help me build inclusive, equitable classrooms for my students.”

Despite the official university credential that could be earned through completion of MI,² including the potential for additional recognition and compensation, only one person shared this as their motivation for participation. This participant indicated that they were motivated to build their resume through the university’s official credentialing for teaching-related professional development. While others may have also been motivated by this, we have seen a relatively low rate of participants who have completed MI and are eligible for the credential actually apply for the credential. At the time of writing, roughly one third of MI participants have applied for and received the endorsement credential.

4.2 Self-perceptions of Learning

Before the end of the workshop, we shared the pre-workshop survey responses with the participants who completed that survey and asked them on the post-workshop survey if their participation in MI had changed their understanding of several key topics of the workshop (see Table 3). Of the 45 participants who completed both the pre- and post-workshop surveys, the majority perceived that their understanding of these topics had changed. In the section above, we reported that significant motivations for participating in the workshop included the desire to design better research assignments, to help students develop their critical thinking and research skills, and to learn more about equitable learning environments. The responses on the post-workshop survey indicate that MI seems to be successful in addressing those goals. Eighty-six percent perceived that their understanding of research assignments had changed, 78% perceived that their understanding of information literacy had changed, and 67% perceived their understanding of equitable learning environments had changed. The communication of expectations for student performance on research assignments is related to all three of these motivations, and 93% perceived that their understanding of this topic had changed.

Participants’ open-ended responses about their changed understanding of information literacy revealed several themes. For some participants, the workshop helped them to develop a more complete or clear definition of information literacy. For example, one participant shared “Instead of a vague definition I now have a full & complete definition along w/frameworks/threshold concepts.” A related theme was that participants developed a more nuanced or complex definition of information literacy, which also frequently indicated a shift away from a skills-based definition of information literacy. Several participants used language from the *Framework for Information Literacy*

² See <https://drakeinstitute.osu.edu/instructional-support/teaching-endorsements> for details.

Table 3. Post-workshop survey responses

Has participation in this workshop changed your understanding of...	Yes response (n = 45)
research assignments?	38 (86%)
communicating expectations?	42 (93%)
information literacy?	35 (78%)
equity gaps?	24 (53%)
equitable learning environments?	30 (67%)

for Higher Education [24], including authority, conversation, contextual, ethical, and threshold. A few of these participants identified the importance of discipline, as well as viewing the student as an information or knowledge creator. Two of the participants who responded that MI did not change their understanding of information literacy shared that their teaching practice related to information literacy has changed. One said “how to go about it has changed,” and the other shared “but now I will more proactively consider and teach it.”

4.3 Most Valuable Aspects of the Workshop

A total of 43 participants answered the post-workshop survey question asking “Did a specific aspect of the workshop prompt you to think about changing your research or inquiry-based assignments?” After an initial analysis, nine themes emerged from their responses (see Table 4). Decoding the Disciplines [25], which is a strategy for identifying barriers to student learning, was the most frequently shared element, appearing in just over a quarter of the responses. In the open-ended responses, participants most frequently highlighted the value of identifying bottlenecks to student learning when referring to Decoding. Just under a quarter of the participants indicated that TILT [26] was valuable to them. Just under one fifth of the responses mentioned threshold concepts, and it was not clear if they found the idea of threshold concepts valuable or if they were specifically referring to information literacy threshold concepts. Only three responses (7%) specifically call out information literacy. Fourteen percent of the participants highlighted that the entire workshop was valuable. One participant shared, “I think just the way each week builds off the previous means no one week was a huge “a ha” (sic) moment for me, but the cumulative was impactful.” Another participant appreciated “dedicating time to thinking and writing about everything.”

4.4 Anticipated Changes to Teaching Practice

On the post-workshop survey, participants were asked if they intended to change the way in which they design research assignments or communicate expectations after having participated in the workshop. Of the 44 participants who responded to this question, 43 (98%) indicated that they did intend to make changes. An initial analysis revealed nine themes related to these intended changes (see Table 5). Four of the top five themes were

Table 4. Most Valuable Aspects of the Workshop

	Total (n = 43)
Decoding the Disciplines	12 (28%)
TILT	9 (21%)
Threshold concepts	8 (19%)
Meaningfulness/motivation	6 (14%)
Everything	6 (14%)
Writing/writing to learn	5 (12%)
Reflections, discussions, activities	3 (7%)
Information literacy	3 (7%)
Equity framework/equity gaps	2 (5%)

related to TILT [26]. Almost one-third of responses highlighted how they wanted to be sure that their assignments were transparent and clear to eliminate student confusion. Many responses focused specifically on the three key elements of TILT – purpose, tasks, and criteria. Just over one quarter of responses indicated that they wanted to more clearly articulate the purpose of assignments to students, so students could understand what role these assignments were meant to have in their learning. A related answer was being more explicit about incorporating students’ interests and learning goals into assignments to motivate students and help them find meaning in their academic work. Just under a quarter of the responses highlighted the desire to focus on the research process by scaffolding larger assignments into smaller assignments and activities, which would allow students to receive feedback throughout the course, not just on the final assignment. Just over one third of the participants highlighted their desire to ensure that they are transparently communicating their expectations for student performance on assignments, including being clear about the criteria the instructor would be using to assess students’ performance on these assignments. Although the instructor responses indicated that TILT was the second most valuable aspect of the workshop (see previous section), the participants seem to realize the practical utility of this strategy for designing and communicating about research assignments to students.

Table 5. Intended changes to teaching practice and/or research assignment design

	Total (n = 44)
Criteria/expectations	15 (34%)
Transparency/clarity	14 (32%)
Meaningfulness/motivation	13 (30%)

(continued)

Table 5. (continued)

	Total (n = 44)
Purpose	12 (27%)
Tasks/scaffolding	9 (23%)
Addressing bottlenecks	6 (14%)
Information literacy	6 (14%)
Threshold concepts	6 (14%)
Writing to learn	5 (11%)

5 Summary of Findings

Although instructor development programming is not a new concept in academic libraries, it has not been widely adopted as a mechanism for integrating information literacy into academic programs and curricula. Existing literature provides evidence of how academic librarians have incorporated instructor development into their practice, but research about the effectiveness of this kind of programming is limited. In this paper, we attempt to address that gap in the literature by examining instructors' perceptions of a workshop that focuses on how they can equitably and transparently incorporate information literacy into their courses with a specific focus on research assignments. For this examination, we explored instructors' motivations for participating, self-perceptions of learning, most valued aspects of the workshop, and intended changes to teaching practice.

While instructors who participated in MI had the opportunity to receive an official credential from the university, this did not seem to be a significant motivating factor for participation. Rather, the overwhelming majority of participants expressed a desire to improve their teaching practice and/or gain pedagogical knowledge. Furthermore, the focus on a common assignment type – the research assignment – was particularly appealing for the MI participants. The participants expressed a desire to improve their skills in designing these assignments, as well as improving students' performance. Although the instructors shared that they wanted to be able to effectively teach students the skills necessary to be successful, information literacy as a concept was only mentioned in one response. In general, the expressed motivations for participating were aligned with the goals of the MI workshop.

Although the desire to learn more about information literacy was not a primary motivator for these participants, the overwhelming majority indicated that participation in MI changed their understanding of this concept. In general, participants shared that they believed they had developed a more clear, complete, and/or complex understanding of information literacy. Furthermore, several participants used language from the *Framework for Information Literacy for Higher Education* [24], including authority, conversation, contextual, ethical, and threshold in their responses. The workshop also appears to have been successful in addressing the motivations of the participants, with the majority of respondents indicating that participation changed their understanding of the purpose of research assignments, communicating expectations for performance

on research assignments, and equitable learning environments. While this study did not measure actual changes in instructors' knowledge as a result of participating in MI, they perceive that their knowledge related to this topics did in fact change.

There was significant overlap between participants' perceptions of the most valuable aspects of the workshop and the ways they intend to change their teaching practice as a result of participating in MI. Decoding the Disciplines [25], which is a strategy for identifying barriers to student learning, appeared most frequently as the most valuable aspect of the workshop. TILT [26] was rated second, but elements of TILT appeared most frequently in the responses about intended changes to teaching practice. These findings align with instructors' reported motivations for participating in MI – the desire to learn about how they could improve their teaching practice, particularly related research assignments, inquiry-based pedagogy, and inclusive teaching. Both Decoding and TILT provide instructors with practical approaches to making changes to their practice that should also be more equitable for students. Information literacy was not rated in the top of half of responses for either question. However, if we create a combined category of information literacy and threshold responses, this combined category would be one of the more popular responses for both questions.

While many librarians want to use educator development programming as a way to promote information literacy to instructors, the findings of this study suggest that framing this programming specifically around information literacy as a concept may not be appealing to the target audience. Instead, identifying practical strategies that instructors can use to improve their teaching, and integrating information literacy into those strategies, may be more effective. This finding aligns well with recommendations provided by Flierl et al. [4], who emphasized the need for librarians acting in the educational developer role to “frame IL in ways that are understandable and useful” for the faculty (p. 11). It is possible from the instructor viewpoint that information literacy is interwoven with the concept of inquiry-based assignments; one is not possible without the other. Concrete strategies to improve their inquiry-based assignments are a more compelling reason for instructors to participate, with the assumption that better assignments will lead to better information literacy outcomes.

Moving forward there are additional methods that could be used to explore both the short- and long-term effectiveness of the Meaningful Inquiry workshop. First, further disaggregation of the results presented in this paper by delivery mode (i.e., in-person or virtual) could provide some insight into whether or not one delivery mode is more effective than the other. Furthermore, the administration of a follow-up survey would help us know if the instructors are actually making the changes to their teaching practice that they reported in the post-workshop survey. This could also help us to identify potential barriers or obstacles to application concepts and strategies from Meaningful Inquiry into teaching practice.



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Social Project of Media and Information Literacy Knowledge Improvement Among Academic and School Librarians in Kazakhstan

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Abstract. This paper reports the results of the “SauattyKeleshek” social project aimed to improve Media and Information Literacy (MIL) knowledge, skills, and abilities among academic and school librarians in Kazakhstan. The project included educational trainings developed and introduced to the target group consisting of 391 participants, both online and onsite. The objectives of this research paper are to identify the MIL competencies participants possess and ways to improve their MIL knowledge. In this study, researchers will answer the following questions: what are the information needs of the target audience; how does MIL training improve the MIL knowledge of participants; how does an MIL training program content respond to the information needs of the learners? Specifically, researchers applied a qualitative research method by analysing the results of primary data from an online survey conducted before the training, and the MIL training program was developed on the basis of the preliminary survey analysis.

Keywords: Kazakhstan · media and information literacy · school librarian · social project · MIL

1 Introduction

The Republic of Kazakhstan, located in Central Asia, gained its independence from the Soviet Union in 1991. Its current population is about nineteen million people. A national model of education has been formed in the country, which aims at improving the quality of human resources training, and conforming to the needs of the individual, society and the state. Considering the current era of the digital economy, media and information literacy of the population is one of the key factors in the development of human capital to ensure highly efficient innovative and sustainable growth of the Republic of Kazakhstan.

The availability of various initiatives and programs on developing the MIL competencies in many countries does not affect the overall situation in Kazakhstan. Due to a lack of standards introduced at the state level, existing materials and projects cannot be implemented thoroughly. Also, available programs presume omissions and gaps and do not respond to the current realities and the level of the citizens. The deficit of the materials in Kazakh language aggravates the development of MIL, and creates a barrier

to obtaining the necessary information for local teachers, librarians and school children in Kazakhstan.

A practice of transition to various models of distance learning during the COVID-19 pandemic, has shown that teachers should have essential skills, attitudes, and competencies related to media and information literacy in education. Furthermore, considering the current functions and responsibilities of school librarians, these above abilities are applied to library staff as well. Teachers and librarians have to be able to manage data flows, find, use, and disseminate reliable information. They must utilise these sets of skills to effortlessly navigate the online space and establish various kinds of communication and interaction, select and organise digital content, identify necessary online materials, understand copyright issues, and apply strategies of critical thinking. Moreover, schoolteachers and librarians are expected to develop all these skills and abilities for their students through a variety of online educational activities.

The Nazarbayev University librarians developed and implemented the SauattyKeleşek [sauattykeleshek] project aimed at developing media and information literacy skills of academic and secondary school librarians through online training in Kazakhstan. The project highlights the role of librarians as information professionals around the world, including Kazakhstan. Today, librarians are important agents in developing the key literacies of the young generation. They recommend and guide users in searching for valuable and reliable sources of information.

This paper presents the preliminary and final surveys results aimed at identifying project participants' MIL competencies. Also, researchers analyse the project program content in order to improve MIL knowledge. Authors of this study will present findings to the following research questions:

- What are the information needs of the target audience?
- How does MIL training improve the MIL knowledge of participants?
- How does MIL training program content respond to the information needs of the learners?

The project involved partners such as governmental and state agencies, national leading organisations in the professional development of pedagogical staff in Kazakhstan, including the librarians, and also secondary schools.

2 Review of Literature

The critical role of media and information literacy has been historically proven by many authors and studies when it comes to the vast amount of information available from different channels with uncertain quality [1]. As a result, the competencies of MIL have been discussed for more than three decades in Europe and other countries to understand its definitions, policies and initiatives [2]. UNESCO introduced the media and information literacy as a “composite concept, unifying information literacy, media literacy, digital competencies as well as considering the right to freedom of expression, access to information through ICTs, and intercultural dialogue” [3, p.7]. One of the selected definitions of the UNESCO Guideline adapted from Media Development Indicators: A framework for assessing media development states: “MIL is concerned with the ability to access the

media [new and old] and other information sources, to understand and evaluate critically their contents and functions and to critically use them to create communications in a variety of contexts including teaching and learning, self-expression, creativity and civic participation.” [3, p. 180] and another definition was developed during the Media and Information Literacy for Knowledge Societies International Conference which states: “MIL is defined as a combination of knowledge, attitudes, skills, and practices required to access, analyse, evaluate, use, produce, and communicate information and knowledge in creative, legal and ethical ways that respect human rights.” [4, p. 2].

At the same time, Thoman & Jolls highlight the increasing importance of media and information literacy skills, as the current generation is exposed to more information in one day than our great-grandparents in a year [5]. Especially nowadays, children and teenagers reach eight hours of screen activity, including television, smartphones and other gadgets [6] and most teenagers admit they utilise media on a daily basis particularly social networks, blogs and video streaming channels [7]. As a result, children and teenagers face vast amounts of unreliable information online and regularly experience difficulties distinguishing fake information [8].

In addition, as Gretter and Yadav (2016) noted, it is now crucial to understand the tendency of becoming knowledge creators rather than being passive consumers of information [7]. Bernier (2020) also stated that the ability of teenagers to utilise, absorb and share the media is one of the key competencies of the 21st century [9].

Considering misinformation growth there is an urgent need for integration of MIL competencies into the educational programs. However there is no clear understanding of how MIL pedagogies and training might be provided [10–12]. De Paor & Heravi [13] also affirm the importance of library efforts and initiatives to stop the spread of fake news and educate communities on MIL competencies. Various studies also confirm that librarians are the driving force supporting and organizing MIL activities to develop the MIL competencies of students and children [14–16].

Thus authors consider librarians one of the important agents to integrate the MIL competencies to the schools and academic institutions.

3 Methodology

This research paper explores the MIL competencies of project participants and ways to improve their MIL knowledge. The researchers adapted the qualitative method by (a) conducting two language (Kazakh and Russian) online surveys before and after the MIL training. The Qualtrics platform was utilised for collecting data. The questionnaire was processed through and approved by the Institutional Research Ethics Committee of Nazarbayev University. The data collection was started in December 2021 till January 2022. The survey contained questions with options, scaling and open ended queries.

The formal letter was sent to the Republican Scientific Pedagogical Library of the Ministry of Education of the Republic of Kazakhstan, the supervising institution of all Kazakhstani high and secondary school libraries, with the request to recruit participants. The survey was further spread to the target group including high and secondary school librarians. Overall 472 librarians registered for the MIL training, as well as 214 of them responded to the survey, and 391 participants enrolled in the MIL program. The MIL training lasted for four months, in between February and May 2022.

In addition, (b) the content analysis method has been used to study the MIL program for evidence of providing required knowledge on MIL competencies based on deficiencies identified during the preliminary survey.

4 Findings and Discussion

4.1 Preliminary Survey Results

The preliminary survey results revealed the librarians' basic knowledge on MIL before participating in the training program. Furthermore, researchers identified the vulnerable information needs of the target audience. The results of the questionnaire served as a starting point for the development of the MIL training program to meet the librarians' needs.

The first question of the survey sought to find out the familiarity of the respondents with the term "media and information literacy", and almost 90% (192) of respondents pointed out "Yes" they know. However, the second question, which asked for a definition of MIL showed that only about 30% (64) of respondents properly understood what MIL is. The next question of the survey was to identify if the respondents provide any information literacy sessions, and only 20% (42) of the librarians claimed that they do. Additionally, respondents were asked to list the sessions, and as a result barely 25% (53) of the provided sessions from the list were on information literacy. Librarians indicated different types of activities and perceived them as information literacy sessions (Fig. 1).

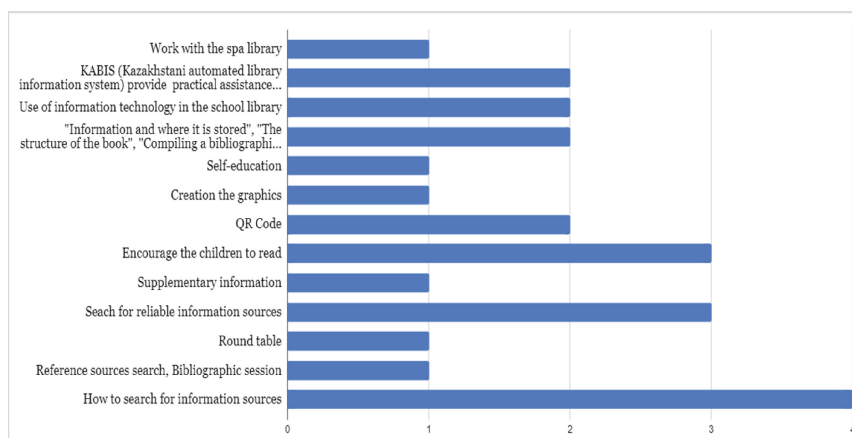


Fig. 1. Librarians' response on library activities

According to the preliminary survey responses, more than 80% of librarians support the inclusion of media and information literacy classes in the educational process as they believe it will improve student achievements. Moreover, about 40% (85) of the librarians suppose they are capable of teaching media and information literacy skills to schoolchildren, teachers, and parents.

One of the questions asked respondents to indicate the sources they trust, and it turned out that most librarians trust governmental periodicals and broadcasts. Nearly 20% (42) of the participants underline that they do not trust any sources fully; in contrary, less than 10% (21) of the librarians rely on any kind of sources, which is an alarming fact. According to the next question response, more than 80% (171) of the librarians use Internet as the main source of the information (Fig. 2).

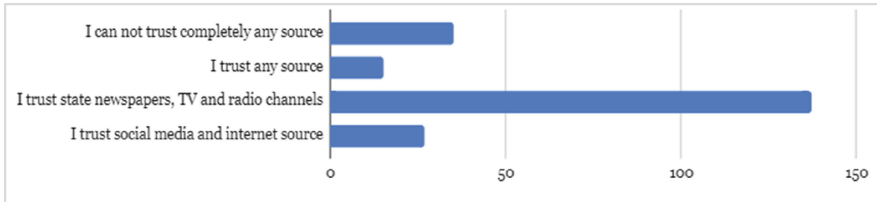


Fig. 2. Librarians' response on trusted sources of information

Another important finding from the survey was that some respondents admitted to using information without proper attribution.

These preliminary survey results played a key role on developing of the fundamentals of MIL program. The researchers were able to apply collected data in the MIL training program to respond to the users needs.

4.2 Post Evaluation Analysis

As mentioned above, 214 librarians took part in a preliminary survey, however after the start date of the MIL training program the number of participants increased to 391 librarians. According to the MIL training program, a post-evaluation test was provided, and a total 317 librarians responded to the survey questions. The online survey contained 50 questions pursuant to MIL course topics, and each correct answer was scored one point. The results of the post evaluation test revealed that only 245 librarians were able to pass the exam, and 87 of them got the highest scores (Fig. 3).

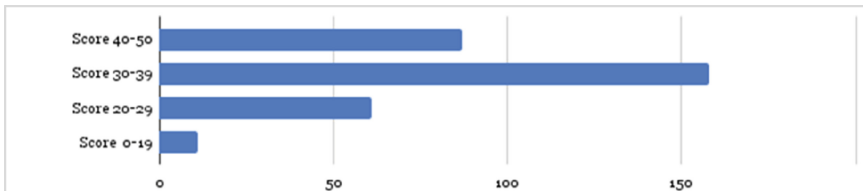


Fig. 3. Post evaluation score results

The questionnaire contained seven specific questions aimed at defining the concept, principles, and characteristics of MIL, and more than 60% (234) of the learners answered correctly. Compared with the preliminary test, where initially about 30 percent of respondents had a correct understanding of the meaning of MIL, the post-test showed that due

to the knowledge gained during the training, the number of participants who indicated the correct answer doubled.

Several questions of the survey were aimed at identifying what MIL activities were carried out during the training by the participants of the program and how effective they were. In the framework of the project, the participants were required to hold activities dedicated to the development of the MIL competencies, which allowed them to practically apply the acquired knowledge and integrate it into the educational process and library activities. As a result of successful MIL activities, librarians reported on the proportion of trained students who learned to evaluate the reliability and quality of information based on different surveys and tests; the highest value was found in the activities of 62 librarians with an indicator of 75%; average value with a score of 50% in the activities of 233 librarians; and a minimum knowledge increase of 25% was found in the event of 22 librarians.

To identify the sustainability and future actions of program participants, the questionnaire asked whether librarians plan to promote MIL in their schools and colleges, and almost 90% (351) of them confirmed that. In the preliminary survey, participants confused various activities with MIL and now in the final questionnaire, respondents indicated the following activities that they plan to conduct in their educational institutions to promote MIL, thus proving that they distinguish MIL activities from other library activities; info-session “Media and information literacy”, “References, dictionaries and encyclopedias as a primary source of information”, “Journals and newspapers as a source of information”, “Internet ethics”, “Children and Media (Internet)”, “Cyber security”, “The structure of the book (journal)”, library lesson on “How to search for information (in the library, online)?”, “MIL games and quizzes”.

4.3 MIL Training Program Content Analysis

Given the knowledge gaps of the project participants, the authors of the training program faced the task of developing an MIL training program according to the information needs of the target audience. The authors of the program, the Nazarbayev University librarians, also acted as trainers, developers, and experts of the SauattyKeleşek project. After studying the results of the preliminary survey, it was decided to include materials on the basic skills of digital literacy and information inclusiveness. Thus, the authors compiled a training program in three sections, which was designed for a total of 16 h of training. Each section was aimed at developing relevant competencies and skills and divided into subsections with thematic units. The teaching methodology included: a theoretical part for studying fundamental knowledge about MIL; a practical part to consolidate the knowledge of the participants of the training; brief testing for summing up; homework, and development of MIL activity projects in their schools and colleges.

The first section of the MIL program is aimed at developing school librarians' knowledge in the field of information, including the importance of developing MIL in education, and the ability to identify its key elements. This section introduces the librarians to the theoretical foundations of MIL and expands their initial knowledge. The material is structured in such a way that librarians would be able to develop their own MIL training program or extracurricular activities on MIL based on initial and gained knowledge and experience. Definitions of various terms and concepts such as “information”, “media

and information literacy”, and “inclusion” are provided for reference in the section. The material is supplemented with information about various types of information and media sources, their characteristics, including accessibility for people with disabilities, as well as the safety of their use. The material is expanded with the subsection “MIL in Education” to familiarize participants with the scale of MIL as a global movement that brings innovation to the development of society through education. In addition, the main initiatives in the field of MIL promotion and the role of various agents (librarians, teachers, students, and their parents) in the formation of MIL at the local, regional, and international levels are highlighted.

As an example, the first section contained tasks such as analyzing the content of the website, the presence of hyperlinks, studying the types of information presented on the website, as well as performing other assignments such as compiling exercises for schoolchildren to determine the types of information according to the topic covered (Fig. 4).

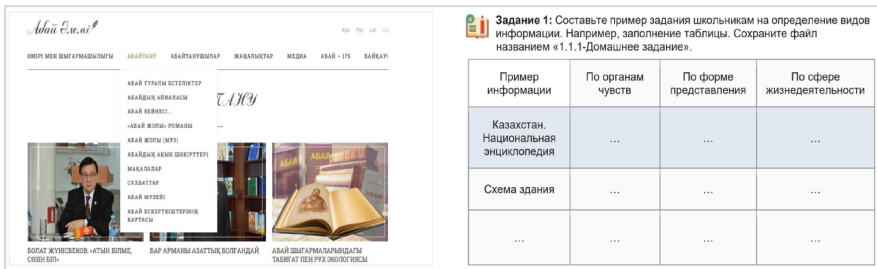


Fig. 4. Section 1 program content

The second section develops key competencies and skills that ensure effective search, analysis, critical evaluation, interpretation of information, creation, and distribution of media and information products using all required means and tools in a creative, legal and ethical manner. Librarians learn to evaluate the reliability and quality of information, use it in the educational process, and study information prevention for safe and successful communication in a virtual environment, including the Internet and social networks. The materials of this section can be used as a template for the development of information lessons on the topics indicated in the subsections.

The section contains a topic about methods of searching for various information, including scientific, educational, and reference information, in specific local and international databases. Librarians learn to search for information using keywords, address data, or advanced search (Fig. 5).

The second subsection teaches librarians how to evaluate information quality and critically analyze the sources using various methods and tools. Concepts such as argumental assessment, opinion formation, and decision-making are also considered. In this section, the participants learned what qualities can own information, and how to recognize fake information, and disinformation. As an example, exercises on spotting fake information are included in the content (Fig. 6).

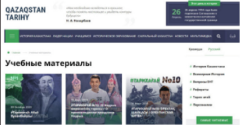
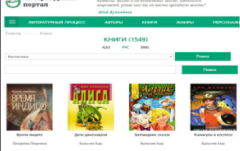
<p>QAZAQSTAN TARİHİ https://le-history.kz/ru/</p> <p>Главный исторический портал Казахстана. Все про Казахстан: подборка самых интересных исторических статей</p>		<p>1 Ключевая фраза подбирайте ключевую фразу не более 5-ти слов, включая предлоги и союзы</p>
<p>ЛИТЕРАТУРНЫЙ ПОРТАЛ https://lelibportal.kz/ru/</p> <p>«Литературный портал» на базе АО «Казинформ» при поддержке службы Централных коммуникаций при МИК РК.</p>		<p>2 Альтернативные ключевые слова Используйте альтернативные ключевые слова, слова синонимы или термины близкие по значению, которые помогут найти все документы по заданным ключевым словам</p>
		<p>3 Логические (булевые) операторы Используйте логические операторы И, ИЛИ, НЕ, чтобы сузить или расширить поиск, или исключить определенное слово из поиска</p>
		<p>4 Кавычки " " для получения результата, содержащий точный набор ключевых слов, без каких-либо изменений и синонимов, введите ключевую фразу в кавычках</p>
		<p>3 Расширенный поиск / Инструменты Используйте фильтрацию в расширенном поиске или инструменты поиска</p>

Fig. 5. Section 2 program content


	<p>Вакцины против COVID-19 вызывают смертельное кожное заболевание - манипуляция</p> <p>АСТАНА. КАЗИНФОРМ - В популярном казахстанском Telegram-канале распространяется информация о том, что первая доза вакцины производства Pfizer/BioNTech вызывает крайне опасное заболевание - токсический элидермальный некролиз. Об этом якобы уже сообщают научные журналы. В сообщении также содержится призыв защитить детей от столь опасной вакцины. Портал stopfake.kz объяснил, что же в самом деле говорится в научной статье, на которую ссылается автор сообщения. Об этом передает МИА «Казинформа».</p> <p>21.09.2022 25:00</p>
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Fig. 6. Popular fake news in messengers

The two previous sections introduced librarians to the theoretical basis and practical skills of media and information literacy, which will allow them to more confidently navigate the information environment, and use media and information products.

The third section teaches librarians that we are both consumers and creators of information sources. The quality of the final information product depends on the ability to analyze and process data, as well as on the competent use of information and communication technologies to achieve desired content. In addition, this section is designed to develop the skills and abilities of librarians to organize and conduct their own MIL training for schoolchildren, their parents, and teachers, taking into account the availability of information for people with disabilities, as well as to apply technologies for creating media and information products.

During the training, librarians gained a range of knowledge about various tools for promoting MIL in education, namely the use of social networks; the creation of presentation materials; the creation of games and quizzes using multiple platforms, and advanced leveraging of Microsoft capabilities (Fig. 7).

In addition to the prepared curriculum, the SauattyKeleşek website was developed as an educational tool. The website contains detailed information about the project, project members and experts, as well as training program materials, including training videos, presentations, and examples of homework. The website is available in Kazakh and Russian languages through the link: <https://sites.google.com/view/sauattykeleshek-ru/materials-ru>. The statistics indicate two thousand views as of May 2023 (Fig. 8).

To support the sustainability of the project, the authors of the program developed an MIL guide that systematizes knowledge about media and information literacy. The uniqueness and novelty of the guide consists in the implementation of an inclusive

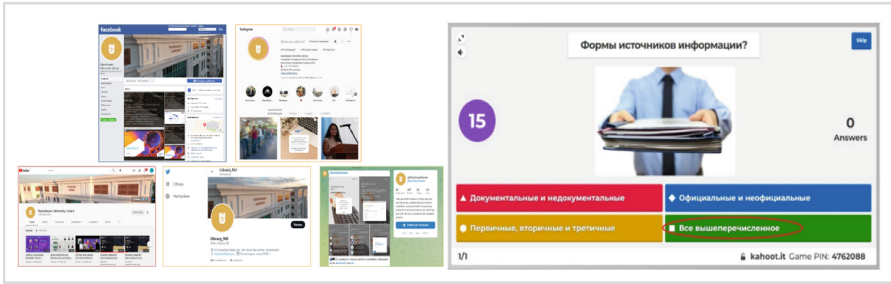


Fig. 7. Section 3 - Exercises

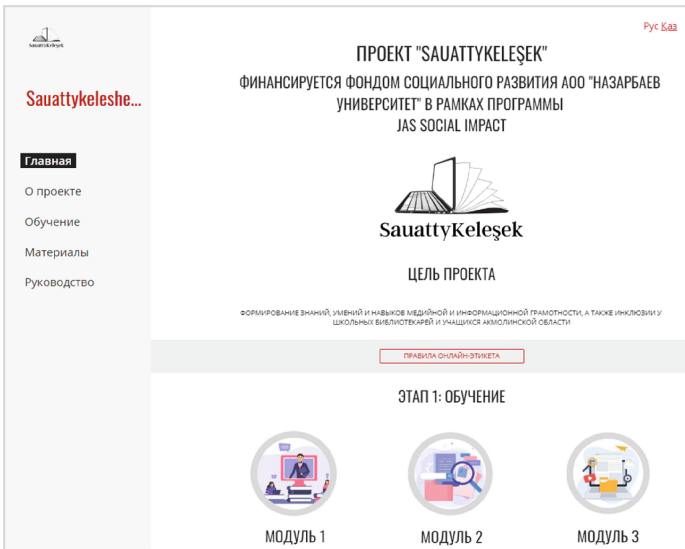


Fig. 8. SauattyKeleşek website

approach to MIL, namely the integration of the principles of accessibility of information for people with special educational needs. The guide was developed on the basis of the training materials of the SauattyKeleşek project and is intended for school librarians, teachers, students, children, and anyone interested in the formation and development of knowledge in the field of information. The guideline is available in open access on the project website (Fig. 9).

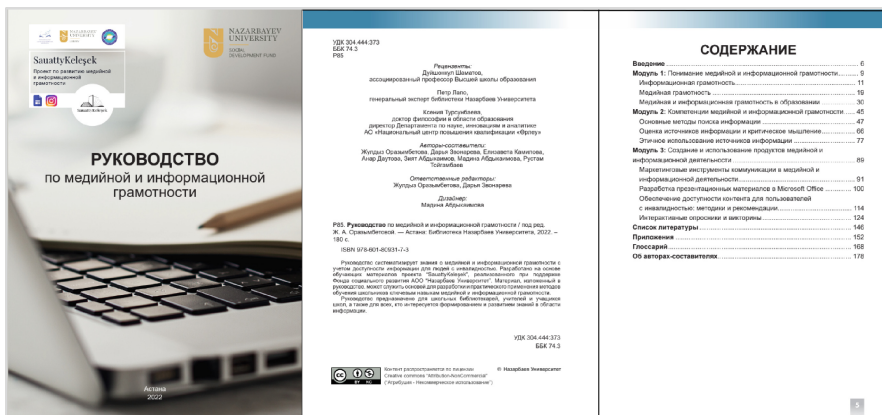


Fig. 9. MIL Guideline

5 Conclusion

The first stage of the project implementation, namely the training of school librarians, lasted from February 28 to March 25, 2022, during regular business days.

Despite the fact that 472 participants were registered for participation, due to the poor quality of the Internet in some regions, only 391 librarians were able to join online training through Zoom. The second phase of the training included practical activities. The librarians conducted MIL activity projects according to the chosen topics. Using the data obtained during the preliminary survey, the authors were able to find out the information needs of librarians and develop relevant educational material for the training implementation. By examining the data collected during the final questionnaire, the researchers were able to get an overall picture of how librarians increased their knowledge in the field of MIL. The content of the program and the topics of the course were logically connected and ergonomically presented to the reader, thereby transferring fundamental knowledge and practical skills for effective work with information.

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Author Index

A

Adair, Heather F. I-199
Addimando, Loredana II-277
Ahlryd, Sara I-223
Akkoyunlu, Buket II-83
Alamettälä, Tuulikki II-267
Anghelescu, Hermina G. B. II-44
Antunes, Maria Luz II-92, II-150

B

Baldarelli, Beatrice II-210
Bastos, Glória II-59
Beretta, Chiara II-277
Biškupić, Ivana Ogrizek I-39
Blockside, Katie II-304
Boh Podgornik, Bojana II-290
Botturi, Luca II-277
Bouret, Christian II-140
Brylska, Karolina I-88

C

Choquard, Laetizia Sabatini I-67
Crane, Ashley B. I-199
Cruikshank, Peter II-15

D

de Vevey, Vincent I-67
Deja, Marek II-239
Dolničar, Danica II-290

E

Enwald, Heidi I-145
Eriksson-Backa, Kristina I-145

F

Feeney, Andrew J. I-121
Flierl, Michael I-52
Folk, Amanda L. II-304

G

Głowacka, Ewa II-239
Grgić, Mihaela II-254
Gross, Elizabeth A. I-199
Guirlet, Marielle I-67

H

Hammons, Jane II-304
Hanell, Fredrik I-223
Henkel, Maria II-107
Henninger, Maureen I-3
Hermida, Martin II-277
Hérubel, Jean-Pierre V. M. II-219
Hirvonen, Noora I-145
Hurley, David A. I-15
Huvila, Isto I-145

J

Jacob, Armin II-107

K

Kalmárová, Kristýna II-210
Kamilova, Yelizaveta II-316
Kisilowska-Szurmińska, Małgorzata II-161,
II-239
Konecki, Mario I-39
Konecki, Mladen I-39
Koukourakis, Manolis II-199

L

Landøy, Ane I-111
Langseth, Henry I-111
Lepik, Krista I-27
Løkse, Mariann Cecilie I-111
Lopes, Carlos II-92, II-150

M

Martinović, Ivana II-254
Maybee, Clarence II-219

Menzi Çetin, Nihal II-83
Milosheva, Marina II-15

N

Nahotko, Marek I-130
Novo, Ana II-59, II-227

O

Ochôa, Paula II-227
Orazymbetova, Zhuldyz II-316

P

Pálsdóttir, Ágústa I-168
Pardo, Javier Lloret I-67
Paul, Magdalena II-239
Peñaflor, Janice I-186
Perrey, Lennart II-107
Primeau, Hanna II-304

R

Rak, Dorota II-71
Rath, Matthias O. II-129
Repanovici, Angela II-199
Ryan, Bruce II-15

S

Sanches, Tatiana II-92, II-150
Schneider, René I-67

Šobota, Dijana II-3
Steinerová, Jela II-119
Sviličić, Nikša I-211
Świgoń, Marzena II-239

T

Teixeira, José I-158
Trenchev, Ivan II-173
Trencheva, Tereza II-173

V

van Wyk, Brenda I-101
Vidačković, Zlatko I-211
Vilar, Polona II-28
Vizváry, Pavla II-210
Vrana, Radovan I-77

W

Wiorogórska, Zuza II-185
Wojciechowska, Maja II-239
Woods, Laura I-178

Y

Yerbury, Hilary I-3

Z

Zdravkova, Evelina II-173