Serap Kurbanoğlu · Joumana Boustany
Sonja Špiranec · Esther Grassian
Diane Mizrachi · Loriene Roy (Eds.)

Communications in Computer and Information Science 552

# Information Literacy: Moving Toward Sustainability

Third European Conference, ECIL 2015
Tallinn, Estonia, October 19–22, 2015
Revised Selected Papers

Springer

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# Preface

The Third European Conference on Information Literacy (ECIL) was co-organized by the Department of Information Management of Hacettepe University, Turkey, Department of Information and Communication Sciences of Zagreb University, Croatia, and the Institute of Information Studies of Tallinn University, Estonia. Information literacy and sustainability being the main theme, ECIL 2015 aimed to bring together researchers, information professionals, 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 third conference was "Information Literacy in the Green Society." In all, 226 proposals were submitted to the conference. Contributions came from 50 different countries (Albania, Armenia, Australia, Austria, Belgium, Bangladesh, Bulgaria, Canada, China, Croatia, Czech Republic, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, India, Iran, Italy, Jamaica, Japan, Lithuania, Mexico, Nigeria, Norway, Oman, Pakistan, Poland, Portugal, Puerto Rico, Qatar, Romania, Russia, Serbia, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Taiwan, Thailand, The Netherlands, Turkey, UK, Ukraine, United Arab Emirates, USA). All submissions were subjected to a double-blind review process. This book consists of a total of 61 papers addressing many different issues.

Starting with the host organization, the Institute of Information Studies of Tallinn University, we are grateful to many organizations for their support. We would like to express our deep gratitude to EAS (Enterprise Estonia) for their generous financial support. Our special thanks go to UNESCO and IFLA, two major organizations that have contributed tremendously to the development of information literacy, for providing their patronage.

We would like to take this opportunity to thank: the conference keynote speakers Susan Danby, Carol Collier Kuhlthau, and Sonia Livingstone; the invited speakers (Gobinda Chowdhury, Heidi Julien, Mihkel Kangur, Mandy Lupton, Eero Sormunen and Olof Sundin); the authors and presenters of papers, best practices, PechaKuchas, posters, workshops; and the session chairs. We would like to thank and acknowledge the hard work of the members of the Standing and Program Committees, who invested their time generously to make this event happen.

Our editorial team should also be acknowledged here. Special thanks to Joumana Boustany, Esther Grassian, Diane Mizrachi, and Loriene Roy for their hard work and valuable editorial contributions.

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

November 2015

Serap Kurbanoğlu
Sonja Špiranec
Sirje Virkus

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# Information Literacy, Environment and Sustainability

# Looking for Creative Information Strategies and Ecological Literacy

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**Abstract.** Information strategies and creative information processing are considered for information literacy research. Information use patterns based on empirical and phenomenographic studies by selected authors are analyzed. Three case-studies are subject to meta-analysis resulting in identification of factors of information creativity and ecological information literacy. Ecological literacy is described. Main sources and aspects of creative information strategies as part of information literacy are presented in the final conceptual model. Three dimensions of the model are identified, including the problem-oriented, knowledge-oriented and the interactive strategies. For each dimension we determine main supportive strategies, such as conceptual structuring, conceptual exploration, and conceptual navigation. It is proposed to pay more attention to creative information strategies in information literacy research.

**Keywords:** Creative information strategies · Ecological literacy · Information use patterns · Conceptual models

## 1 Introduction

The aim of this paper is to identify creative information strategies with regard to innovative views on information literacy. Creativity and information strategies are considered as background for information literacy research. In line with creativity research we claim that both logical and intuitive aspects of information strategies should be considered. The main question is if we can support creativity as part of information literacy research and practice. The starting point is the analysis of information use patterns identified by several researchers. We also analyze three case studies based on empirical surveys of doctoral students, information managers and artists and scholars and determine sources of creativity in information strategies.

Creative information strategies are strongly tied with the environment and contexts. That is why we further explore and determine ecological information literacy as part of the cultivation of the information environment. We suppose that the main challenge of information literacy research is to understand creative information strategies. Based on our analyses we applied conceptual modeling for identification of creative information strategies. Finally we proposed a three dimensional conceptual model of creative information strategies with implications for ecological information literacy, digital services and creative digital spaces.


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## 2 Information Strategies and Creativity: Related Research

Information strategies are information activities that help in information problem solving and sense making and represent differences in experiencing information environments. Information search strategies were determined in information seeking and retrieval as planning the searching process. The strategy itself means cognitive planning and decision making in information processing. From the viewpoint of information behavior, information strategies mean planning the information problem solving and can be considered as part of human information interactions [1]. The main factors of these strategies are stages of the information problem solving, including problem definition, planning, realization of solution and assessment [2]. This has been embodied in several models of information seeking and behavior. For example, in guided inquiry [3] the authors emphasized building information learning spaces and the intervening strategies as collaborate, converse, continue, choose, chart, and compose in contexts. Common strategies are browsing, monitoring, chaining, differentiating, extracting and visualization.

General behavioral theories described several phases that can be identified in human information behavior including the orientation-analytic phase, the strategic-operational phase, and the synthetic-verification phase. In the first phase the structure of the problem is determined. In the second phase heuristic rules and previous knowledge are applied to development of global direction to solution. Heuristic rules can represent mental shortcuts that help in problem solving and decision-making. The synthetic phase concentrates on assessment of alternatives, revisions, verification, and relevance assessment. The information strategies can be divided into traditional strategies: analytic strategies (professional) and intuitive strategies as browsing, empirical strategy, known-site strategy, similarity [1]. The intuitive strategies provide much space for human creativity. As opposed to system and algorithmic approaches they are based on uncertainty, heuristics, and serendipity. Serendipitous information retrieval, for example, occurs when a user finds useful information by chance, as part of different information interactions [4]. Browsing is still considered as one of the most common creative information strategies based on skimming, scanning and "the art of not knowing what you want until you find it" [5].

Alternative phenomenographic approaches determine specific experiences of information literacy in contexts related to practice. Several variations have been identified in relations between information literacy, learning and information use. Bruce [6] mentions two basic types of information literacy experience, the orientation experience and the learning experience. The same skills may be applied in different contexts and information literacy can be understood as creative experience.

However, not very much attention in information literacy research has been paid to creativity. Creativity is determined as the production of new and original ideas or products. The creative mind is manifested by insight, planning and exploration. Cognitive abilities of adaptations and production of new and original entities are typical for the creative personality. Research in creativity usually concentrates on the creative personality, creative process and creative product. Creativity research can inform information studies and provides incentives for innovations [7, 8]. Anderson [9]

mentions the challenge of information science to cultivate creative literacies. She emphasized new creative information ecologies coming from the capacity to engage with information in creative ways. She proposed the 4 P's of innovative culture which represent the four strategies for support of creative literacies: plan, play, pressure, and pause. Bawden and Robinson [5] claim that creativity and innovation can be aided by information tools if used by the "prepared mind". Sources for creative information processing can be found in peripheral, speculative or incorrect information, interdisciplinary information, representations of information bringing analogies, patterns, exceptions, browsing, encouragement of informal channels, individual preferences, exceptions and inconsistencies.

Creative information strategies integrate human creativity with human information behavior. Balance between knowledge of domains, problem solving and rational thinking and intuition, experience, emotions and innovations is required. Creative information behavior of research workers is marked by uncertainty, relevance and intuition [8]. Some authors examined the cognitive information processing and pointed to several sources of creativity [10]. They explore the role of a metaphor in human information organizing behavior. This means development of scaffolding for creative structuring of information. Interesting relationships between information literacy, cognition, brain and learning were presented by Sturges and Gastinger [11]. Modern neuroscience can help understand interactions between brain hemispheres and neuroplasticity as the capacity of the brain to mould and remould itself through learning. The right hemisphere seeks resolution through associative processes. The sources of creativity are interpreted as metaphorical thinking, intuition and empathy. Apart from over-concern with logical structures we should pay attention to intuitive, associative and empathetic thinking.

New perspectives have also been established by the ACRL framework of information literacy [12]. The emphasis is on contexts and mental construction. Metaliteracy is regarded as an overarching set of abilities of creators and users and metacognition as self-reflection in a changing information ecosystem. Information literacy is redefined as the set of integrated abilities encompassing reflective discovery of information, understanding the production and value of information and the use of information in new knowledge and ethical participation in communities.

Based on this background we ask the following research questions: Can we identify creative information strategies with regard to information use patterns? How can we determine the concept of ecological information literacy? How can information science support creative information strategies?

## 3 Information Use Patterns and Phenomenography

Information science has developed its tradition in identifying the information use patterns based on information behavior studies. Information use was determined as the process where the user tries to make sense of discontinuous reality. Some authors emphasize the problem solving characteristics of information use [13]; others regard information use as the incorporation of information into a person's existing knowledge base [14]. Based on empirical studies several authors determined information styles and patterns of information use. For example, Palmer [15] identified the following

information styles of researchers: nonseekers, lone seekers, wide rangers, unsettled, self-conscious seekers, confident collectors, and hunters. Heinström [16] determined three information styles of students based on the relations between types of personality and learning. These styles are determined as broad scanners, fast surfers, and deep divers and point to priorities in orientation or understanding. Selected cognitive characteristics can determine creative information strategies in personal contexts.

Several empirical studies of information literacy and learning identified patterns of information use. Limberg [17] determined three styles of information seeking and use in Swedish schools: fact finding, balancing information or forming a personal standpoint, scrutinizing and analyzing. Students who employed more sophisticated ways of information use achieved better learning outcomes. It depended on understanding, interpretation and reproduction. This methodological approach was based on phenomenography and experiencing information use.

Patterns of experiencing information use and learning were empirically determined by Lupton [18], including sequential, cyclical, and simultaneous styles. We identified three information use patterns, the evolutionary, interactive, and sequential patterns [19]. Another perspective integrates information literacy into a set of multiliteracies (social, scientific, economic, cultural) regarded as a sociocultural practice [20]. The situated information literacy includes such social contexts as workplace, education, leisure, everyday information practices.

From the cognitive viewpoint we can determine convergent and divergent information strategies. Research of serendipity and browsing strategies in libraries confirmed the goal-oriented, focused, rational behavior, and the exploratory, intuitive, impulsive behavior. Björneborn [21] determined the interest space as part of divergent information behavior with systematic browsing, impulsive browsing and incidental encounters. Dimensions of serendipity include unhampered access, diversity (topics, genres, activities), display, contrasts, pointers, imperfections, cross-contacts, multi-reachability, freedom of movement, explorability and stopability.

Selected information use patterns have been analyzed in Table 1. We selected the authors who applied phenomenographic research to information literacy, learning or information use and compared them with general stages of creative problem solving [22]. These patterns are represented by classification of information needs into explicit and implicit and confirm dependence on contexts and division of activities into

**Table 1.** Comparison of several patterns of information use and information strategies

| General information problem solving phases | Information strategies (2010) | Heinström (2006) | Limberg (1999) | Bruce (2013) | Lupton Information use patterns (2008) | Steinerová Information use patterns (2014) |
|---|---|---|---|---|---|---|
| Orientation-analytic | Intuitive - everyday information strategies | Surface students - access | Fact-finding (experience) | Orientation experience | Sequential | Process/ sequential |
| Strategic-operational | | Strategic students-organization | Balancing information | | Cyclical | Interactive |
| Synthetic-verificative | Analytic–professional information strategies | Deep students - quality | Scrutinizing analyzing | Learning experience | Simultaneous | Evolutionary |

orientation/access and deeper analysis/learning. As Heinström noted [16], this division may not be caused by the personality traits, but rather by the type of information need. Another interesting issue emerged in relation to preferences in pathways and exploration of the information environment. Several factors such as the context (situation, task, discipline) or personality traits may cause preferences of stages/process or less rigorous procedures of one's experience in the information environment (interactions, cycle). Differences in information use are influenced by the depth of information processing, type of personality, type of problem, active or passive information behavior, types of tasks. Further contextual factors include the creative process and different stages (orientation, analysis). Other similarities can be found in the use of intuition for orientation, access, fact-finding and problem solving. Deeper, analytic information processing, and learning may open up the potential for creative production.

In search for the common framework for explanation of the complexity of information use patterns we can use the concept of information ecology. Information ecology frames the holistic complexity of information interactions and balance among people, technologies and information. In our research of the academic information environment we determined ecological information interactions as those activities which are close to natural information behavior. Implicit knowledge is made explicit and successful information strategies are re-used [23, 24].

## 4 Three Case Studies - Meta-Analysis

For further exploration and evidence we analyzed three empirical studies, namely the qualitative study of doctoral students, the study of information managers as part of the information ecology of the academic information environment, and a PhD. thesis on information creativity in digital environment based on surveys of scholars, artists and information professionals. The study of doctoral students was based on semi-structured interviews with 19 PhD. students and information horizons methodology [24]. Variations in information styles in different disciplines were confirmed. In sciences we identified monitoring of a few key sources such as electronic journals, in technical sciences conference proceedings and information problem solving prevailed. In social sciences we found deeper categorization of sources, in humanities scholars preferred monographs and one's own knowledge and emotions. The patterns of information behavior included the interactive pattern indicating several multiple interactions, the process/sequential pattern which mapped the information problem solving stages; and the evolutionary pattern pointing to learning and cognitive evolution.

The study on information ecology of the academic information environment applied semi-structured interviews with 17 information managers of selected Slovak universities [23]. Several conceptual models confirmed the significance of values, people and creativity as the most important knowledge asset. The final model identified the cognitive (visual), behavioral (collaborative) and semantic (conceptual) levels of information ecology. Ecological information strategies included semantic filtering, visual filtering and collaborative filtering. Creative strategies emerged as a result of sensitivity to contexts in time and space. Visual representations (color, form, shape, place, size) contribute to construction of knowledge. Ecological information strategies

mean re-use of information objects, exploration of information spaces and cognitive processes as organization, analyses, syntheses, interpretations, assessment.

The study on information creativity in the electronic environment was based on a survey of 255 scholars, artists and information professionals in Slovakia [25]. The author compared information processing and creativity with scholars, artists and information professionals. Resulting models depict differences in information processing with these groups. While information professionals and scholars applied mainly analytical information processing strategies; with artists holistic creative information strategies emerged. In final models the dynamic reconstruction of information was presented, including multiple analyses and syntheses, transformations, interactive disintegrations and collaborations. Information creativity was redefined as the manifestation of information behavior determined by the personality of creator, the process of creation and resulting products in contexts. These studies proved empirically the value-added creative information strategies embedded in the information environment. People explore information spaces and incorporate new knowledge into knowledge bases. The role of context as inspiration was also determined. Multiple knowledge representations and free movement forward and backwards, browsing and discovery can support creative information use. Three dimensions of the information space were identified; the cognitive, behavioral and semantic dimensions. Three patterns of information use can be integrated into common creative information spaces for problem solving, learning/knowledge growth, interactive exploration. Coming from the role of information environment and contexts, we further explored the concept of ecological information literacy.

## 5 Ecological Information Literacy

The emergent ecological paradigm of information science explains holistic experience of people in the information environment. Phenomenographic traditions apply holistic ecological principles, viewing people as part of the environment and overcoming the anthropocentric perspectives. At a general level, ecological information literacy means ecological awareness of information use and environmental risks regarding chemical, pharmaceutical, medical, bioethical, energetic, and material factors of the environment pollution. Green libraries and green technologies movements focus on environmental changes and reduction of libraries' and technological environmental impact. It is recommended to raise awareness to ecological issues in education and promote research focused on ecological operations, behavior and practices [26]. Sustainability means minimization of these influences and taking environmental issues into account when making decisions; re-use of documents and information and education of environmentally responsible citizens. Green libraries cover a broader range of activities such as ecological buildings, operations, reduced use of plastics and paper, the impact of technologies, and the provision of creative services.

At the micro level of information behavior we can determine ecological information literacy as a metaliteracy including cultivation of information environment, relevance assessment, and making informed decisions. In creative information strategies people should consider how their information behavior affects the information environment. Ecological information literacy emerged as part of an integrated space for development

of the awareness of information objects in digital environments. Our studies confirmed that people build their own ecological information spaces. These spaces comprise both stages of information use. The first stage is the orientation and the second one is the creative use, exploration and discovery. Ecological information literacy then means understanding information environment, use of mixed strategies, multiple adaptations, awareness of information overload and other information pathologies (security, identity). Information resiliency as determined by Lloyd [27] is also part of ecological information literacy and means development of tools for adaptations and resistance against information overload and stress. The challenge is how to design digital ecological creative information spaces.

## 6 Conceptual Modeling of Creative Information Strategies

Based on the patterns of information use we developed a conceptual framework for creative information strategies (Table 2). The first part identifies existing dominant strategies within each of the patterns. The columns represent taxonomy of activities and experience. Different manifestations of creative information strategies are outlined in the bottom part of the table as mixed sources of creative exploration.

**Table 2.** Conceptual framework of creative information strategies

| **Problem/process oriented** | **Interactive** | **Knowledge oriented** |
|---|---|---|
| Problem-solving strategies | Communicative strategies | Cognitive development |
| Control/analytical strategies | Holistic strategies | Cognitive strategies |
| Monitoring, scanning | Sense making | Evolving information ecosystem |
| | Adaptations<br>Associative strategies/browsing | Knowledge patterns (gestalt) |
| *Find/use*<br>*Multiple pathways*<br>*Exceptions,*<br>*Speculative inf.*<br>*Inf. encountering*<br>*Intuition*<br>*Divergent strategies* | *Collaborate*<br>*Creative navigation*<br>*Interdisciplinary information*<br>*Associative thinking*<br>*Analogies,*<br>*Empathy* | *Create/advance*<br>*Creative discovery, Visualize implicit information, Concept mapping, Peripheral information*<br>*Metaphoric thinking* |

Following this framework we developed a conceptual model of creative information strategies in problem-oriented, knowledge and interactive dimensions.

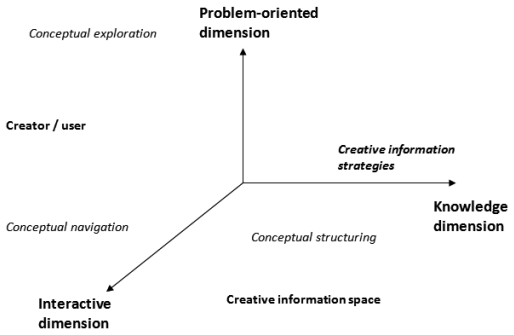


**Fig. 1.** Conceptual model of creative information strategies

In this model (Fig. 1) we determined the ecological information space as a source of creative information strategies built by the creator and the user of information. He/she develops creative information strategies in the three dimensions of this space, namely the problem-oriented, the knowledge-oriented and the interactive strategies. They are applied in information ecosystems and depend on contexts such as tasks, personality, intent, process, product or service. Information sources and processes shape this ecological space using and re-using different strategies. Other dimensions can be identified by relevance assessment or components of information products. In each dimension we determine main supportive strategies, such as conceptual structuring, conceptual exploration, and conceptual navigation. Factors of ecological literacy include the use of information for inspiration, remembering, and adaptations of successful strategies. In the problem-oriented dimension we can identify problem statement and identification of concepts - conceptual exploration. In a knowledge dimension we determine different types of knowledge, topic structuring, and contexts. The dominant creative strategies are conceptual structuring and concept mapping. Other creative strategies include visualization, knowledge representation, pattern recognition, and categorization. The interactive dimension supports adaptations, collaboration, knowledge discovery, multiple revisions and syntheses. The main creative strategy is the conceptual navigation.

Basic sources of creative information strategies are metaphors, analogies, intuition, emotions and empathy. However, creative information strategies can require much time for deep reflective thinking and mapping the information landscape. The sources of creativity can be found in information strategies focused on ill-structured problems, ambiguity, and imperfect information. Metacognitive strategies include feedback and self-reflection and can be supported by tools for representations. For doctoral students we propose strategies based on conceptual navigation and conceptual structuring. For researchers and information professionals we recommend conceptual exploration and conceptual navigation. Based on this model we can develop ecological information services and spaces in digital libraries. Creative information strategies are continuously adapted to information environment, often mixed with routines, habits and exploration. Further research could help better understand creative information strategies and support communities of practice to be more creative in information use.

## 7 Conclusions

The analyzed patterns of information use resulted in identification of creative information strategies and ecological information literacy in information processing. Meta-analysis of three studies confirmed creativity as a source of innovations in information literacy research. We proposed a conceptual framework and a conceptual model of creative information strategies. The model can be used for building digital creative information spaces for information literacy development. For guidance in research work ecological features such as the concept infrastructure, multiple knowledge representations, pattern recognition, analogies, associations, metaphors, visualization, knowledge discovery, clustering, and collaboration can be considered. Ecological features, such as re-use of research data, can be provided in creative and collaborative information spaces. Systems and services which support implicit knowledge discovery can be improved by research of creative information strategies. Ecological literacy develops awareness of environmental and holistic approach to information use including information analytical tools (data analytics, pattern recognition). The message is that we should pay more attention to intuitive, synthetic thinking as part of information strategies and to treat information literacy holistically. Holistic ecological approach can help discover new knowledge and support creativity and innovations by services, products and activities of information professionals.

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## References

1. Fidel, R.: Human Information Interaction: An Ecological Approach to Information Behavior. MIT Press, Cambridge (2012)
2. Wilson, T.D.: Models in information behavior research. J. Doc. **55**(3), 249–270 (1999)
3. Kuhlthau, C.C., et al.: Guided Inquiry Learning in the 21st Century. Library Unlimited, Westport (2007)
4. McCay-Peet, L., Toms, E.: Measuring the dimensions of serendipity in digital environments. Inf. Res. **16**(3), paper 483 (2011). http://InformationR.net/ir/16-3/paper483.html
5. Bawden, D., Robinson, L.: Information for creativity and innovation. In: Bawden, D., Robinson, L. (eds.) Introduction to Information Science, pp. 275–276. Facet, London (2012)
6. Bruce, C.S.: Information literacy research and practice: an experiential perspective. In: Kurbanoğlu, S., Grassian, E., Mizrachi, D., Catts, R., Špiranec, S. (eds.) ECIL 2013. CCIS, vol. 397, pp. 11–30. Springer, Heidelberg (2013)
7. Anderson, T.: Kickstarting creativity: supporting the productive faces of uncertainty in information practice. Inf. Res. **15**(4), paper colis 721 (2010). http://InformationR.net/ir/15-4/colis721.html
8. Anderson, T.: Information science and the 21st century information practices: creatively engaging with information. In: Bawden, D., Robinson, L. (eds.) Introduction to Information Science, pp. 15–17. Facet, London (2012)
9. Anderson, T.: The 4Ps of innovation culture: conceptions of creatively engaging with information. Inf. Res. **18**(3), paper C28 (2013). http://InformationR.net/ir/18-3/colis/paperC28.html

10. Cole, C., Leide, J.E.: A cognitive framework for human information behavior: the place of metaphor in human information organizing behavior. In: Spink, A., Cole, C. (eds.) New Directions in Human Information Behavior, pp. 171–202. Springer, Amsterdam (2005)
11. Sturges, P., Gastinger, A.: The information literate brain. In: Kurbanoğlu, S., Grassian, E., Mizrachi, D., Catts, R., Špiranec, S. (eds.) ECIL 2013. CCIS, vol. 397, pp. 31–40. Springer, Heidelberg (2013)
12. ACRL 2015. Framework for Information Literacy for Higher Education (2015). http://www.ala.org/acrl/standards/ilframework#authority
13. Spink, A.: Information Behavior: An Evolutionary Instinct. Springer, Heidelberg (2010)
14. Savolainen, R.: Everyday Information Practices: A Social Phenomenological Perspective. Scarecrow, Lanham (2008)
15. Palmer, J.: Scientists and information: 1. using cluster analysis to identify information style. J. Doc. **47**, 105–129 (1991)
16. Heinström, J.: Fast surfing for availability or deep diving into quality - motivation and information seeking among middle and high school students. Inf. Res. **11**(4), paper 265 (2006). http://InformationR.net/ir/11-4/paper265.html
17. Limberg, L.: Experiencing information seeking and learning: a study of the interaction between two phenomena. Inf. Res. **5**(1) (1999)
18. Lupton, M.: Information Literacy and Learning. Ph.D. Thesis. Queensland University of Technology, Faculty of Information Technology (2008)
19. Steinerová, J.: Information horizons mapping for information literacy development. In: Kurbanoğlu, S., Špiranec, S., Grassian, E., Mizrachi, D., Catts, R. (eds.) ECIL 2014. CCIS, vol. 492, pp. 70–80. Springer, Heidelberg (2014)
20. Lloyd, A.: Recasting information literacy as sociocultural practice: implications for library and information researchers. Inf. Res. **12**(4), Paper colis 34 (2007). http://InformationR.net/ir/12-4/colis34.html
21. Björneborn, L.: Serendipity dimensions and users' information behaviour in the physical library interface. Inf. Res. **13**(1), paper 370 (2008). http://InformationR.net/ir/13-4
22. Steinerová, J., Grešková, M., Ilavská, J.: Informačné Stratégie v Elektronickom Prostredí. Univerzita Komenského, Bratislava (2010)
23. Steinerová et al.: Informačná Ekológia Akademického Informačného Prostredia. UK, Bratislava (2012)
24. Steinerová, J.: Ecological information interactions for digital libraries. In: Návrat, P., Bieliková, M., Laclavík, M., Paralič, J., Steinerová, J. Cognitive Traveling in Digital Space of the Web and Digital Libraries. Yield of the Interdisciplinary Multi-Partner Project TraDiCe, pp. 158–169. STU, Bratislava (2014)
25. Kropajová, M.: Informačná Tvorivosť v Elektronickom Prostredí/Information Creativity in the Electronic Environment. Ph.D. Thesis. FiFUK, Bratislava (2014)
26. Kurbanoğlu, S., Boustany, J.: From green libraries to green information literacy. In: Kurbanoğlu, S., Špiranec, S., Grassian, E., Mizrachi, D., Catts, R. (eds.) ECIL 2014. CCIS, vol. 492, pp. 47–58. Springer, Heidelberg (2014)
27. Lloyd, A.: Building information resilient workers: the critical ground of workplace information literacy. what have we learnt? In: Kurbanoğlu, S., Grassian, E., Mizrachi, D., Catts, R., Špiranec, S. (eds.) ECIL 2013. CCIS, vol. 397, pp. 219–228. Springer, Heidelberg (2013)

# Organizational Knowledge Sharing, Information Literacy and Sustainability: Two Case Studies from Local Government

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**Abstract.** Sustainability goals are at the center of a range of local government initiatives in Australia. Such initiatives are often developed in response to community needs and to the broader needs of urban greening. This study takes a sociocultural approach to two such initiatives, one involving intra-organizational and the other inter-organizational knowledge sharing and applies a framework of information literacy activities to the analysis of participant's knowledge sharing experiences. This framework was supported by the findings though *Influencing* and *Sharing* were more prominent than *Information work* and *Coupling* activities. *Sharing* activities became the norm in the study, underpinned by the expectation that the expertise of participants would be validated and incorporated into the collaborative endeavor. Expression of emotion was minimal when the normative nature of this activity was highlighted however emotions were experienced when the norm was not being followed and when participants believed that their contribution was not being validated.

**Keywords:** Knowledge sharing · Information sharing · Emotion · Practice theory · Sustainability · Information literacy · Biodiversity

## 1 Introduction

Increasing pressure on national, state and local governments to improve environmental, social and economic sustainability has necessitated reviews of long-held organizational practices as well as attempts to identify more sustainable solutions to organizational and community issues. Local and state governments in Australia have developed a range of initiatives aimed at enhancing sustainability that involve both intra-organizational and inter-organizational collaboration and knowledge sharing. Such initiatives are often customized for, and arise from, the unique characteristics of the local government organization in which they develop, as well as to the social and environmental characteristics of the local community.

This study investigates two Australian local government initiatives that have several features in common. First, both have arisen from the specific demands and characteristics of their local context or 'place'. Second, both represent organizational responses to increasing demand for greater environmental, social and economic sustainability.


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Thirdly, both initiatives demand a high degree of co-operation, collaboration and information and knowledge sharing on the part of their organizational participants. While the focus of the investigation is organizational knowledge sharing practices, the theoretical framework adopted encompasses a broader concept, that of information literacy [1], of which information or knowledge sharing is a central activity. In addition, while the investigation into both initiatives focuses on participant reported experience, and thus reveals the cognitive aspects of the sharing experience, it also sheds light on the more affective and emotional aspects of the participant knowledge sharing experiences.

## 2 Review of Recent Literature

Place-based planning, introduced in Warringah, New South Wales, as an experiment at the beginning of the twenty-first century, views places as social constructs, and this means that different perspectives, interests and expertise need to be brought together through innovative processes in the workings of local councils [2]. These processes must foster cultures that are well informed, well integrated and nimble, favoring collaborative approaches in the development of new ways of working and new ways of communicating [3]. An important aspect of this new way of working is the move away from traditional "professional silos" [4] to integrated and outcome-focused teams. The establishment of a common group identity is important in collaborative working processes [5], whether among and between experts and laypersons or among people working in so-called professional silos.

Knowledge sharing is seen as fundamental to initiatives in organisations working towards sustainability [6] and the development of knowledge in a collaborative context is essential for understanding issues and modifying practices [7]. Craig and Allen [8] similarly noted that sustainability champions with the knowledge, skills and influence to promote changes were critical to the success of innovation. Studies of knowledge sharing in sustainable development tend to focus on the mechanisms through which knowledge sharing is achieved and the boundary spanning and facilitating processes through which specific expertise can be incorporated into a policy-making process [9].

The theoretical approach taken in this study is that of practice theory which emphasises the importance of context in social life as opposed to an individual's mental states, as well as the importance of 'sayings, doings and tasks' [10]. Gherardi [11] summarises that a working practice is a collective activity undertaken in a particular place at a particular time which assumes all the variability connected with the context that encloses it and makes it possible [11, p. 202].

Information or knowledge sharing activities may be seen as practices in themselves and/or components of larger practices such as information literacy. Indeed, knowledge sharing practices have been seen as central to the concept of information literacy, the meaning of which, as Limberg et al. [12] acknowledge, varies according to the theoretical lens from which it is approached. In a theoretical paper examining the concept of information literacy, Lloyd [1] suggests that information literacy is a practice that occurs inside other practices and, as such, the unit of analysis for researchers should not be the information skills themselves, but the sociocultural affordances furnished within a site

that lead to the development of information skills. Lloyd [1] uses 'site ontology', as developed by Schatzki [13, p. 26], to analyze social life that is a social field where coexistence transpires through an ongoing web of interwoven practices and arrangements [13].

Thus, as Lloyd [1] suggests, practices are not individual activities but are formed, interwoven and sanctioned through an intra-group discursive process that may include educational, workplace or religious discourse. In this context, 'information literacy' is defined as the ability to define, locate, access and manage information; to use and present information ethically; to employ effective information seeking skills and information behaviors; and to think about information critically' [1]. In particular, information literacy activities, described by Lloyd [1], include:

- *Influencing:* Advocacy or negotiation and sharing of collective organizational meaning - convincing, engaging, attempting to change colleagues opinions and practices
- *Information Work:* Work aimed at production and reproduction of collective organizational knowledge- description and/or demonstration of expert work practices for colleagues
- *Sharing:* Sharing professional/disciplinary expertise or knowledge/information on rules and 'ways of working'
- *Coupling:* Facilitating awareness of where information/knowledge is and access strategies to get it, i.e., connecting people with information.

This paper takes a sociocultural approach and investigates the applicability of Lloyd's [1] four activities of information literacy practice to multi-disciplinary team environments in local government in Australia. In addition, given Schatzki's contention that practices are not only constituted by 'how to do things' and by rules, but also by teleo-affective features which structure emotions that are acceptable or prescribed for the participant in practice [14] the study also considers the emotional elements of knowledge sharing practices. Recently, Savolainen [15] found that positive emotions are more likely to be embedded in comments agreeing with ideas presented before while negative emotions are particularly characteristics of invective and provocation. The present study also investigates how emotion and affect are expressed in knowledge sharing activities and, more broadly, the practices of information literacy.

## 3 Methodology

This investigation focuses on two sustainability initiatives coordinated by local councils in Australia. Each initiative involved the engagement of multi-disciplinary project teams, which include members from disciplines as diverse as engineering, sustainability, and community services. In each, participants were identified by the project manager as champions of sustainability and invited to participate in the project.

The first initiative is concerned with intra-agency knowledge sharing and the second with inter-agency knowledge sharing. The first initiative is set in the context of a single local government authority (council), and is based on the practices of a multidisciplinary

project team formed by the council's management to seek to transform the policy, planning and work practices from a very traditional structure and approach to more sustainable, place-based work practices. The project team, known here as the Verdana Sustainability Project Team (VSPT), seeks to create a more collaborative, cooperative and sustainable approach to the organization's operations. The second initiative concerns a project team composed of representatives from several local government authorities (councils). This project is funded by a State government grant allocated to improve biodiversity, including management of both flora and fauna, along a river catchment corridor and is driven by a team known here as the Garamond River Biodiversity Project Team (GRBPT). The project is coordinated by a project manager/consultant who is hosted by Garamond Council and funded from the grant. The project manager's role is to co-ordinate representatives from the twelve participating councils to implement a range of measures to improve biodiversity across the river catchment area. Approval to use each project team's operations in this research was granted by the project managers of each of the initiatives and data were collected from each project in similar ways between June 2014 and May 2015. One researcher attended project meetings and audio-recording discussions and held one to one guided conversations based on an approach outlined by Siedman [16] with project team members describing a single experience of knowledge sharing drawn from the previous week. Altogether, eight meetings of the Verdana project and two of the Garamond project were attended, observed and recorded; and sixteen members of the Verdana team and five members of the Garamond team were engaged in individual guided conversations with the researcher.

All recorded meetings and conversations were transcribed verbatim and subsequently analyzed. In the first instance, examples of Lloyd's four information literacy activities were identified, using her indicators for each activity. Secondly, expressions of emotion were identified from the transcripts. Thirdly, the context for each of these expressions of emotion was identified and linked back to one of four of Lloyd's [1] information literacy activities (Table 1).

## 4 Findings

### 4.1 Primary Information Literacy Activities

The investigation found that all four of Lloyd's information literacy activities were described in some way by twenty of the twenty-one participants in their experiential accounts of knowledge sharing. One participant described only three of the four activities in their account.

The following table indicates the number of participants identifying each of the four activities as Primary (predominant) and Secondary (important but not the main activity) in their knowledge sharing practice. The practice of knowledge sharing, as presented by the majority of this study's participants in their description of a recent knowledge sharing experience, closely resembles what Lloyd [1] contends as information literacy practice, in that it comprises all four of her information literacy activities.

**Table 1.** Participant's primary and secondary sharing activities according to Lloyd's [1] information literacy framework activities.

| | Influencing activity | Sharing activity | Information work activity | Coupling activity |
|---|---|---|---|---|
| Primary (predominant) activity | 8 | 10 | 3 | – |
| Secondary activity | 6 | 5 | 6 | 4 |

Results of the study indicate that *Sharing* activity, that is, sharing professional and/or disciplinary expertise on rules and ways of working, was the most common primary activity. Ten out of twenty-one participants described a primary knowledge sharing activity that most closely resembled *Sharing*. The second most common activity was *Influencing,* that is, convincing, engaging or attempting to change colleagues opinions or practices. Eight out of twenty-one participants described a primary knowledge sharing activity that most closely resembled *Influencing* activity.

The less important activities in the study proved to be *Information Work* and *Coupling*, the former describing an activity aimed at producing or reproducing organizational knowledge and the latter an activity aimed at connecting people with material, non-human information objects such as documents or recorded data. Only three out of twenty-one described a primary knowledge sharing activity that most closely resembled *Information Work* as described by Lloyd [1]. No participants in the study described a primary knowledge sharing activity that resembled *Coupling.*

As outlined in Sect. 3, further analysis was undertaken to identify emotions or affect mentioned by the participants in their descriptions of their knowledge sharing experiences. Emotions associated with participants' primary knowledge sharing activity were recorded and categorized as positive, negative or 'none reported'. Emotions such as happiness, passion or inspiration were recorded as positive emotions while feelings of anger, frustration or sadness were considered negative emotions.

### 4.2 Emotions Associated with *Influencing*

Emotions associated with *Influencing* appeared to arise when participants felt they had either triumphed in some way, that is, were successful in their influencing activity, or when they felt they had not been heard, or had been ignored and did not achieve their desired result. All eight participants whose primary activity was categorized as Influencing described some form of emotion associated with their knowledge sharing experience. Six participants described positive emotions and two more negative emotions.

An example of a positive emotion associated with influencing activity was that of 'FG', who reported, *'…it was like we had been through a marathon and everyone went: Oh! That's fantastic!!! Everyone said: Oh FG, that's SO exciting and [Colleague x] was beaming his head off!'.* An example of a negative emotion associated with influencing was reported by 'JK', who felt she had failed to influence her colleagues as she had intended and her knowledge had not been validated. She reported, *'…I didn't get the*

*level of response that I would have hoped'* and *'I was disappointed with the whole conversation when I came out of the meeting'.*

### 4.3 Emotions Associated with *Information Work*

All three participants whose primary activity was categorized as *Information Work* also described some form of emotion associated with their knowledge sharing experience. However, unlike with *Influencing*, all three described negative emotions.

For example, the participant identified as 'IJ' reported, *'There were feelings of frustration, there were feelings of anger, there were feelings to our manager like: Well, have you TOLD him about that? We needed confirmation that he, in discussions with the Director, had represented us and our staff concerns…and that he was aware of the personal and operational issues arising from his decision'.*

Likewise with 'AB' who, although satisfied with the overall outcome of the experience, expressed anger and frustration that attendees arrived late and did not demonstrate the appropriate level of engagement required from the organization. She reported, *'They were all twenty minutes late! … that's where my agenda diverted because I had to quickly back-track to what we had already covered…and they just wanted to get some quick answers instead of going through the full agenda!'*

### 4.4 Emotions Associated with *Sharing*

Emotion was less likely to be expressed by those whose primary activity was categorized as *Sharing*. Indeed, five of the ten participants did not report any emotion or affect associated with their knowledge sharing experience.

Of the five participants describing some emotion with *Sharing* activity, three described a general, low-level contentment that the collaborative experience had been positive, while the other two described stronger emotions associated with responding to an external threat or demand. An example of the former was the participant identified as 'OP' who reported, *'…I was pleased and excited that they both understood the [traffic project] principles' and 'I thought they were excited by what was being done and I was also relieved 'cause…I have got quite an ethic that, whatever I do, I like doing well'.*

While their primary activity was *Sharing*, the latter two participants described emotions related more to their ability to successfully convince, or influence, attendees to take a particular course of action due to an external threat or demand. For example, the participant identified as 'NO' described emotions in response to needing to compile a convincing response to an external organization seeking to build an unwelcome road in the area. He reported, *'… there was so much passion behind their questions … like: 10,000 vehicles on that tiny road?…It's absolute madness!…'.*

### 4.5 Other Expressions of Emotion

A further finding was that negative emotions tended to arise if there was a general consensus that a particular activity was to be undertaken, but an attendee sought to engage in an alternate activity. For example, in the case of the participant identified here

as 'CD', feelings of frustration were expressed about a clash between organizational requirements and expression of expertise. 'CD' was seeking to focus discussion on organizational requirements, or undertaking *Information Work,* in a context where other staff attendees had expectations of undertaking *Sharing* activity. He reported, *'I am doubtful…I feel a bit scared that this whole sign-off process may not happen until December…I can't break policies…I am not going to cut corners for that. Can't be grey, it's got to be black and white'.*

## 5 Discussion

The context of both case studies demonstrated that decision-makers in the local government areas were aware of the importance of having sustainability champions involved in the projects. All four of Lloyd's information literacy activities: *Influencing*, *Information Work*, *Sharing*, and *Coupling* were found indicating that the ideals of working toward environmental sustainability [6, 7] were also being met. All but one participant engaged in all four activities, with two categories of activity being less prominent than the other two. *Coupling*, the activity of facilitating awareness of what information exists and how resources may be accessed, is the key feature of other studies concerned with the ways in which people learn and collaborate in multi-site studies. Yet here, it was not found to be the primary information activity of any of the participants and a secondary activity for only four.

Given the strength of the emphasis on the activity of *Sharing*, it was perhaps surprising that *Information Work*, the type of activity that leads to the development of collective organisational knowledge was also rarely found in the knowledge sharing practices of the participants in these two case studies. This does not mean that progress was not made towards the completion of the projects under discussion. Rather, it seems that the projects could be completed without the production of collective organisational knowledge. In other words, they required collaboration that included the validation or authorisation of the expertise of others, rather than the creation of a single organizational perspective on knowledge. This seems to suggest that the focus on the development of collective knowledge [6] where participants are each expected to adapt their own knowledge base to accommodate the expertise of others, may be inappropriate in this context and the expectation that individuals will validate the expertise of others so that it can be used alongside their own may be a more suitable model.

Without exception, participants who expressed negative emotions such as frustration or anger across the three primary activities of *Influencing, Sharing* and *Information Work* were all concerned about a failure to achieve professional or personal validation of their opinion or view, expertise or organization-related goal. This suggests that the dynamics of power are operating where participants feel their knowledge, expertise, status or authority are being questioned and challenged, or worse ignored.

Conversely, participants expressed positive emotions such as happiness and satisfaction when their *Influencing, Sharing* and *Information Work* activities were validated, accepted and integrated into their team's collaborative process. In these collaborative processes, it appears that it was this information activity of *Sharing* that was the almost taken for granted activity, the one that participants expected that they would be taking

part in when they were nominated to join the multi-disciplinary teams. Negative emotions, again, would signal issues arising from the collaborative process of completing the project.

Expressions of emotion, then, can be seen not only as expressions of personal feelings but also as expressions of the result of power plays within the collaborative process, instances where a participant felt that insufficient attention had been paid to his or her potential contribution to the collaborative endeavour.

## 6 Conclusion

Practice theory has proved a useful approach to this investigation in that it acknowledges the central importance of context or place in social life. The emphasis, in practice theory, on 'doings and sayings and tasks' [10, p. 73], as well as teleo-affective structures, is also appropriate for investigating activities and practices such as knowledge sharing, information literacy, interactions between inter-disciplinary team members and associated emotions.

Lloyd's [1] sociocultural approach to information literacy and her associated activity framework has also proved a useful and nuanced lens through which to analyze the specific activities of collaborative, multi-disciplinary teams, involved in place-based planning.

In a team made up of champions of sustainability, it appears that Lloyd's activity category of *Sharing* becomes the norm, underpinned by the expectation that the expertise of individual members will be validated by the group and incorporated into the collaborative endeavor. The normative nature of this activity is highlighted when expressions of emotion are taken into account. When *Sharing* is happening - the activity that people have agreed to take part in - there is little or no expression of emotion. Rather, emotions are experienced when the norm is not being followed, when participants believe that their contribution is not being validated, in which case they move to *Influencing* or, when they sense that another participant has moved from the normative behavior of *Sharing* to either *Influencing* or to *Information Work.*

These two insights into knowledge sharing in two multi-disciplinary teams of sustainability champions suggest the need for further research in teams engaged in sustainable development in other settings, to explore their practices and investigate the ways in which expressions of emotion shed light on those practices.

## References

1. Lloyd, A.: Framing information literacy as information practice: site ontology and practice theory. J. Doc. **66**(2), 245–258 (2010)
2. Untaru, S.: Place-based planning for NSW local government; the Warringah local environmental plan 2000. Aust. Planner **39**(2), 83–89 (2002)
3. Healey, P.: Building institutional capacity through collaborative approaches to urban planning. Environ. Plan. A. **30**, 1531–1546 (1998)
4. Mant, J.: Place management as a core role in government. J. Place Manage. Dev. **1**, 100–108 (2008)

5. Cheng, A., Daniels, S.: Examining the interaction between geographic scale and ways of knowing in ecosystem management: a case study of place-based collaborative planning. For. Sci. **49**(6), 841–854 (2003)
6. Cundill, G.: Monitoring social learning processes in adaptive co-management: three case studies from South Africa. Ecol. Soc. **15**, 28–47 (2010)
7. Blackmore, C.: What kinds of knowledge, knowing and learning are required for addressing resource dilemmas? a theoretical overview. Environ. Sci. Policy **10**, 512–525 (2007)
8. Craig, C., Allen, M.: Sustainability information sources: employee knowledge, perceptions and learning. J. Commun. Manage. **17**(4), 292–307 (2013)
9. Van Der Meer, R., Torlina, L., Mustard, J.: Inter-organisational knowledge sharing in regional sustainable development communities. Int. J. Inf. Technol. Manage. **12**(3–4), 252–272 (2013)
10. Schatzki, T.: The Site of the Social: A Philosophical Account of the Constitution of Social Life and Change. Pennsylvania University Press, Pennsylvania (2002)
11. Gherardi, S.: How to Conduct a Practice-Based Study: Problems and Methods. Edward Elgar, Cheltenham (2012)
12. Limberg, L., Sundin, O., Talja, S.: Three theoretical perspectives on information literacy. Hum. IT J. Inf. Technol. Stud. Hum. Sci. **11**(2), 93–130 (2012)
13. Schatzki, T.: The social bearing of nature. Inquiry **43**, 21–38 (2000)
14. Schatzki, T.: On organizations as they happen. Organ. Stud. **27**(12), 1863–1873 (2006)
15. Savolainen, R. Expressing emotions in information sharing: a study of online discussion about immigration. Inf. Res. **20**(1), paper 662 (2015)
16. Siedman, I.: Interviewing as Qualitative Research: A Guide for Researchers in Education and the Social Sciences. Teachers College Press, New York (2013)

# Smart and Sustainable Library: Information Literacy Hub of a New City

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**Abstract.** Our paper presents a proposition for the new approach to the role of library in a sustainable city. An in-depth literary review on smart library concept is presented along the comparative insight into contemporary smart city and sustainable city literature. Based on these findings a proposition is depicted for smart and sustainable library as a central public institution of a sustainable smart city. Several library services of the new generation based on cutting edge technologies and user participation are proposed. The claim is made that sustainable library is to be an integral part of a sustainable city making not just an-other useful urban addition providing for some of the various smart and sustain-able services of the new city, but a central hub that carter for constant upgrade of information literacy of its users allowing for innovativeness and creativity of citizens of sustainable cities to come to the fore.

**Keywords:** Smart library · Sustainable library · Smart city · Sustainable city · Information literacy

## 1 Introduction

Technological, social, and economic complexities of a smart and sustainable city lead to changing prerequisites for information literacy of its citizens. Reliance on ubiquitous technology in a sustainable city means that its citizens need to update their knowledge of technology use very frequently. Effective information literacy in a sustainable city emerges as a complex and changing framework with fragmented knowledge levels and skills needed for use of even the same technology in different use scenarios. Publicly funded libraries are the natural venues that may alleviate the problem of constant need for updating of technology based know-how in everyday life situations by providing access to novel technologies and, more importantly, knowledge and skills for its use. A participatory library focusing its services on peer learning and in-group help in grasping first hand experiences of new technology use in specific urban development scenarios of a sustainable city may add significant value for its users and transform the library into the most praised public institution providing services that are sought for and supported.

The role of a library in a new city has not been defined properly. In this paper we advocate for a new approach to the role of a library in a smart city and for the new generation of library services that are integrated with the city infrastructure and are using it to enhance information literacy across the city. Based on the literary review on the


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smart library concept and a comparative insight into contemporary smart city and sustainable city literature, we depict a proposition for a new role of the library in a city that has changed and become smart and more sustainable. We propose a focus on information literacy in the new library services. These services have the potential of transforming the library into the information literacy hub of a smart city where new technologies can be experimented with and new concepts related to technology grasped.

## 2 Smart Library Concept

Literature on the smart library concept has been growing in size lately as the smart city concept gained prominence and smartness related to information and communication technologies (ICT) become popular in many areas of human endeavor. The adjective, "smart," is related to the environment described. Various propositions for a smart library and smart library services were given as early as 1993 [1]. This trend persisted into late nineties and early 2000s [2–4]. In the mid 2000s, there were some propositions regarding the smart library that never gained much prominence or scope in the literature, such as the one for use of Artificial Neural Networks in libraries to make them smart [5]. But it was not until late 2000s that smart library propositions matched the trends that are still prevailing today. One early proposition of this type regarded use of radio-frequency identification (RFID) technology in conjunction with mobile telephony in libraries [6]. This trend was extended with several papers analyzing the possibilities RFID provided for making a library smarter [7–11] with several papers focusing on the specific field of RFID enabled smart library shelves [12, 13]. The Internet of things (IoT) as a dominant trend in contemporary ICT development and was the basis of several propositions for a smart library [14, 15]. A range of papers proposed use of different cutting edge technologies or concepts in smart libraries, such as cloud computing [16, 17], 3D virtual world enabled by APEX [18], software as a service [19] and big data [20]. Although some attempts have been made to give a larger picture of development of smart libraries [21], generally propositions for smart libraries so far have been based primarily on particular use of technologies and lacked broader conceptualizing of smart library role.

In order to avoid any confusion regarding terminology, we will provide here a short review of green or sustainable library concepts. Many papers dealing with library sustainability refer to building sustainability and green aspects of library buildings [22–25]. When sustainable or green library building is referenced it is usually referring "to the broad definition that developing a green building is the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle from site selection to design, construction, operation, maintenance, renovation and deconstruction (http://www.epa.gov/greenbuilding/pubs/about.ht)" as in [23]. Also, sustainable or green library services have been referenced in the past in regards to economic, social, or ecological long term viability of these services. This was usually presented either dominantly in conjunction with library building sustainability [24, 25]. Sustainable library services have been the main focus of the analysis [26, 27].

## 3 Smart Sustainable Cities

As stated by Neirotti et al. [28, p. 25], a "shared definition of SC (Smart City) is not available and it is hard to identify common global trends." The same authors propose that smart cities can be analyzed along the lines of their major features such as natural resources and energy, transport and mobility, buildings, living, government, and economy and people. The importance of cities in our age is not questionable as well as the fact that cities of today and of tomorrow do not resemble those of the past. As "new generation of cities and a new city-planning paradigm are emerging: knowledge-intensive, innovative, and intelligent cities," they are "driving and being driven by the above global changes (globalization, urbanization, and climate change)" [29, p. 1].

The concept of the smart city has been evolving intensely since the Internet of Things gained momentum as a major discourse in technology development [30]. Emphasis is increasingly shifting from Internet based infrastructure of a city towards services that make the city sustainable [31]. It would be impracticable, even impossible, to give a complete literature review of the smart city in a paper of this size. Therefore our focus will be on service related aspects and sustainability features of a smart city that relate to the new role of a library in it.

Along with cities and its citizens, services offered and consumed in cities are also changing. These changes include "unbundling services from production processes, growth of the information-rich economy and society, the search for creativity in service production and consumption and continuing growth of digital technologies" [32, p. 323]. One can conclude that creativity and innovativeness are paramount for services and a more broad economy in a smart city. These in turn can be set loose only through use of digital technologies building on the information rich soil of a smart city. In such an environment emerge "cities with smooth information processes, facilitation of creativity and innovativeness, and smart and sustainable solutions promoted through service platforms" [32, p. 323]. Conclusions regarding importance of achieving wide ranging effective information literacy among citizens for building sustainable economy and solid society basis are easily anticipated. Further, importance of information for all kinds of services, inter dependant and building on top of information provided to each other, grows exponentially as novel services emerge almost daily in smart cities. These services are provided mostly by "ubiquitous and secure applications in many domains, such as, e-government and public administration, intelligent transportation systems, public safety, social, health-care, educational, building and urban planning, environmental, and energy and water management applications" [33, p. 169]. Some of the examples of smart city services are "the navigation assistance, the signaling of an urban accident aimed at improving the public safety, the reservation of a medical examination, the remote assistance of patients, and the management of waste in a city" [33, p. 169]. One can conclude easily about the importance of information for providing these services but also about importance of information literacy for their consumption and even more their design and implementation on a daily basis. On another level, the ability to receive, interpret, and act upon information becomes even more important in a smart city. As Gabrys defines [34, p. 38], "…biopolitics 2.0…that unfold through many smart-city proposals (is) expressive of…operations of citizenship within programmed environments and

technologies. A biopolitics 2.0…involves the programming of environments and citizens for responsiveness and efficiency," If a citizen is not able to use effectively the technology that is changing rapidly and is omnipresent in all spaces of a smart city around the clock and in all urban human endeavors, he/she will not be a full fledged citizen although having the rights of one.

A sustainable city concept is easy to relate to the environment and sustainability of city growth and development in terms of its physical surroundings. The science of ecology plays an important role when one is deliberating about the sustainable city concept [35]. City smartness is considered to be a major chance to increase its sustainability in terms of technical solutions providing for more efficient functioning e.g. in area of energy consumption [36]. Planning of urban infrastructure is important for achieving high levels of efficiency in performing city functions. Understanding of the past planning processes is noted as one of important inputs into the successful planning process today [37]. One can conclude that sustainability, perhaps the one most important single aspect of a smart city, can be achieved and pursued only by having in mind and including the previous history of a city, including its culture heritage [38]. Finally, long term sustainability of smart cities depends on viable strategies and policies that can be achieved only through "the active participation of citizens in assessing the Public Value of policy decisions and their sustainability over time" [39], making the technology use that allow for effective participation key to sustainability of a smart city. Technological savvy and deep understanding of culture history and culture development of a city become foundations for building smart, sustainable cities based on services that dynamically change to accommodate novel needs of individual citizens and urban communities, but also rely on citizen participation as an invaluable source of data for an efficient service [40].

It is important to note that interaction between services and its users in the smart city or in a smart environment as defined in [41, p. 177] consists of "a sequence of actions that involve users, mobiquitous services, interaction resources, environmental context items, and information exchanges between the user and the mobiquitous service," where mobiquitous depicts the strategic convergence of mobile and ubiquitous technologies. Same authors also state that "the human interaction with mobiquitous services (are) more crucial and more challenging as compared with the classical human–computer interaction". A conclusion about the importance and complexity of ICT based services in a smart city is evident. The bottom line is that in the root of smart city is still ICT. Also we need to note that "through automation, dematerialization, persuasion and soft transformation ICT holds the potential of making urban life more sustainable" [42, p. 299]. And further "ubiquitous introduction of ICT for sustainability may also influence the spatial and institutional organization of the city… there is little research on ICT for sustainable cities from the perspective of planning and governance" [42]. Thus, no wonder that no special planning of ICT use in libraries of a smart city was present so far. In [42, p. 299] a solution to this situation is proposed as "what actor networks are needed to implement the ICT solutions and how these can be managed." We propose a similar solution in this paper for smart library services. This will be done having in mind that "despite extensive research on cities' successful transformation into smart cities, a gap exists on how these cities' services shift toward smart services and on the

methodology that the cities follow in transforming these services" [43, p. 1414]. It is also worth noting that deliberations on the new library role in a smart city and new library services will be based upon the framework of building a smart city on top of IoT structure as described in [44, p. 112] encompassing "the complete urban information system, from the sensory level and networking support structure through to data management and Cloud based integration of respective systems and services."

## 4 A Proposition for a Smart Sustainable Library in a Smart City

Libraries have always been considered important for city development. This especially holds true since the emergence of smart cities. We can find an inspiring relation in [45, p. 16] on the importance of a library for the smart city: "Just like the small coffee shop in Alaska, the smart library will serve as a knowledge broker engaged in locating qualified sources of critical knowledge to solve a particular problem." One could add that such services may function effectively only in a participatory environment where librarians and library services are facilitators in finding critical knowledge needed among other citizens and library users. As early as 2000, some public librarians deliberated on their role in building a smart city by "redefining its role to underpin the creation of Brisbane as a smart city" [46, p. 166]. This does not come in line with contemporary discourses regarding smartness but it still is important as an overarching idea and concept proclaiming the need for new library services and new library roles in a city that is changing. For changes in libraries the role of librarians has been correctly identified as important and they have even been designated with the title of smart librarians in [47].

Libraries have been places where data have been selected for preservation and organized and where information was created when data and user met. In a smart city, ubiquitous ICT create huge amount of data that is stored within different infrastructure systems. Most important, data in a smart city becomes knowledge and specifically knowledge on how things work, e.g. how ICT related systems work. This becomes crucial for mere access to these systems but also as a basic ground for building new systems. The new role of the library as a preserver and presenter of knowledge becomes the one related to ICT where human interaction can unlock the knowledge in direct user communication. The library services become facilitating grounds equipped with ICT possibilities and frameworks that foster human contact and collaboration.

## 5 New Library Services

We will present ideas for three types of distinctive new library services in general, along with underlying principles, having in mind a multitude of possibilities for specific services oriented towards specific goals and user groups based on these service types. For the sake of improved clarity, we will also present a rough description of possible service examples in each category.

One kind of new library services is built upon access to specific city services that not all users can access privately, for reasons both of economy (and thus physical/virtual access to the service) and ICT savvy. If the library provides access to such services in

the library physical/virtual space and in such an environment that fosters collaborative use of the service within groups of users, both gaps for service use will be bridged. The first subcategory of such a service relates to those services not available to all citizens due to reasons of economy. An example of such a service may be new kind of a service for providing online entertainment materials (video, 3D, or hologram, for example). Access to such a service may be based on relatively expensive monthly/yearly subscription that may not be available to all citizens but is comparatively more available to an institution such as library. Such a new service may entail new features and functions that, if successful, may soon spread to other services and become part of a more general digital discourse, thus becoming the part of information literacy. If such a service is available in the library, it may be put to use through library services in two ways. Firstly, librarians may provide basic training to users on how to use this new service. More importantly, librarians may provide an attractive framework in which users are challenged to play with the new service themselves, helping other users along the way in jointly unlocking materials selected for them by librarians. The other example of such a service may be the one put forth by the library in cases where ICT savvy is the obstacle to accessing some city service. This may be relatively important for some user groups such as elderly citizens or school children. One example that might be provided by the library is to provide a gamified framework revolving around an action-motivation-feedback triangle in which users will be motivated to help other users by small rewards provided by the library. Such rewards might be material or, even more importantly, appropriate intangible rewards and other tools from gamification toolbox.

The other kind of new service in the smart library may be based on the technology that is also used in some other urban infrastructure and in a different scenario. Libraries might make users use technology in the library environment for less complex tasks at first and then advancing into a wider range of complex tasks for advanced library services and with added functionalities that foster collaboration among users. Such a gamification frameworks adds value for users and will, in effect, broaden the scope of their effective information literacy in a smart city. An example of such service in terms of currently available technologies may be the offer young library users an opportunity to play the Angry-birds game on library tablets and thus learn and repeat all kind of swiping moves. If this is complemented in the same service by providing users with the opportunity to complete a useful task, such as correction of text coming from an optical character recognition process in mass digitization, a piece of information literacy puzzle is found. Users who do not have the opportunity to use mobile devices or gain mastery of sweeping moves by themselves now can gain that skill. In time, users of any group, young or old, will learn to appreciate the usefulness of new found information literacy if adequate results come from their activities. Librarians may incorporate entertainment as part of their services in order to provide attractive and interesting challenges to begin with.

Finally, the library may provide types of services that are based on indirect use of technologies in libraries where users would use older technologies in order to grasp the principles of novel ones. This can help users learn without having to bridge too wide a gap that may arise if presented with completely new applications and systems that differ not just physically but also in principles that are driving them. These services may be based on attractiveness of older technologies to users that may be explained in more

detail by looking deeper at motivational structures of each library user group and subgroup. Some people may find it more interesting to drive an old timer vehicle than to be driven in a self-driving vehicle after several hours of the experience of being driven in the boring and slow way of robot-drivers. And driving an old timer may be not just more fun but also provide an insight into how the clutch works and provide users with another layer of mastery in coordinated physical moves. Digital simulators of old timers may be readily available for libraries in near future to provide such a service when driving cars becomes a bit more of a forgotten experience than it is today. In order to provide more examples for this kind of library services one can also turn to legacy ICT technologies providing more opportunity for users to grasp concepts such as compiling of code or using interfaces without graphics that are almost non available today. Putting in use historic pieces of computer equipment may be also fun for some librarians and provide younger users with the opportunities to connect more directly with inner workings of computers and ICT machines. If graphics are removed, at least once in a while, perhaps additional imagination might rise in user. This may help them be more motivated to just become users of new smart city applications and services, but also to be their creators and implementers. While complex relations between presentation, imagination, and cognition needs to be looked into if such services are to be made efficient and meaningful, it seems that such an effort may be worthwhile if a library is to become true information literacy hub of a smart city.

## 6 Conclusions

New library services in the smart and sustainable library that is the central culture institution of a smart city provide for effective and efficient information literacy of its citizens. Such services are participatory and provide access to contemporary ICT systems and technologies on which city systems are built. Citizen participation is crucial because no librarian can get a grip on all aspects of use of fast changing urban technologies needed for access to different city systems and in different scenarios. Librarians become facilitators of communication among users. Instead of being the ones who select data stored in books for preservation and use, librarians become head hunters who select and encourage those users willing to share their knowledge with other users. In the smart library, librarians tap into specific user knowledge in order to provide service for other users.

## References

1. Picekring, W.: Smart library. Datamation **39**(23), 112–120 (1993)
2. Puncerelli, P.: Colorado library gets ‘smart’. Nation’s Cities Weekly **22**(28), 6–13 (1999)
3. Nelson, M.: Buckets: smart objects for digital libraries. Commun. ACM **44**(5), 60–62 (2001)
4. Taylor, C.: Smart library. Time, 162(20) (2003)
5. Buscema, M., Terzi, S., Maurelli, G., Capriotti, M., Carlei, V.: The smart library architecture of an orientation portal. Qual. Quant. **40**(6), 911–933 (2006)
6. Kwok, S.K., Cheung, C.F., Lee, W.B., Tsang, H.C., Tang, M.C.: Development of an RFID-enabled mobile smart library system. Int. J. of Enterp. Netw. Manage. **2**(2), 185–197 (2008)

7. Becker, B.: Get smart: raising the intelligence of DIY library smart objects. Behav. Soc. Sci. Libr. **21**(1), 80–83 (2012)
8. Kushal, K.S., Kadal, H.M., Chetan, S.: Design and implementation of a RFID based prototype SmArt LibrARY (SALARY) system using wireless sensor networks. Advances in Computer Science, Engineering & Applications. Advances in Intelligent Systems and Computing, pp. 499–505. Springer, Heidelberg (2012)
9. Saranya, C., Venkatesh, V.: Enactment of smart library management system exercising ubiquitous computing. Contemp. Eng. Sci. **7**(11), 501–507 (2014)
10. Pui-Yi, L., Yung, K., Yung, E.: A low-cost printed CP patch antenna for RFID smart bookshelf in library. IEEE Trans. Industr. Electron. **57**(5), 1583–1589 (2010)
11. Younis, M.I.: SLMS: a smart library management system based on an RFID technology. Int. J. Reasoning Based Intell. Syst. **4**(4), 186–191 (2012)
12. Markakis, I., Samaras, T., Polycarpou, A.C., Sahalos, J.N.: An RFID-enabled library management system using low-SAR smart bookshelves. In: 2013 International Conference on Electromagnetics in Advanced Applications (ICEAA), pp. 227–230. IEEE (2013)
13. Lang, J., Han, L.: Design of library smart bookshelf based on RFID. Appl. Mech. Mater. **519**, 1368–1374 (2014)
14. Xiaoxia, D., Xiangyang, G., Ruolin, Z., Chaobin, Y.: The design and implementation of the smart library based on the internet of things. Libr. J. 3 (2011)
15. Sun, M.: The research on the development of smart library. Appl. Mech. Mater. **571**(572), 1184–1188 (2014)
16. Min, B.W.: Next-generation library information service-'smart library'. Int. J. Softw. Eng. Appl. **6**(4), 171–193 (2012)
17. Min, B.W., Oh, Y.S.: Evolution of integrated management systems for smart library. Int. J. Contents **8**(4), 12–20 (2012)
18. Abade, T., Gomes, T., Silva, J.L., Campos, J.C.: Design and evaluation of a smart library using the APEX framework. In: Streitz, N., Markopoulos, P. (eds.) DAPI 2014. LNCS, vol. 8530, pp. 307–318. Springer, Heidelberg (2014)
19. Min, B.W.: Improvement of an integrated management system for smart libraries based on SaaS. Int. J. Softw. Eng Appl. **6**(4), 223–245 (2012)
20. Min, B.W.: Improvement of information service system for smart library based on bigdata. Int. J. Appl. Eng. Res. **9**(21), 8713–8722 (2014)
21. Wang, S.: The resource sharing and cooperative development of smart libraries in Asia. J. Libr. Inf. Sci. **82**, 1–12 (2013)
22. Antonelli, M., McCullough, M.: Greening Libraries. Library Juice Press, Los Angeles (2012)
23. Genovese, P., Albanese, P.: Sustainable libraries, sustainable services: a global view. In: IFLA 2011 Conference (2011). http://conference.ifla.org/past-wlic/2011/196-genovese-en.pdf
24. Brodie, M.: Building the sustainable library at macquarie university. Aust. Acad. Res. Libr. **43**(1), 4–16 (2012)
25. Mulford, S.M., Himmel, N.A.: How Green is My Library?. Libraries Unlimited, Santa Barbara (2010)
26. Jankowska, M.A., Marcum, J.W.: Sustainability challenge for academic libraries: planning for the future. Coll. Res. Libr. **71**(2), 160–170 (2010)
27. Miller, K.: Public Libraries Going Green. American Library Association, Chicago (2010)
28. Neirotti, P., De Marco, A., Casgliano, A.C., Mangano, G., Scorrano, F.: Current trends in smart city initiatives: some stylized facts. Cities **38**, 25–36 (2014)
29. Komninos, N.: The Age of Intelligent Cities. Routledge, New York (2014)
30. Albino, V., Berardi, U., Dangelico, R.M.: Smart cities: definitions, dimensions, performance, and initiatives. J. Urban Technol. **22**(1), 3–21 (2015)

31. Höjer, M., Wangel, J.: Smart sustainable cities: definition and challenges. In: Hilty, L.M., Aebischer, B. (eds.) ICT Innovations for Sustainability. Advances in Intelligent Systems and Computing, pp. 333–349. Springer International Publishing, Heidelberg (2015)
32. Anttiroiko, A.V., Valkama, P., Bailey, S.J.: Smart cities in the new service economy: building platforms for smart services. AI Soc. **29**(3), 323–334 (2014)
33. Piro, G., Cianci, I., Grieco, L.A., Boggia, G., Camarda, P.: Information centric services in smart cities. J. Syst. Softw. **88**, 169–188 (2014)
34. Gabrys, J.: Programming environments: environmentality and citizen sensing in the smart city. Environ. Planning D Soc. Space **32**(1), 30–48 (2014)
35. Pickett, S.T.A., Boone, C.G., McGrath, B.P., Cadenasso, M.L., Childers, D.L., Ogden, L.A., McHale, M., Grove, J.M.: Ecological science and transformation to the sustainable city. Cities **32**, S10–S20 (2013)
36. Kramers, A., Höjer, M., Lövehagen, N., Wangel, J.: Smart sustainable cities–exploring ICT solutions for reduced energy use in cities. Environ. Modelling Softw. **56**, 52–62 (2014)
37. Malekpour, S., Brown, R.R., de Haan, F.J.: Strategic planning of urban infrastructure for environmental sustainability: understanding the past to intervene for the future. Cities **46**, 67–75 (2015)
38. Rostami, R., Khoshnava, S. M., Lamit, H.: Heritage contribution in sustainable city. In: IOP Conference Series: Earth and Environmental Science, vol. 18, no. 1, 012086, pp. 1–5. IOP Publishing, Kuching, Sarawak, Malaysia (2014)
39. Castelnovo, W., Misuraca, G., Savoldelli, A.: Citizen's engagement and value co-production in smart and sustainable cities. In: International Conference on Public Policy 2015, Milan, pp. 1–16 (2015)
40. Piderit, R., Flowerday, S., McLean, S.: Motivating citizens to contribute to the smart city: a public safety case study. In: Giaffreda, R., Cagáňová, D., Li, Y., Riggio, R., Voisard, A. (eds.) Internet of Things: IoT Infrastructures. Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering, pp. 131–136. Springer International Publishing, Heidelberg (2014)
41. Volpentesta, A.P.: A framework for human interaction with mobiquitous services in a smart environment. Comput. Hum. Behav. **50**, 177–185 (2015)
42. Kramers, A.: Planning for smart sustainable cities. In: 2nd International Conference on ICT for Sustainability (ICT4S 2014) Proceedings, pp. 299–305. Atlantis Press, Stockholm (2014)
43. Letaifa, S.B.: How to strategize smart cities: revealing the SMART model. J. Bus. Res. **68**(7), 1414–1419 (2015)
44. Jin, J., Gubbi, J., Marusic, S., Palaniswami, M.: An information framework for creating a smart city through internet of things. IEEE Internet Things J. **1**(2), 112–121 (2014)
45. Wheaton, K., Murray, A.: Why smart cities need smart libraries: stories from the alaskan frontier. KM World **21**(4), 16 (2012)
46. Mackenzie, C.: Urban public libraries: helping brisbane to become a smart city. Aust. Publ. Libr. Inf. Serv. **13**(4), 166–169 (2000)
47. Johnson, I.M.: Smart cities, smart libraries, and smart librarians. In: paper presented at 'smart city and library service', 6th Shanghai International Library Forum, Shanghai, China, 18–19 July 2012. http://eprints.rclis.org/20429/

# Information Literacy and Environmental Sustainability Correlation in Using and Communicating Information

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**Abstract.** Information literacy is the discipline that shapes the informational behavior of young students, Master and PhD students. The skills acquired by attending this course can decisively influence thinking and may generate critical thinking for analyzing information. Extending the module designed for achieving Information Literacy standards, we present a module on green practices, green libraries and the implications of using electronic resources on carbon emissions and consumption of electricity. Our premise was that these concepts may help develop sustainable thinking, in addition to critical thinking. In this paper we will focus mainly on the green information literacy aspect, through a study from Transilvania University of Brasov.

**Keywords:** Information literacy · Environment · Sustainability · Green movement · Search strategies

## 1 Introduction

Along with the growing concerns for climate changes and global warming among the general public there comes an awareness of many actions that we used to think of as environmentally neutral but are in fact damaging the environment. Libraries, who used to be custodians of informational sources in the time of printed books and journals, became pilots and information brokers when the digital age arrived and information sources were suddenly readily available. The fifth law of the long standing laws of Librarianship by Dr. Rangnathan states that a 'Library is a growing organism' [1]. Hence, the imperatives of the new information environment required that the competencies of knowledge organization were developed and implemented with creativity or innovation and a sense of entrepreneurship. Academic libraries developed Information Literacy programs for their patrons, enabling them to find and use the information they needed in an ethical way. But they did not think about sustainability.

## 2 Green Libraries, Green Practices

A lot of the work going on in a library can be considered as logistics. As well as the actual movement of printed books and other material both within and without the library


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building, the change in information medium from printed to electronic formats present new logistical challenges. Integrating environmental sustainability performance into logistics management is still a new phenomenon. Recently, Lay and Wong find that "green logistics management reflects ability to conserve resources, reduce waste, improve operational efficiency, and satisfy the social expectation for environmental protection" [2]. Similarly Pazirandeh and Jafari characterize green logistics as that "which is designed not to only be environmentally friendly, but also economically functional" [3].

The literature's key message is that green logistics is minimizing a firm's environmental impact while improving operational efficiency including cost savings and better resource utilization.

Since the 1990s, the literature on library sustainability and environmental concerns has grown and garnered much attention.

Jankovwska's review identifies four major categories of green practices in libraries: (1) Sustainability of scholarship and collections; (2) Green library operations and practices; (3) Green library buildings; and (4) Measuring and improving sustainability [4].

Libraries have the possibility to play a unique role in the green building movement. This is due to the altruistic mission and the public and pedagogical nature of libraries.

A "green" library may be a library in a "green" building; or a sustainable building. This includes careful selection of the site, and using renewable and biodegradable construction materials and products. Further, the library pays close attention to conservation of resources (water, energy, paper), and responsible waste disposal (recycling, for example). This is done with a view to minimize negative impact on the natural environment, as well as maximize indoor environmental quality, and is applicable both in new constructions and library renovation [5].

There is growing concern about a variety of factors that may threaten the sustainability of academic libraries: developing and preserving print and digital collections; supplying and supporting rapidly changing technological and networking infrastructure; providing free services; maintaining growing costs of library buildings; and lowering libraries' ecological footprint [4]. The total amount of "e-waste" generation in libraries and archives increase as results of digital preservation activities and changes in technology [6].

Traditionally, libraries consume large quantities of energy for user services and comfort, content creation and preservation. They produce considerable waste, particularly in energy, water, computer paper, and used electronic equipment [6].

In their conceptual paper Kurbanoglu and Boustany divide the way libraries may be green into several subsets: green buildings; green operations and practices; green programs and services; green information systems; green collections and collection development; and green information literacy. The authors of this paper were inspired by Kurbanoglu and Boustany's claims about the benefits of green information literacy, and decided to test the principles on a group of students at Transilvania University of Brasov, Romania [7].

## 3 Qualitative Research on Green Practices and Information Literacy

In this paper we will take our starting point in green information literacy. Given the aspects highlighted in literature, we started from the H0 statistical hypothesis: there is a strong correlation between the ability to search, use ethically and communicate information, and the development of a sustainable thinking, which is green practice behavior.

To investigate this, we made a survey of students' attitudes. The surveyed population was the community of undergraduate students, masters and PhD students of the Faculty of Product Design and Environment, the study programs of Mechatronics, Optometry and Medical Engineering at Transilvania University of Brasov, Romania, in total 482 students for whom the concepts of green library, green informational system and green practices were presented.

### 3.1 Collecting Data Preparation

In the normal run of an Information Literacy course, the students from the Faculty of Product Design and Environment were provided with the following notions concerning the impact of internet and accessing information on the environment:

- Information systems and services are widely using ICT (information and communication technologies,) and the increasing use of ICT has a significant impact on energy consumption and emissions of greenhouse gases.
- Current reports and publications have focused on the amount of energy consumed in using ICT and internet searches. The figures might help us understand the impact of information systems and services on the environment:
  - It is estimated that a Google search generates 1 g–10 g of $CO_2$ emissions, depending on the time needed and the equipment used, and whether the equipment/computer was turned on or not, for one simple search on internet.
  - Google estimates several billion searches (about 6 billion in 2013) per day.
  - Billions of searches are performed daily to find information not only on the internet, but also in library catalogues, databases, institutional repositories, and electronic resources such as books and journals.
  - Behind each information system there is an information retrieval system which ensures access to information and, in turn, consumes energy and generates $CO_2$ emissions.
  - In 2010, Google's total electricity consumption was 2.26 million MWh
  - It is estimated that the internet consumes between 170 and 307 GW of electricity, which is the equivalent of 11–19 % of the total energy consumption of mankind.
  - An ordinary computer operating one day (24 h) generates 494 kg of $CO_2$.
  - The hosting of 10 MB of data generates 2-1/2 kg of $CO_2$. The energy consumption of servers and data centers is doubled in five years. The data center infrastructure needs electricity for power and cooling. Such structures can be 40 times more active energetically than the conventional office buildings [8].

All study years participated in the research. The demographic composition of the respondents conformed to the actual structure of the study years, and also of gender (58 % male, 42 % female) and age-groups.

### 3.2 Research Methodology

After the Information Literacy course, the students were given an online survey. The research was approved by the Ethics Committee of Transilvania University.

When submitting the survey, the student agrees implicitly with the use of its data in the study *Information literacy and sustainable thinking* and that the results of the study will be used to publish a scientific article.

The survey included 10 questions, three of which were descriptive. The descriptive questions asked about age, gender and study year. Students also responded to questions on the level of novelty of the information presented in the IL course – how much of the information about "green searching" they already knew. They were asked about which information sources they prefer; printed or electronic or both. Students were asked explicitly their opinion on whether the skills acquired during the Information Literacy course could help reduce substantially the carbon emissions and power consumption during information searches. They were also asked whether finding such information change their behavior when searching for information; whether they think information literacy can shape a sustainable thinking pattern; and how much time they spend daily accessing the internet.

### 3.3 Results of Collected Data

In the following we present the results from responses to the questions. 335 responses were obtained, a sufficient number to validate research data for a 95 % confidence interval and ±3 % accuracy.

99 % of the students considered the information about the energy consumption of internet searches new information. Only one student commented that he or she had discovered such information on the internet earlier.

Most students, 73 %, prefer both printed and electronic sources of information for their studies. 10 % prefer mainly printed, while 17 % prefer only electronic.

After the course, 74 % of the students surveyed agreed that information searching skills may help substantially reduce carbon emissions and consumption of electricity while searching for information.

Thirty-two percent of students regarded the Information Literacy course as a determining factor in the development of sustainable thinking, and agreed that it will have a very strong influence, while 56 % saw it as having a strong influence. Almost 12 % of the students agreed that training in Information Literacy wields a small influence, while none of the 333 respondents said it does not have any influence at all (Table 1).

**Table 1.** Level of agreement with the statement in Q5. "In your opinion, is Information Literacy supportive to develop a sustainable thinking?"

| Answer | % | N |
|---|---|---|
| 1. To a great extent | 32.1 | 107 |
| 2. A lot | 56.2 | 187 |
| 3. To a small extent | 11.7 | 39 |
| 4. Not at all | 0.0 | 0 |
| | answered question | 333 |
| | skipped question | 2 |

On the other hand, 17 % of the respondents did not know if they would change their information searching behavior using the techniques learned during the Information Literacy course, while 80 % thought that they would. The students also commented on this question. Of the 7 comments to this question, the most interesting were:

*- "I think our generation of students, adults, young people wants to search information quickly, we no longer have enough patience to get informed from books, newspapers, materials which involve us more visually."*
*- "The current trend is focused very much on multimedia and permanent internet access. I think that few people turn off their laptop/PC, because they want to instantly access internet when information is needed."*
*-"Yes, because we save time, which can be used for other activities and tasks we have to fulfil."*
*-"Based on the information I received during this course, I can find information more quickly and accurate!"*
*-"Nothing in life is impossible and anything that can be learned can also be unlearned! The better informed one is on certain things, the more one feels the need to change old habits! I have definitely changed my information search behavior, thanks to the Information Literacy course!"*

The average time spent on the internet were four to five hours daily. The minimum reported were two hours, 3.6 %/12 respondents, while 2.1 %/7 respondents said more than eight hours.

## 4 Discussions

Information on green practices, green systems, their economic influence and environmental impact had a high degree of novelty for students. Seventy-three percent of them (242 respondents) prefer both print and electronic information sources, and 17 %/58 respondents prefer mainly electronic. The biggest impact of the presented information will be applied upon students who use only print sources.

However, when looking at the responses from students in Brasov to the Multinational survey on students' preferences of print vs electronic study literature presented at ECIL2015 by Landøy, Repanovici and Gastinger, there is a much clearer preference for print and not so much for electronic material among these students, who had not

been presented with information literacy and sustainable searching. In the multi-national survey the preference were 66 % for print and 22 % for "both" [9]. The results are not absolutely comparable, since the multi-national study asked specifically for study literature. Still, they give an indication that showing students how to use electronic resources in an information literate way in itself will lead to a change of preferences, and that the preference for print and non-preference of electronic literature also has to do with the preference of the known and the non-preference of the unknown.

Students are aware that effective and safe information search skills using the strategies learned during Information Literacy courses can substantially reduce carbon emissions and consumption of electricity while accessing electronic information using the internet.

Students believe that the presentation of these concepts and the Information Literacy courses can lead to the change of informational behavior and generate sustainable thinking.

Students appreciate the concepts learned during Information Literacy course and believe that they acquired skills for their entire professional development.

## 5 Conclusions

Data from the survey demonstrates the students' high interest in green subjects and resources, and shows how Information Literacy can have an added contribution to the education of the young generation in the area of sustainable thinking. One way this can happen is if the courses are adopted to environmental sustainability. Students must be made aware of the ecological manner of searching, selecting, using and communicating information.

The data from the survey also shows that the students experience electronic resources as something new. When they have been exposed to the electronic resources and sustainable information searching through the Information Literacy course, they agree that they will change their information search behavior.

## References

1. Ranganathan, S.R.: The Five Laws of Library Science. Madras Library Association, Madras, India and Edward Goldston, London, UK (1931). http://hdl.handle.net/10150/105454
2. Lay, K.H., Wong, C.: Green logistics management and performance: some empirical evidence from Chinese manufacturing exporters. Omega **40**(3), 267–282 (2012)
3. Pazirandeh, A., Jafari, H.: Making sense of green logistics. Int. J. Prod. Perform. Manag. **62**(8), 889–904 (2013)
4. Jankowska, M.A., Marcum, J.W.: Sustainability challange for academic libraries: planning for the future. Coll. Res. Libr. **71**(2), 160–170 (2012)
5. Ruisheng, N.G., Low, J.S.C., Song, B.: Integrating and implementing lean and green practices based on proposition of carbon-value efficiency metric. J. Cleaner Prod. **95**, 242–255 (2015). doi:10.1016/j.jclepro.2015.02.043
6. Kim, S.: Electronic Waste (e-Waste) in Libraries and Archives (2001). http://srhkim.com/ewaste/index.html

7. Kurbanoğlu, S., Boustany, J.: From green libraries to green information literacy. In: Kurbanoğlu, S., Špiranec, S., Grassian, E., Mizrachi, D., Catts, R. (eds.) ECIL 2014. CCIS, vol. 492, pp. 47–58. Springer, Heidelberg (2014)
8. Bennett, S: Libraries Designed for Learning, CLIR Report (2003). http://www.clir.org/PUBS/abstract/pub122abst.html
9. Landøy, A., Repanovici, A., Gastinger, A.: The more they tried it the less they liked it: norwegian and romanian student's response to electronic course material. Presentation at ECIL2015 in Tallinn, Estonia, 19–23 October. To be published in Communications in Computer and Information Science by Springer

# Customizing New Library Catalogue for Information Literacy, Digital Collections and Sustainable Development

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**Abstract.** Finding high quality information is an ever-growing challenge in the academic world. The Library of Lahti University of Applied Sciences is tackling this challenge with the new Masto-Finna discovery tool which provides a single search interface for public catalogue and digital collections. With Masto-Finna, students can search the library catalogue and digital collections at the same time, so the amount of time used for teaching technical searching skills can now be used to guide students in source criticism and reference skills. This way, information literacy teaching is hoped to result in students finding higher-quality source material. In the future, Masto-Finna is expected to further increase the usage of digital collections and thus assist in decreasing the carbon footprint by substituting the print collections with online information services.

**Keywords:** Information literacy teaching · VuFind · Digital collections · OPAC · Masto-Finna search service · User survey · Sustainability

## 1 Introduction

Traditionally, academic libraries have spent a lot of time teaching students how to use a library catalogue and versatile digital collections. This has been almost inevitable with so many search channels in use, which generally have different and rather unintuitive user interfaces. With the new generation web and the next generation of web users, the need for improving online services, especially catalogues, has surfaced. According to Fagan [1], these new library interfaces, sometimes called "next-generation library catalogues" are often separate from existing integrated library systems and aim to provide an improved user experience for library patrons by offering a more modern look and feel, new features, and the potential to retrieve results from other major library systems such as article databases.

### 1.1 About Finna Portal

Finnish National Library started developing the Finna search service as part of its National Digital Library project in 2012 [2]. Finna is based on open source software solutions VuFind and Solr and it enables a variety of customization options for organizations using the search service [3]. Finna aims to provide information on


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materials in all Finnish memory organizations in a meaningful, simple, yet informative and explorable way [4]. For libraries, Finna is a modern, single point of access to library collections, both printed and digital.

Finna portal consists of two separate services, a national view and an organizational view. The national view at www.finna.fi gathers the collections of Finnish archives, libraries and museums to the same search interface using web-harvesting and indexing services. The organizational view provides the participating organizations with a tool to create a search service best suited for their organization. Finna's web-harvested materials and multiple outlook tools are available for customizing. Its views are network services for the end users [5].

Finna's member organizations can create their personalized version of the search service, which has their organization's own look and feel and a selection of their preferred search tools. For example, administrators can decide on the appearance of the search results and ranking [4]. Because Finna is designed for various memory organizations with different kind of customers, customization plays an important part in making the user interface fit the user needs of every participating organization.

### 1.2 About VuFind and Solr

VuFind, which Finna is based on, is an open source discovery tool designed to sit on top of an integrated library system, replacing the public catalog interface. It also provides a single discovery interface for other digital resources such as a digital repository or a local database [6]. VuFind features faceted navigation, and control over basic and advanced search functions [7]. Because VuFind is open source, it is available for anyone to download, use, modify and distribute, in accordance with the GPL (General public licence) open source license [6]. VuFind is used in over a hundred libraries internationally [8].

VuFind's most useful feature for its users is its narrowing facets, which can include things such as classification, subject, era, language and author [7]. When a search result is displayed, these facets are displayed as lists in the right column, with each item in the list displaying the number of search results associated with it [7].

Solr is an open source search platform, providing distributing indexing, replication and load-balanced querying and it is used to provide search and navigation features for many of the world's largest internet sites [9].

## 2 Customization Process of the New Search Service Masto-Finna

In 2012, the Information and Library Services at Lahti University of Applied Sciences started developing their own, localized version of Finna, called Masto-Finna. It was released as a beta version at the beginning of 2013 and as a primary search service in December 2014. During the customization process, several changes were made to improve the customer experience and usability for the Lahti University of Applied Sciences customers.

In the first stage, the personnel used and evaluated Masto-Finna with the help of an evaluation table created by the Masto-Finna project group. As a result of that evaluation, many changes and improvements were made and several functions that were non-relevant to the library users were hidden from the interface. The facets selected for Masto-Finna include topic, format, author, language, publication year, content type and organization, thus leaving out, for example, the facets designed to narrow down results to museum artefacts [see also 10]. Relevance ranking was also customized for local purposes to better bring forth the newest material, especially in the collection search.

### 2.1 Developing the Search Service Together with Users

The users' insight into the new information retrieval system was seen as crucial from the beginning, so the next stage of development involved the end-users of Masto-Finna. Beta testing was done by a selected group of clients in spring 2013 using both a questionnaire and open-ended questions. The testing group consisted of teachers, students and staff of Lahti University of Applied Sciences and a total of eight answers were collected. Based on the testing group's experiences a number of improvements were made, for example page navigation, relevance sorting and quick guides were updated.

The next stage of user participation was a survey conducted by the Finnish National Library and it was executed in all live sites of Finna, both in the national view and in the organizational views. At the time as the survey, Masto-Finna was a beta site, but available to the customers.

Ninety-five responses were received, 71 % of them from students and 26 % from staff of Lahti University of Applied Sciences. The remaining three percent consisted of other users of the library. The respondents analyzed Masto-Finna's usefulness, usability, effectiveness, time saving and user friendliness on a scale of 1 to 5, with 1 being the least useful and 5 the most useful (Fig. 1). The results indicated that Masto-Finna is fairly successful in all qualities, with scores varied from 3.69 (effectiveness) to 4.19 (usefulness). Respondents were also asked to grade Masto-Finna on a scale of 1–10, with 1 being the lowest rating and 10 the highest, and the average was 7.9.

Mostly Masto-Finna was used to find certain material (57 %) or to find information on a certain subject (21 %). When asked if respondents found what they were looking for using Masto-Finna, 77 % answered yes, eight percent answered no, and 15 % were not looking for anything specific. The respondents were most interested in resources available online for all types of materials. With book material, eBooks and printed books available for borrowing were almost as interesting. eBooks interested 86 % of respondents, and printed books 85 %. With journals and articles, the digital version was more appealing, with 90 % interested in digital and 52 % in borrowable, printed material. Ninety-six percent of respondents were interested in digital theses, while 33 % were interested in printed theses available for borrowing.

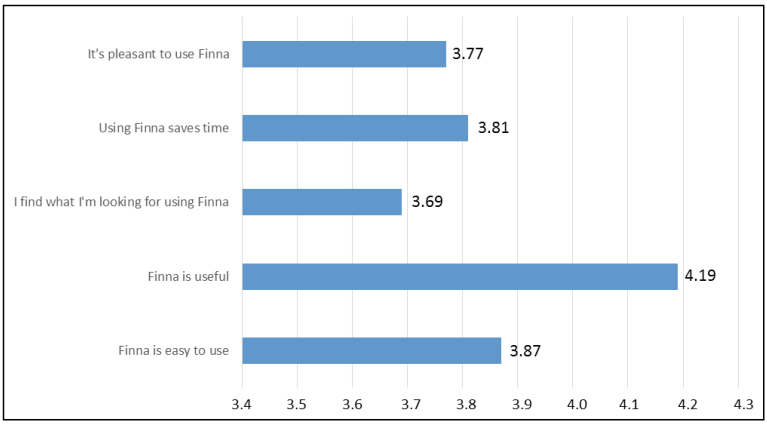


**Fig. 1.** Assessment of Masto-Finna

Masto-Finna users visited the site at least once a week (31 %), a few times a month (25 %), daily (11 %), monthly (10 %), or less than once a month (8 %). Sixteen percent of respondents were first time Masto-Finna users.

## 2.2 Impact of User Data on Development Process

Users' input has been very important in developing the new library catalogue, and collecting user data from the start of the beta phase has speeded up the development process remarkably. According to the survey conducted at the end of the beta phase, Masto-Finna was seen as an effective tool for finding useful information, with a rather good overall grade at this early stage of implementation. It is also noteworthy that clients were most interested in materials available online, even though with books the printed materials were found to be nearly as interesting as eBooks. When it comes to journals, the digital versions were already far more appealing than the print journals. In the future it will be interesting to see how the survey results develop when customers become more acquainted with Masto-Finna.

According to Lapatto [11], mapping user experiences was seen as an important factor in the ongoing development of Finna's organizational views. In Lapatto's [11] thesis, a semi-structured interview and a benchmarking process were conducted based on three local views of Finna (Satakunta University of Applied Sciences, Metropolia University of Applied Sciences and Lahti University of Applied Sciences). The aim of the data collection was to find out what kind of role usability has had when constructing Finna in these organizations. The results indicate that it pays off to tailor Finna's local interface and a tailored interface is usable, easy to use and clear. However it was stated that the construction of an interface is a never-ending process and the designers should continue to utilize user experiences of the interface.

## 3 Masto-Finna's Impacts on Information Literacy Teaching

Nevalainen's [12] thesis explored the use of a next generation user interface as a tool for information seeking and guidance at Lahti University of Applied Sciences library services. The data was gathered by thematic interviews of information specialists working in Lahti University of Applied Sciences and analyzed by using qualitative methods.

In Nevalainen's [12] study, the key factors identified in information literacy teaching and guidance were lifelong learning, source criticism, media literacy, integration of information literacy to subject studies, and the interactive nature of guidance. The goal is to provide students with information skills useful in working life and thus support lifelong learning and professional development.

According to Nevalainen's thesis [12], important factors in information skills guidance were situational sensitivity, interaction and meeting the information needs of the student. The personal information needs of the students should be emphasized even more when planning both lectures and personal guidance. Information should also be divided into manageable pieces to avoid information overload.

Masto-Finna is changing the process of information retrieval from long, specific search phrases to more simple word searching, where the results are narrowed down later on using facets. Facets are seen as a very useful and well executed tool in Masto-Finna. Despite the facets, it is seen as important for students to understand search logic more comprehensively, including Boolean operators, truncation and phrase searching. When it comes to assessing the information found via Masto-Finna, the key question is whether or not the information found is relevant to the information seeker. Search portal users should be able to define their information need and be able to determine what kind of results are adequate to meet their needs [12].

In the future it is hoped that the focus of information skills teaching and guidance can be shifted from the technical searching skills and different user interfaces to information literacy skills, like identifying scientific sources and using more international source material. Information specialists interviewed also expected that with Masto-Finna, the references used in theses will become more varied, resulting even in higher quality thesis work [12].

The results of the study indicate that the new Masto-Finna doesn't seem to lessen or eliminate the need for information seeking guidance. As high-quality information is available through one search in both printed and digital formats, the meaning of source criticism and ethical use of information increases. The significance of information literacy for lifelong learning and professional development is emphasized, and at its best it is thought to be interactive and connected to problem-based learning [12].

## 4 The Usage of Digital Collections

The default search in Masto-Finna is a dual search, bringing results from both local content and digital collections. The search results are shown in two columns, the local content on the left and digital material in the right column. This allows the user a quick glance of everything that is offered on the subject for they are searching. Narrowing

down the result using facets can be done by selecting either local content or digital collections, after which the facets appear on the right hand side of the page.

So far with Finna interfaces in Finnish libraries of Applied Sciences, only Masto-Finna is using the dual search as a default, while the other libraries have selected the local content search as a default selection. For Masto-Finna, the main reason for using dual search is the promotion of digital resources and the aim to offer one interface for all library acquired material. However there are still problems concerning the dual search. Finna uses Primo Central Index for finding digital collections and very little Finnish language material has been indexed in it. Because of that, the searches made in Finnish yield irrelevant and unsatisfactory results, which is presumed to be the main reason why other Libraries of Finnish Universities of Applied Sciences have not included it in their default search.

This offers an interesting opportunity to compare how much the use of dual search affects the use of digital collections. Figure 2 summarizes the uses of different search types in three different University of Applied Sciences Libraries. Even though the organizational Finna view is being tested and developed in many University of Applied Sciences Libraries, the only three libraries currently using an implemented version of Finna services are Satakunta University of Applied Sciences (SAMK), Oulu University of Applied Sciences (OAMK) and Lahti University of Applied Sciences (MASTO). The information shown in the table is collected from Finna's national statistics from January 1 to May 31, 2015.

The default search selection seems to be the most used search type, for Masto-Finna it's the dual search and for SAMK and OAMK it's the basic search. It is notable that with dual search being the default selection, the other search types, like basic local content search and PCI (digital collection) search collect a bigger percentage compared to the situation where the basic local content search is the default. With Finna, the digital resources not indexed in PCI are found via the Metalib search.

With Masto-Finna, the total of 15 % of searches were made exclusively to digital collections and when adding the amount of dual searches, which also include digital collections, the percentage is as high as 78. With more searches made to digital collections, it could be presumed that digital collections are more known to library users. However it is too early to comment on the statistical effects of Masto-Finna on the user statistics of digital collections on the whole, because of the relatively short period of service time for the implementation version.

In the future, it will be interesting to see what kind of effect Masto-Finna has on digital collection user statistics. With PCI playing an important role in digital collection searching, it will be interesting to see whether the databases involved in PCI indexing will gain more users.

### 4.1 Environmental Aspects of Using Digital Material

Sustainability has become a major global issue, and library and information services can play a role in cutting their carbon footprint by substituting their print collections with online information services [13]. Sustainable development covers and integrates strategies for environmental protection as well as social equity and economic development.

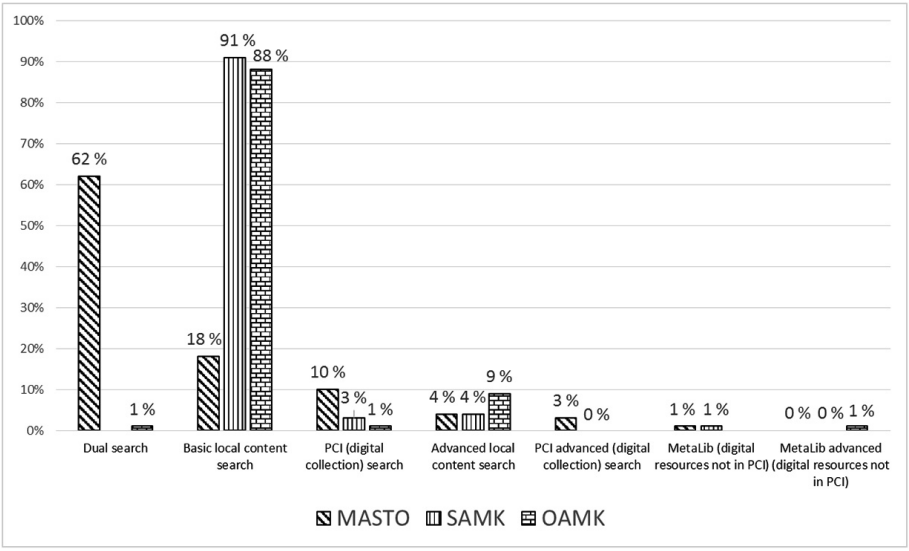


**Fig. 2.** Usage of organizational Finna's search modes in three Universities of Applied Sciences

There are two dimensions included in the umbrella concept of sustainable information: information concerning sustainable development and development of sustainable information [14].

The prevailing practices for print and photocopy-based knowledge distribution, access and reuse produce significant carbon footprint. It is evident that within a digital environment with less physical production of knowledge products, there will be less paper, less ink, less production and transportation of physical knowledge products, and all of these will eventually result in a reduction of the carbon footprint. Digital knowledge products cost almost nothing to distribute, and they have a much smaller environmental footprint because they are read online, and digital versions will have more flexibility for real time transfer and access, value addition and use in a shared digital environment [15].

According to Chowdhury [15] it may be argued that if we move to digital content services and therefore produce a lesser number of printed products then there will be a smaller carbon footprint produced. Chowdhury [15] also states, that a digital content service will be environmentally beneficial compared to the current print-based model. However, this does not mean that the current print-based model should be completely replaced by the digital content service model; rather it should be complementary. A digital content model will be suitable to support knowledge-intensive activities like education and research [15], thus fitting the needs of Universities of Applied Sciences.

## 5 Discussion

Nowadays, Web search engines, like Google, are the first stop for almost everyone looking for information. When it comes to academic information retrieval, libraries should be able to offer flexible and easy-to-use information search portals to customers

used to easy access to information. However, when searching information for academic work, usability and user-friendliness are good starting points, but the material found should also meet the standards of high quality information.

Traditionally, information literacy teaching has focused heavily on technical searching skills and different user interfaces, because that was essential for students so that they were able to locate relevant information sources. With more modern discovery tools like Masto-Finna, the focus can be shifted to source criticism and identifying scientific, high-quality information sources. In addition, with more intuitive user interfaces, information literacy teaching has the opportunity to acknowledge more profoundly the personal information needs of the students.

In the future, information literacy teaching will be redefined at the international level, when the new ACRL framework for information literacy for higher education [16] forms the basis for information literacy teaching. In the new framework, the creation of new knowledge and understanding of the often uncertain information ecosystem is becoming an integral part of information literacy teaching and guidance [16]. This way, knowledge construction processes such as reading and writing can be given more attention [see 17]. For Lahti University of Applied Sciences, the new single discovery interface Masto-Finna is a good tool for information literacy teaching and guidance, especially now when the often limited time resources of information literacy teaching should focus even more on understanding the information ecosystem rather than teaching separately how to use all the information channels library has to offer.

## References


1. Fagan, J.: Usability studies of faceted browsing: a literature review. Inf. Technol. Libr. **29**(2), 58–66 (2010)
2. The National Digital Library. http://www.kdk.fi/en/
3. Föhr, P.: Finna-käyttöönottoprojekti. Unpublished project plan, Päijät-Hämeen koulutuskonserni, Tieto-ja kirjastopalvelut (2013)
4. Lassila, A.: Reaching out to users everywhere. Scand. Libr. Q. **46**(3) (2013). http://slq.nu/?article=volume-46-no-3-2013-6#sthash.TmazyIBr.dpuf
5. Kansalliskirjasto: Finna-hankkeen Projektisuunnitelma Vuodelle 2015 (2015). https://www.kiwi.fi/display/finna/Raportit?preview=/38833901/38833902/Finna-projektisuunnitelma2015_v1%282%29-3.pdf
6. Houser, J.: The VuFind Implementation at Villanova University. Library Hi Tech **27**(1), 93–105 (2009)
7. Ho, B., Kelley, K., Garrison, S.: Implementing VuFind as an Alternative to Voyager's WebVoyage Interface. Libr. Hi Tech **27**(1), 82–92 (2009)
8. VuFind: VuFind Customer Installations (2015). https://vufind.org/wiki/installation_status
9. Solr: Learn More About Solr. (2015). http://lucene.apache.org/solr/
10. Föhr, P., Pitkänen, J., Segerstedt, A.: Lukuvuosi Masto-Finnaa Lahdessa: Finnaa Kehitetään Jatkuvasti Eteenpäin. Kreodi 2/2015 (2015). http://www.kreodi.fi/en/13/Artikkelit/273/Lukuvuosi-Masto-Finnaa-Lahdessa-Finnaa-kehitet%C3%A4%C3%A4n-jatkuvasti-eteenp%C3%A4in.htm

11. Lapatto, E.: Käytettävyys ja Finnan paikallisnäkymät: suositukset Finnan rakentamiseen Turun ammattikorkeakoulun kirjastolle. Bachelor's Thesis, Turku University of Applied Sciences (2015)
12. Nevalainen, K.: MASTO-Finna ja tiedonhankinnan ohjaus – Finnan paikallinen näkymä Lahden ammattikorkeakoulun kirjastossa. Bachelor's Thesis, Turku University of Applied Sciences (2014)
13. Chowdhury, G.: How digital information services can reduce greenhouse gas emissions. Online Inf. Rev. **36**(4), 489–506 (2012)
14. Nolin, J.: Sustainable information and information science. Inf. Res. **15**(2) (2010). http://www.informationr.net/ir/15-2/paper431.html#unga2
15. Chowdhury, G.: Carbon footprint of the knowledge sector: what's the future? J. Documentation **66**(6), 934–946 (2010)
16. ACRL: Framework for information literacy for higher education (2015). http://www.ala.org/acrl/sites/ala.org.acrl/files/content/issues/infolit/Framework_ILHE.pdf
17. European Conference on Information Literacy (ECIL): Invited speakers: Professor Eero Sormunen (2015). http://ecil2015.ilconf.org/professor-eero-sormunen/

# Workplace Information Literacy and Knowledge Management

# Mapping Collective Information Practices in the Workplace

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**Abstract.** The collective management of informational resources, or the "information landscape", within two workplace settings is investigated through a methodology based on facilitated concept mapping sessions using a non-digital tool. Mapping raises information literacy practice – the ongoing, critical judgments about information, made within these communities – into the conscious awareness of both the research team and the participants. The maps therefore both provoke and record the intersubjective agreements that are continuously being made in these communities, and which constitute the information landscape.

**Keywords:** Information literacy · Mapping · Workplace · Practice · Information landscape

## 1 Introduction

This paper summarizes the *Bibliotek i Endring* (Changing Libraries) project, a study of how information literacy plays out as a group practice, in a workplace setting. The project investigates how members of communities of practice collectively manage, or "steward" [1] their informational resources – or *information landscapes* [2] – in workplaces that are facing significant change. The project has taken place in two academic libraries. One (library A) is merging four existing campus libraries into one, with a parallel restructuring of roles and responsibilities, while library B has appointed a new director.

## 2 Background: Information Literacy as Dialogue in Practice

The project takes the view that information literacy is not definable as merely a set of competencies and skills, but is more fundamental; it is the basis of practice [3]. Practice is "constructed corporeally and socially… within a social site" [3, p. 249]. Therefore, practice is a *dialogue* [3, p. 250] through which judgments are made, and understandings


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developed about how to perform activity and how to draw on resources (information, artifacts, people) that are relevant to the completion of this activity. This collectivity of resources is what Lloyd [2] calls the *information landscape*. The information landscape is not a static structure, but an ever-evolving, dynamic space. Therefore, the dialogue of information literacy is, ideally, a *transformative* one [4], as through these collective judgments, the information practices that shape the landscape are scrutinized and, if necessary, revised in line with changed circumstances. Thus, the *community of practice* [5] is collectively engaged in a continual process of *stewarding* the information landscape that they draw on to meet shared learning needs [1].

Two significant issues arise when translating these ideals into practice, however. The first is that the stewarding role is typically concentrated in a small subset of the community, sometimes only one person, and/or elements of it may be delegated outside the community altogether. That is, *authority* over the community's information practices – how information literacy is defined, valued and operationalized by the community – becomes centralized, embedded in dominant interests in an organizational hierarchy [4, p. 154], and/or imposed on communities from outside (cf. Hamelink [6]). Information literacy thereby becomes monologic, not dialogic. Scrutiny of practice by members of the community becomes constrained, as conformity to authority is encouraged, and challenges dissuaded. This is not necessarily a less desirable way of making judgments – and is certainly a more efficient one – but it is oriented only to "single-loop learning" rather than "double-loop", where the continued relevance of practices is called into question, rather than just their effectiveness [7]. For effective change management, both types of learning need to come into play. Effective direction from organizational leadership is needed, but this direction also needs to be *informed* by the on-the-ground experiences of core staff, and the dialogues and relationships they engage in within their communities of practice.

The second issue is the limited understanding of how, specifically and in practice, communities make these collective judgments. Although Wenger et al. [1] introduce the idea of stewarding they do so in a rather limited way, referring only to information technology rather than information practices more widely, and do not develop the notion. And in his seminal review of the notion of relevance, Saracevic [8] notes that for library and information science (LIS), the question of how to capture group judgments about relevance is largely limited to aggregating individual preferences. To date, LIS has struggled to capture the *intersubjective* elements of judgment: that is, those rooted in dialogue, emerging between people.

Nevertheless, these collective judgments regarding relevance are constantly taking place within communities of practice. Information literacy of this kind can be *learned*. The questions which are of interest here are: how can the development of *collective* and *information literate* stewarding practices be facilitated in ways which distribute authority over information practice across the community as a whole; and what is the impact of doing so on change management within a workplace setting?

## 3 Methodology: The Role of Mapping

To answer these questions successfully, and to address the other issues raised in Sect. 2, the BiE project needs a methodology that can:

- bring together representatives from different communities (particularly management and on-the-ground staff) in a space where common perspectives on information practices can at least potentially be found;
- both facilitate, and record, how the communities of practice that arise in these project spaces collectively steward their information landscapes. How are the groups making collective judgments about information and relevance, in practice, and in the context of the organizational changes each faced?

The information landscape is not just a vague metaphor, rather [3, p. 773]: "Information landscapes reflect the modalities of information (agreed upon sources) that people draw upon in the performance of their practices in working or everyday life, and therefore constitute the intersubjective agreement that informs our situated realities…" The question posed was how this "intersubjective agreement" can both be facilitated and recorded. We propose that *mapping* meets these requirements. A detailed justification for this is in Whitworth [4, pp. 160–165]; a summary is given here.

Maps serve as a cognitive depiction of reality [9]. Through experiencing and exploring a landscape [2, p. 2], maps can be drawn that show relationships between relevant resources in the landscape. One can learn about a landscape one has never seen by looking at a map of it, as a map represents, and thus can communicate, information that is known about a landscape. Maps can also suggest new routes through a landscape that may already be well known, and one can use a map to record or observe change in a landscape over time.

The map remains a *representation* of the landscape however. Thus, like all representations, the map must be interpreted, and the messages that it imparts will be selective and partial. This may be for reasons of usability. For example, it makes sense for a map targeted at drivers to emphasize roads rather than contours and streams, whereas a hikers' map would do the opposite. But by omitting certain features of the landscape from consideration, a map might also become an instrument for 'pushing' cognitive schema – that is, schemes for organizing and making judgments about information [10]. In short a map may be – indeed, is more likely to be – drawn by dominant interests in a landscape, rather than the mass, or the oppressed within it, as with, say, 19th century maps of Australia which defined it as 'Terra Nullius' (uninhabited, empty land: see Lindqvist [11]).

None of these concepts are exclusive to maps of geographical landscapes. There are many techniques to map information landscapes: organization charts, concept maps, sociograms, information visualizations for instance (see examples on http://mappinginformationlandscapes.wordpress.com). All summarise information about a landscape, allow exploration of it, and are representations that reflect certain interests but can also be subject to multiple interpretations.

Such maps are often drawn implicitly, as the outcome of everyday (and often unconscious) enquiries into working practice, and while this is an important aspect to mapping, for reasons of space it is not further emphasized here (see Whitworth [4, pp. 160–165]). What the BiE project seeks to do is raise the mapping process into conscious awareness, and exploit its potential to act as a learning experience. This experience can be a genuinely collective one if it is, in terms defined by Bruce et al. [12], *relational*; that is, the mapping process, as noted at the head of this section, elicits a wide experience of variation, and is used as a space in which different perspectives can

contribute equally to the drawing of the map [4, p. 149]. The process is made conscious through the use of a specific tool for mapping (see below) and the use of facilitators.

Facilitation is needed because "no community can fully design its own learning" [5]. Facilitation guides and structures, but does not direct, the mapping process, providing *alterity* [13, pp. 82–85]; the external perspective that helps the reflective process. In research terms, this turns BiE into a *co-operative inquiry* [14], a collaboration between external researchers and action researchers, reflecting on their own practice (*viz*, the library staff in this case).

## 4 Method: Facilitated Concept Mapping

In both locations, participants (numbering around 50 percent of the full-time staff at each library) have engaged in six facilitated concept mapping sessions between October 2013 – September 2014. Participants have also been interviewed at the beginning and end of this period. The opening interviews gather preliminary data on their personal information landscape, using it to draw sociograms (maps of social networks) that, later, have been cross-referenced with information about who plays dominant roles in managing the information landscape (see Sect. 5; this aspect of the work is discussed in Whitworth et al. [15]). The closing interviews elicit feedback from participants on both the usefulness of the mapping sessions and their feelings on the change process they have undergone in the preceding year.

The concept mapping is undertaken with the tool Ketso (www.ketso.com). Ketso is designed to allow several members of a group to contribute to mapping a problem space [16]. Figure 1 below shows a fragment of a Ketso map. Each 'leaf' can be written


**Fig. 1.** Example Ketso map (Color figure online)

on then wiped clean, and repositioned if necessary. The durable material makes it easy to store maps between sessions, then revise them.

At the six Ketso sessions, each facilitated by two members of the project team, library staff are asked to map the following: the tasks they are working on, the information they need to address them, the sources of this information, blocks on acquiring it, priorities, and actions to be taken by the next session. These factors cluster around topics, represented by the ovals. Small yellow circular markers indicate priorities. For example, around the topic "Teaching" on the map in Fig. 1 appear tasks (brown leaves) such as "Endnote" and "summer school". Next to the last task are placed two information needs (yellow leaves) and an associated source (green leaf), but also a blockage (grey); that summer school course leaders do not have access to local systems. Actions are also marked with grey leaves plus a star (Ketso kits have only four colours, a minor hindrance to our use of it); here one is "Adapt course to needs of students", which has also been prioritized (yellow tick symbol: white circles are comments).

As the optimal size for a Ketso group is 5–6 participants, two maps have been drawn at each location, providing two complementary perspectives on the landscapes. Each session after the first begins by reviewing actions placed on the map in the last session, recording which member(s) of staff are agents of actions undertaken. The maps are then revised. Completed actions are removed, which might also lead to changes in needs and sources. Blockages and tasks are reviewed. Thus, throughout the study period, the maps record changes in resources and connections between them, revealing the evolution of the information landscape. Importantly, these data are also immediately available to project participants, helping reveal gaps in knowledge and areas of work that need prioritizing.

Mapping sessions are facilitated by two members of the project team, for reasons noted above. Sometimes, facilitators write leaves for inclusion on the map, but this remains subject to agreement (thus, scrutiny) by the library staff.

In terms used by Wenger et al. [1, p. 60] to classify tools that can help communities of practice with stewarding, Ketso is *group-oriented*, *participatory* and *synchronous*. It is designed to be used by groups (rather than individuals working alone), and the group gathers at a particular point in space and time to use it (rather than using it asynchronously). It is participatory because it is designed to elicit insights from all group members; no one person (including the facilitators) 'controls' or produces the map, at least in principle.

## 5 Results

### 5.1 Mapping as a Record of Change – and Stagnation

The dataset as a whole – all maps created over the six sessions at both locations – clearly serves as a record of change in both locations over the year. This is most apparent with the reorganization and relocation themes in library A's maps. There is a lot of activity around these until the fifth session, June 2014; then, the theme, and all its related tasks, information needs and so on, disappear from the map altogether. There are various measures of volatility that can be drawn from the maps; Table 1 uses the

**Table 1.** Numbers of actions placed in each session

| Group | Section 1 (Oct 2013) | Section 2 (Nov 2013) | Section 3 (Feb 2014) | Section 4 (Apr 2014) | Section 5 (Jun 2014) | Section 6 (Sep 2014) | Total |
|---|---|---|---|---|---|---|---|
| A1 | 15 | 0 | 7 | 21 | 4 | n/a | 47 |
| A2 | 4 | 3 | 1 | 7 | 2 | n/a | 17 |
| B1 | 6 | 0 | 5 | 1 | 5 | 2 | 19 |
| B2 | 3 | 1 | 3 | 4 | 3 | 0 | 14 |

number of new actions laid in each session and illustrates how library A's activity peaks just before the summer 2014 move. (Session 6 is omitted from A's data because we experimented with a different approach in their final session and did not lay new actions.) Conversely, library B's map is relatively stagnant until their new director arrives in January 2014, after which comes a peak of activity, though it never becomes as active as library A.

The question is, what are these data actually showing? Do these figures, and similar quantitative and longitudinal data that might have been drawn from the maps, have any relevance beyond an audit of practice in each location? Do they say anything about group information literacy practices in a more generalizable way?

Each map is a *representation of a group discussion*; a dialogue focused on making *collective judgments* about the general shape of each community's information landscape, the more specific resources available within it, and how they are related to each other and to the community members' learning needs. The map is thus a record of the "intersubjective agreement" that constitutes the information landscape (see above), rather than some kind of "objective" encapsulation of it.

The significance of this, for information literacy, can be illustrated by examining a portion of group B1's map, shown in Fig. 2 above. The map on the left is from session 2 (Nov 2013), the one on the right from session 5 (Jun 2014). Though there have been some changes and additions over this period, a number of tasks, needs and blockages remain in place below the oval (indicating these leaves are all related to 'Undervisning' or teaching). This is the case despite a priority marker and some relevant actions remaining in place throughout. On the surface, then, this seems to reflect an area of work where no activity was taking place. Yet the discussions that took place in the


**Fig. 2.** Ketso maps showing area of little change (below oval)

sessions and final interviews with the relevant staff members make it clear that this is not the case. What the map records, then, is not a lack of activity *per se*, but sustained blockages in information flows, and activity being completed without this then leading to any change in perceptions of the information landscape, or in practice. Work is being done here, but it is not addressing information needs.

This is an example of where mapping reveals insights to participants at the time, during the sessions, rather than only at the end. Some of our interviewees stated that the map was directly useful in their subsequent practice, for example: *Sometimes you 'see the leaves' later, and remember that for certain activities you linked them with pieces of information, and sources, and people that you had said you would contact. Also it solidifies or consolidates some practices that you are unsure about, or insecure about. After the discussions you feel, yes, that was the right way to do it.*

But the maps were not consulted between sessions. It is the mapping *process* that is valuable to staff, more than the map itself. Staff valued the opportunity to acquire information about colleagues' priorities and problems, in a space that was less mediated by the agendas of regular meetings and the buffers of line management relationships. A senior manager at one location said: *It was a good opportunity to take time out with members of staff and reflect where we are at and how we understand the situation around us. What are the hot topics? What are the priorities and how do we perceive them?… I got more out of it than from the normal monitoring and meeting process. The amount of information I would normally get [directly] would be a lot less, and particularly the perceptions of the staff. Previously contact would be mediated through middle management, but even though they were there in the sessions, the mediating aspect was removed.*

Thus, there is evidence that the collective judgments being made in the mapping sessions were inclusive, and actively contributing to evolving practices during the change period. The idea that information literacy is not only an individual, but also a collective phenomenon, forming the basis of practice, is given some support.

## 5.2 Evidence of Collective Stewarding

If stewarding can and should be distributed across a community of practice, what does this actually entail, operationally? How can the benefits of job specialisation be retained while still allowing for the work of a specialist to be checked by others?

Data from both the Ketso maps and the interviews reveals several instances of where regions of the maps are being largely managed by specific individuals. For example, on certain maps this is quite apparent with each of the research support; digital resources; and teaching topics (see Fig. 3). The impression is of a particular 'territory' being the responsibility of a particular individual. One interviewee, 'Dawn', who had a responsibility for research support and digital resources within her library, is emphatic when stating that she and others look after specific areas of the map, and: ... *they would be lying if they said they didn't. Yes, you are part of a team, but we have certain areas in which we are supposed to be professionals. You need to have this kind of specialist knowledge. We were hired to do a particular job and if I was supposed to care about things like the reference desk then I couldn't do my job properly.*

**Fig. 3.** Region of Ketso map from group A2

Others were less emphatic but still recognised that this 'territorialisation' had occurred, particularly in library A. 'Joanna' said: "people defended their territory, which may have been a consequence of the reorganisation process, which has involved the explicit definition of roles and responsibilities." We also observe a reluctance of staff members to make changes to certain regions of maps where a colleague is absent from a session for whatever reason, if that region is seen as 'belonging' to that colleague.

At one level this seems self-evident — logically, the research support topic would be expected to be stewarded by the staff member with a responsibility for research support — yet also stands against the fact that Ketso was designed to elicit a group perspective [16] and was employed in this project to help distribute the stewarding role. Yet note that even in the areas mentioned, where a map is being *largely* managed by one person, this does not mean it is *solely* being managed by them. Figure 3 illustrates this. Most of the leaves have been written and placed by one person (in fact, the interviewee quoted above). But the circles indicate leaves that were contributed by others.

Therefore, we suggest that the technique allows for the 'best of both worlds'. Expertise and responsibilities are recognised and other team members will, indeed, defer to the 'expert' when it comes to constructing that region of the map (that is, the representation of the area of the library's information landscape which is relevant to tasks that cluster around the theme in question). But that does not mean the *authority* of that staff member cannot be scrutinised, and where deemed appropriate, their depiction of the region reviewed and altered (cf. Whitworth [4]). This insight calls for further research, but is, potentially, an original contribution of the project to the research literature in the area of how communities of practice collectively steward their informational environments, make judgments about relevance, and thus manifest information literacy within their practice.

## 6 Conclusion

Stewarding cannot be simply equated with information literacy. It may be done in 'information illiterate' ways. Stating that information literacy is the basis of practice does not mean that all information practices are information literate; there remain

normative elements to literacy, and the stewarding of information landscapes may be being done in ineffective or inefficient ways [4, pp. 172–173]. But even when IL is seen as practice, or rather, embedded into practice in much more fundamental ways than can usually be perceived by the rubric-heavy, competency frame of IL, it is still something that can be *learned*. The BiE research project has itself become a learning process, facilitating the action research of its participants [15]. Although this research process has not been a systematic one, it nevertheless has allowed participants to address questions arising from the relationship of their information landscapes to the changes taking place in their organisations during the study period. In that this investigation is something which supports the critical judgments that the library staff are continuously making about informational resources, it can be suggested that BiE's mapping methodology is a group-oriented, participatory and synchronous means by which communities of practice can be helped to become more aware of their information landscape and, hence, more information literate. The methodology helps both provoke, and record, the ongoing "intersubjective agreement" that is the collectively stewarded information landscape [3]. There is more work to be done with the method but, broadly, we present mapping as a potential way to fill the gap in the literature that Saracevic [8] highlighted: how to operationalize group judgments of the relevance and significance of informational resources.

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## References

1. Wenger, E., White, N., Smith, J.D.: Digital Habitats: Stewarding Technology for Comm unities. CPSquare, Portland OR (2009)
2. Lloyd, A.: Information Literacy Landscapes: Information Literacy in Education, Workplace and Everyday Contexts. Chandos, Oxford (2010)
3. Lloyd, A.: Information literacy as a socially enacted practice: sensitising themes for an emerging perspective of people-in-practice. J. Documentation **68**, 772–783 (2012)
4. Whitworth, A.: Radical information literacy: reclaiming the political heart of the IL movement. Chandos, Oxford (2014)
5. Wenger, E.: Communities of Practice: Learning, Meaning and Identity. Cambridge University Press, Cambridge (1998)
6. Hamelink, C.: An alternative to news. J. Commun. **20**, 120–123 (1976)
7. Argyris, C., Schön, D.: On Organizational Learning. Blackwell, Oxford (1999)
8. Saracevic, T.: Relevance: a review of the literature and a framework for thinking on the notion in information science. Part III: behavior and effects of relevance. J. Am. Soc. Inf. Sci. Technol. **58**, 2126–2144 (2007)
9. Wandersee, J.H.: Concept mapping and the cartography of cognition. J. Res. Sci. Teach. **27**, 923–936 (1990)
10. Blaug, R.: Cognition in a Hierarchy. Contemp. Polit. Theory **6**, 24–44 (2007)
11. Lindqvist, S.: Terra Nullius: A Journey Through No One's Land. Granta, London (2007)

12. Bruce, C.S., Edwards, S.L., Lupton, M.: Six frames for information literacy education. Italics **5**, 1–18 (2006)
13. Linell, P.: Rethinking Language, Mind, and World Dialogically: Interactional and Contextual Theories of Human Sense-making. IAP, Charlotte, NC (2009)
14. Heron, P., Reason, P.: The practice of co-operative inquiry: research 'With' rather than 'On' people. In: Reason, P., Bradbury, H. (eds.) Handbook of Action Research: Participative Inquiry and Practice, pp. 179–188. Sage, London (2001)
15. Whitworth, A., Torras, M., Moss, B., Amlesom Kifle, N., Blåsternes, T.: Changing libraries: facilitating self-reflection and action research on organisational change in academic libraries. New Rev. Acad. Librarianship **20**, 251–274 (2014)
16. Tippett, J., Handley, J.F., Ravetz, J.: Meeting the challenges of sustainable development—a conceptual appraisal of a new methodology for participatory ecological planning. Prog. Plann. **67**, 9–98 (2007)

# From Workplace to Profession: New Focus for the Information Literacy Discourse

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**Abstract.** The present paper suggests articulating the general context of workplace in information literacy research. The paper considers distinguishing between information literacy research in workplaces and professions. Referring to the results of a phenomenographic enquiry into web professionals' information literacy as an example, it is indicated that work-related information literacy in particular contexts and depending on the nature of the context, is experienced beyond physical workspaces and at professional level. This involves people interacting with each other and with information at a broader level in comparison to a physically bounded workspace. Regarding the example case discussed in the paper, virtuality is identified as the dominant feature of the profession that causes information literacy to be experienced at a professional level. It is anticipated that pursuing the direction proposed in the paper will result in a more segmented image of work-related information literacy.

**Keywords:** Workplace · Information literacy · Profession · Web professionals

## 1 Introduction

The idea of workplace information literacy has been a long-term contributor to the information discourse. Workplaces have been a key context for researching information literacy and the significance of exploring such context has been highlighted by many researchers [1–3]. The development of the workplace information literacy research trajectory has been associated with the unique nature of various workplaces. Workplace information literacy researchers argue that due to the different nature of different workplaces, information literacy may find different meaning in each context. As a result, the necessity of researching information literacy in different contexts is highlighted. Efforts in researching information literacy in different workplaces so far have been in line with this identified need.

Building on this trajectory, we argue that the workplace information literacy research territory is already in a position for the articulation of a more accurate segmentation of this area of research. In this regard, the present paper draws attention to the reconceptualisation of work context in which information literacy is being explored.

In this paper, it is agreed with the fact that information literacy is "shaped" by the context, which includes people participating in the practices involved in that context [2, p. 293–294]. Assuming that interactions among people and the space in which these interactions occur are constituting factors of the context, it can be concluded that the


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meaning of information literacy in each context is a variable of those interactions and the surrounding spaces. This paper, however, considers only one aspect of the interaction: the level of interaction.

Regarding the role the level of interaction can play in defining the meaning of information literacy, the paper suggests considering workplaces and professions as two distinct components of work context when studying information literacy. This distinction will assist with looking at the interaction among people with each other and with information at two different levels. Interaction at professional level gives people a wider space beyond what confines their immediate physical workspace, for interaction with each other and experience of information. Consequently, information literacy is experienced differently at these two levels of interaction. The new image will shed light on new dimensions of work contexts to be studied which is anticipated to be of value for future information literacy research.

This paper first looks at how workplace information literacy studies fit within the whole information literacy research family. It then introduces the distinction between workplace and profession. Using the outcome of a recent research as an example, the paper further illuminates what is meant by looking at information literacy at professional level. This is through referring to the outcome of a study on information literacy experience of a group of professionals: web workers. The paper next discusses the distinction made with respect to the broader area of "workplace" information literacy (vs. educational and community information literacy) and suggests areas for further investigation.

For the purpose of convenience in communication, it is noted here that within this paper, "workspace" is a general term that refers to all work-related spaces including workplaces and professions. "Workplace" and "physical workspace" refer to physical places in which people work such as an office, a hospital or a university. "Profession" is used to refer to a group of people working at the same profession.

## 2 Workplace Information Literacy: Where Does It Fit Within the Broader Area of Information Literacy?

Similar to the general concept of information literacy, there is no single definition for workplace information literacy. Researchers rather have described this concept within different contexts and from different perspectives. From a relational view, [4, 5] Bruce describes information literacy as seven different ways of experiencing effective information use. However, from a sociocultural perspective, Lloyd [6, p. 34] sees an information literate person as someone who "have the ability to engage and interpret epistemic or authoritative forms of knowledge", "social information", "nuanced information", "embodied information" and understands "how this information is created and contested in a workplace community".

The broader domain of information literacy has been explored in different contexts and from different theoretical perspectives. The concept of information literacy has been studied in three contexts of educational, workplace and community. Being in each context, it has also been viewed predominantly from three different theoretical perspectives: behavioural, relational and socio-cultural. Table 1 shows these two lenses for

**Table 1.** The crossing of approaches and contexts in information literacy research

| Context / Approach | Education | Workplace | | Community |
|---|---|---|---|---|
| Behavioural (skill-based) | | Gasteen & O'Sullivan [20]; Rosenberg [21]; Macoustra [22]; Cheuk [7, 8]; Smith & Martina [23]; Kirton, Barham & Brady [24]; Hepworth & Smith [16]; Weiner [25]; Leavitt [26]; Travis [27]; Crawford & Irving [14]; Head et al. [28] | | |
| Relational | | Educational workplaces | Non-educational workplaces | |
| | Limberg [29]; Maybee [30]; Lupton [31] | Bruce [4, 5]; McGuiness [32]; Webber, Boon & Johnston [33]; Boon, Johnston & Webber [34]; Williams & Wavell [35] | McMahon & Bruce [36]; Kirk [10]; O'Farrill [37] | Yates, Partridge & Bruce [38]; Gunton [39]; Gunton, Bruce & Davis [40]; Yates et al. [41] |
| Socio-cultural (contextual) | Lundh & Limberg [42]; Sundin, Limberg & Lundh [43]; Tuominen, Savolainen & Talja [44] | Lloyd-Zantiotis [45]; Lloyd [46], [18]; Veinot [47] | | Kennan, Lloyd, Thompson & Qayyum [48]; Walker [49]; Lloyd, Kennan, Thompson & Qayyum [50] |

viewing the information literacy research domain. In this table, rows represent different approaches and columns represent different contexts. Each cell provides sample studies conducted in the relevant context and through the relevant approach.

Referring to Table 1, research studies within workplace contexts and from different theoretical perspectives are presented in workplace column, which is the area that the present paper focuses on. However, as is seen in the table, so far, information literacy studies in different work contexts are all considered under the general theme of "workplace" information literacy and no distinction is made in this theme in terms of the level of interaction among people. In all studies, it is just a different workplace context that distinguishes studies from each other with most of the studies been conducted in a physical workspace. For instance, Cheuk's [7, 8] case studies occurred in companies.

Conley and Gil [9] looked at recruiters and employers' views of information literacy regarding the importance of the concept to the business. Kirk [10], O'Farrill [11], Sen and Taylor [12], Sokoloff [13] and Crawford and Irving's [14] research focused on different groups of people in their organisations. Klusek and Bornstein [15] explored job descriptions of business and finance occupations, which are normally considered within an organizational workplace framework. Hepworth and Smith [16] investigated non-academic staff's information literacy in university finance and research departments. Lloyd [17, 18] explored firefighters and ambulance officers in their workplaces. Similarly, refugee-related service providers were viewed in their workplaces [19].

However, as was mentioned above, the present paper aims at providing a segmented picture of the area of "workplace" information literacy (vs. educational and community information literacy). Therefore, two sub-contexts of workspaces (physical workspace and profession) are proposed. The paper argues that for studying people's information literacy at work, the context within which information literacy is investigated is not necessarily limited to physical workspaces. When exploring information literacy within work contexts, there are people whose work has strong ties with not only people and resources in their immediate workplace, but beyond that and at a professional level. As a result, the paper makes a distinction between a physical workplace context and a professional context for researching information literacy.

## 3 Workplace and Profession

The word workplace is defined as "establishment or facility at a particular location containing one or more work areas" [51] or it is considered as "a place where people work, such as an office or a factory" [52]. The workplace can be physical or virtual. In this sense, workplaces have a locality essence in terms of being limited to a specific place or space. As was mentioned in the introduction, for the purpose of this paper, the term "physical workspace" is used as an equivalent to the word "workplace".

Profession, however, goes beyond the physical walls and space associated with a workplace. The word profession is used for a group of people who work at a particular profession, however not necessarily in the same physical space. In this paper, a profession is defined as a vast community of same-field people such as librarians, physicians, lawyers or engineers that interact with each other around work at a higher level than their actual physical workspaces. Following these definitions, librarians of a particular library, for instance, are considered in their workplace. At the same time, they are seen as part of the library profession due to their interaction with a wider group of librarians outside their organization. This "outside" space is a workspace that could include association forums, conferences, virtual spaces such as social media platforms or email lists, where there are no local boundaries limiting people's interaction to a specific workplace.

Considering these two definitions, one of the aspects that makes these two types of workspaces distinct from each other is the interaction level among people involved. While people mainly work with their immediate colleagues in their physical workspace, they expand on their interactions when working with potential colleagues at a professional level. Such distinction leads to ask whether the existing workplace information literacy

concepts need to be reviewed and reconceptualised if this concept is explored from the perspective of people who are at different levels of interaction with each other and with information. The assumption made in this paper is that information literacy experienced in physical workspaces could be of different meanings and characteristics compared to when it is studied at a professional context. The result of a study on web professionals' information literacy is discussed below to provide an example of what it means to explore information literacy at a professional level.

## 4 Information Literacy in Profession

The idea of further investigation of work context in information literacy research was inspired by the outcome of a study on the population of web professionals. In a phenomenographic study, constituted of 23 web workers, it was explored how web professionals experience information literacy. Participants of the study were selected from different sections of the website design and development process, from decision makers at macro-levels to programmers and coders at micro-levels, from web design and development business owners to web team members, to ensure a collective voice was heard. The data collected through semi-structure interviews including questions around information literacy experiences of participants.

This is a study which initially launched with a focus on researching information literacy in the general context of "workplace" (vs. educational and community contexts). The outcome of the study however does not happen to be reflecting at the experience of information literacy necessarily at a physical workspace context with its locality boundaries. Rather, the outcome of the study demonstrates that web workers need to be studied in a broader context that is called a professional level in this paper. In their interviews, web professionals mostly talked about interacting with people and experiencing information at a professional level, which is a higher level compared to a single physical workspace.

The results of the study of web professional's information literacy in the form of four inter-related categories show that this group of people experience information literacy as category 1: staying informed, category 2: building a successful website, category 3: problem solving and category 4: participating in a community of practice.

In all of these four categories (but mainly in categories 1 and 4), the fact that interactions among web workers occur at a professional level is very visible. In category 1 which describes the research participants' experience of information literacy as staying informed, web professionals refer to an information environment as the context of their experience. This is where all their potential colleagues and necessary work-related resources are located. According to participants of the study, this information environment is easily expanded to somewhere beyond their single physical workspace, and to a profession level.

In experiencing information literacy as participating in a community of practice (category 4), the role of the profession as the context of the experience is again highlighted. The profession in this category is always referred to as the community of practice. Participants of the study value contributing to the community of practice or using collective intelligence and best practices (as well as avoiding worst practices)

produced by other members of the community. These practices are strongly regarded at a profession level, rather than a physical workspace.

In the other two categories (category 2 and category 3), the context of the experience at the professional level is considered again. However, this is not very central to participants due to the nature of the experience in those two categories. In category 3: problem solving, while the focus of the experience is on solving a problem, the value of the community of practice and the information environment in making the problem solving a smoother process is noted. In this way of experiencing information literacy, web professionals implicitly mention the interaction with their potential colleagues at a professional level (rather than merely at a physical workspace level) and appreciate its importance in consulting with when dealing with problematic situations.

There is a similar case with one of the sub-categories of category 2: building a successful website (the other two sub-categories are sub-category 2-A: "a happy client" and sub-category 2-B: "a satisfied user"). In sub-category 2-C: building a seamless website, web professionals talk about their own role and practice in building a website that works seamlessly. In describing their experience of information literacy at work, web professionals almost highlight the role of their community of practice as their professional reference, rather than colleagues at workplace. This means that they do not merely rely on the information experienced within the local boundaries of their workplace, but go beyond the walls of those physical spaces to experience information literacy at a profession level as well.

## 5 Discussion: Professional Information Literacy

The presented outcome of a study on web professionals' experience of information literacy above shows what it means for information literacy to be experienced at a professional level, rather than a physical workspace level, which is the common context for exploring information literacy. The result of the study shows that, in reflecting upon work-related information literacy, web professionals see their work context at a professional level, mainly in terms of expanded interactions among people involved in the whole profession. When referring to information literacy, web professionals show stronger connections with their broad community of practice at professional level, rather than with people in their physical workspaces.

As was shown previously, the study of web professionals was not initially designed with a view on the distinction between the two sub-contexts physical workspace and profession) for exploring the concept of information literacy. As a result, the reason(s) why web professionals referred to people at their profession in addition to/rather than colleagues at workplace, when describing their experience of information literacy, was not sought directly and purposefully during the data collection phase. However, there was clear evidence in the gathered data that indicated web professionals relied on the interaction at professional level more than a physical workspace level when talking about information literacy. It is argued here that the fact that web professionals mainly talk about their information literacy at a professional level rather than a physical workspace level is partly pertinent to one aspect of the nature of their profession which is virtuality.

It is easily interpretable why web workers who practice on a solitary basis express their experience of information literacy with a view on a professional level. It is anticipated that the logical consequence of such practice (working in an isolated work environment) can be a strong tendency to connect to a robust professional body for more effective use of information. However, in the case of web professionals who work with other people in teams, in small or large organisations, isolation is unlikely to be the main factor. Instead, it is argued here that their willingness to work with their potential colleagues at a professional level, which is very clearly reflected in their described experiences, is related to the unavoidable component of virtuality in their job.

The web profession is a virtual profession. The key context on which the practice of web professionals occurs is the World Wide Web. Due to the potentiality, ease and popularity of communication on the web, individuals working on such platform are more likely to interact with each other around work-related matters in the same space. This interaction is very probable to happen among people that do not necessarily know each other from their immediate workplaces, but only share a profession. As a consequence, they form a broad community of practice in the virtual web space that encompasses all people involved in the profession. This is a workspace to which web professionals refer to when working on their day-to-day job. That is, the work context of web professionals can be as broad as their profession and therefore interactions among people at work can be considered to occur often at a professional level rather than a workplace level. As a result, it makes sense for them to reflect on their experience of information literacy at work at a professional level as this is the context in which they normally practice.

Using the study of web professionals as an example, the current paper considers distinguishing between workplace and profession as two sub-contexts for studying information literacy where applicable. It invites noting whether the interaction level among people involved in work contexts causes any differences in how information literacy is experienced.

A more practical argument around distinguishing between professions and workplaces, as the main point of the present paper, can be framed in Table 2. An indicative study in each specific context has been identified to give a more tangible look to the table.

As seen in Table 2, there can be studies in work context that have been conducted in physical workspaces. Most of the work-related information literacy studies so far fit within this section. These studies can look at both single profession or mixed-profession work contexts. Fire fighters' or ambulance officers' workplaces in Lloyd's studies [17, 18] are examples of single profession work contexts while querying information literacy of

**Table 2.** Work-related information literacy studies

| | Single profession work context | Mixed profession work context |
|---|---|---|
| Workplace (physically bounded workspace) | Lloyd [17, 18] | Bruce [4] |
| Profession | Sayyad Abdi, Partridge and Bruce [53] | |

academics, librarians, IT professionals, counseling services staff and staff developers all at one specific context such as a university in Bruce's [4] Seven Faces can be considered an investigation into a work context constituted of mix of professions. We acknowledge that data in these studies may have been collected from more than one specific workplace, such as more than one university in Bruce's [4] research. However, in comparison to research such as web professionals' study mentioned above, they are still allocated to the research trajectory that explores information literacy in physically bounded workspaces (workplaces). This is mainly due to the strong weight web workers in the study gave to their professional-level interactions. The research participants rarely limited their described experiences to the physical workspaces they belonged. As is seen in Table 2, research that explores people's information literacy at a professional level but in mixed-profession work contexts is still to be conducted.

As a theoretical contribution to the broad area of information literacy, and specifically, workplace information literacy (vs. educational and community contexts), this paper considers reconceptualising the work context in information literacy studies. It is believed this provides researchers of the field with a more articulated image of the general context of workplace which may lead to a more segmented conception of work-related information literacy. Following this, the paper suggests considering using the term "professional information literacy" as a complementary term besides "workplace information literacy" where applicable.

In order to contribute to the argument made in the present paper, it is recommended that the outcome of existing information literacy studies from different areas of Table 2 be compared together to generate a view on possible commonalities and variation across resultant conceptions. This will shed more light on the concern of the current paper on how information literacy is experienced differently when looked in specific work contexts with different levels of interaction.

It should also be noted that web profession is only one example profession in which a dominant feature such as virtuality leads people to work more at a professional level. To further advance this, more investigation into different workspaces is encouraged to identify other influencing features. The outcome of such research theme would add to the current theoretical understanding of workplace information literacy and would be of use to the information professionals who serve people at both levels.

## 6 Conclusion

The present paper suggests articulating the general context of workplace in information literacy research, which is anticipated to result in a more segmented conception of work-related information literacy. The paper considers distinguishing between information literacy researched in workplaces and professions. Referring to the results of a phenomenographic study on web professionals' information literacy, it is shown how work-related information literacy is experienced at professional level. This is indicated with respect to people's interaction with each other and with information at a broader level in comparison to a physically bounded workspace. In the case of web profession, virtuality is identified as the dominant feature of the profession that leads information literacy to be experienced at a professional level.

## References


1. Bruce, C.: Information literacy research: dimensions of the emerging collective consciousness. Aust. Acad. Res. Libr. (AARL) **31**(2), 91–109 (2000)
2. Lloyd, A.: Trapped between a rock and a hard place: what counts as information literacy in the workplace and how is it conceptualized? Libr. Trends **60**(2), 277–296 (2011)
3. Hepworth, M., Walton, G.: Developing People's Information Capabilities: Fostering Information Literacy in Educational. Workplace and Community Contexts. Emerald Group Publishing, Bingley (2013)
4. Bruce, C.: The Seven Faces of Information Literacy. Auslib Press, Adelaide (1997)
5. Bruce, C.: Workplace experience of information literacy. Int. J. Inf. Manage. **19**, 33–47 (1999). doi:10.1016/S0268-401(9800045-0
6. Lloyd, A.: Lessons from the workplace: understanding information literacy as practice. In: Lloyd, A., Talja, S. (eds.) Practicing Information Literacy: Bringing Theories of Learning, Practice and Information Literacy Together, pp. 29–49. Centre for Information Studies, Wagga Wagga (2010)
7. Cheuk, B.: Information literacy in the workplace: issues, best practices and challenges. Paper presented at the Information Literacy Meeting of Experts, Prague, The Czech Republic (2002)
8. Cheuk, B.: Delivering business value through information literacy in the workplace. Libri **58**, 137–143 (2008). doi:10.1515/libr.2008.015
9. Conley, T.M., Gil, E.L.: Information literacy for undergraduate business students: examining value, relevancy, and implications for the new century. J. Bus. Finance Librarianship **16**(3), 213–228 (2012). doi:10.1080/08963568.2011.581562
10. Kirk, J.: Information and work: extending the roles of information professionals. Paper Presented at the Challenging Ideas, ALIA 2004 Biennial Conference, Gold Coast (2004). http://www.conferences.alia.org.au/alia2004/pdfs/kirk.j.paper.pdf
11. O'Farrill, R.T.: information literacy and knowledge management at work: conceptions of effective information use at NHS24. J. Documentation **66**(5), 706–733 (2010). doi:10.1108/00220411011066808
12. Sen, B.A., Taylor, R.: Determining the information needs of small and medium-sized enterprises: a critical success factor analysis. Inf. Res. **12**(4), 1–18 (2007)
13. Sokoloff, J.: Information literacy in the workplace: employer expectations. J. Bus. Finance Librarianship **17**(1), 1–17 (2012). doi:10.1080/08963568.2011.603989
14. Crawford, J., Irving, C.: Information literacy in employability training: the experience of inverclyde libraries. J. Librarianship Inf. Sci. **44**(2), 79–89 (2012). doi:10.1177/0961000611436096
15. Klusek, L., Bornstein, J.: Information literacy skills for business careers: matching skills to the workplace. J. Bus. Finance Librarianship **11**(4), 3–21 (2006). doi:10.1300/J109v11n04_02
16. Hepworth, M., Smith, M.: Workplace information literacy for administrative staff in higher education. Aust. Library J. **57**(3), 212–236 (2008)
17. Lloyd, A.: Working (in) formation: conceptualizing information literacy in the workplace', in life long learning: whose responsibility and what is your contribution? In: 3rd International Life Long Learning Conference, pp. 218–224. Central Queensland University Press, Rockhampton (2004)
18. Lloyd, A.: Informing practice: information experiences of ambulance officers in training and on-road practice. J. Documentation **65**(3), 396–419 (2009)

19. Qayyum, M. A., Thompson, K. M., Kennan, M.A., Lloyd, A.: the provision and sharing of information between service providers and settling refugees. Information Research, 19(2) (2014). http://www.informationr.net/ir/19-2/paper616.html#.Vlj2gmQrKRs
20. Gasteen, G., O'Sullivan, C.: Working towards an information literate law firm. In: Bruce, C., Candy, P. (eds.) Information Literacy Around the World: Advances in Programs and Research, pp. 109–120. Charles Sturt University, Centre for Information Studies, Wagga Wagga (2000)
21. Rosenberg, V.: Information literacy and small business. Paper Presented at the Information Literacy Meeting of Experts, Prague (2002)
22. Macoustra, J.: Information literacy: organisational and law firm perspectives. Legal Inf. Manage. **4**(2), 130–135 (2004). doi:10.1017/S1472669604001483
23. Smith, E., Martina, C.: Keeping the dough rising: considering information in the workplace with reference to the bakery trade. Paper Presented at the 3rd International Lifelong Learning Conference, Rockhampton (2004)
24. Kirton, J., Barham, L., Brady, S.: Understanding and practice of information literacy in australian government libraries. Aust. Library J. **57**(3), 237–256 (2008)
25. Weiner, S.: How information literacy becomes policy: an analysis using the multiple streams framework. Library Trends **60**(2), 297–311 (2011)
26. Leavitt, L.L.: 21st Century workforce initiatives: implications for information literacy instruction in academic libraries. Educ. Libr. Inf. Literacy Workplace **34**(2), 15–18 (2011)
27. Travis, T.: From the classroom to the boardroom: the impact of information literacy instruction on workplace research skills. Educ. Libr. Inf. Literacy Workplace **34**(2), 19–31 (2011)
28. Head, A.J., Van Hoeck, M., Eschler, J., Fullerton, S.: What information competencies matter in today's workplace? Libr. Inf. Res. **37**(114), 75–105 (2013)
29. Limberg, L.: Experiencing information seeking and learning: a study of the interaction between two phenomena. Information Research, 5(1) (1999). http://www.informationr.net/ir/
30. Maybee, C.: Undergraduate perceptions of information use: the basis for creating user-centered student information literacy instruction. J. Acad. Librarianship **32**(1), 79–85 (2006). doi:10.1016/j.acalib.2005.10.010
31. Lupton, M.: Information literacy and learning. Unpublished Doctoral Dissertation. Queensland University of Technology, Brisbane (2008)
32. McGuinness, C.: Attitudes of Academics to the Library's Role in Information Literacy Education. In: Martin, A., Rader, H. (eds.) Information and IT Literacy: Enabling Learning in the 21th Century, pp. 244–254. Facet, London (2003)
33. Webber, S., Boon, S., Johnston, B.: A comparison of UK academics' conceptions of information literacy in two disciplines: english and marketing. Libr. Inf. Res. **29**(93), 4–15 (2005)
34. Boon, S., Johnston, B., Webber, S.: A phenomenographic study of english faculty's conceptions of information literacy. J. Documentation **63**(2), 204–228 (2007). doi:10.1108/00220410710737187
35. Williams, D.A., Wavell, C.: Secondary school teachers' conceptions of student information literacy. J. Librarianship Inf. Sci. **39**(4), 199–212 (2007). doi:10.1177/0961000607083211
36. McMahon, C., Bruce, C.: Information literacy needs of local staff in cross-cultural development projects. J. Int. Dev. **14**(1), 113–127 (2002). doi:10.1002/jid.864
37. O'Farrill, R. T.: Conceptions of Effective Information Use and Learning in a Tele-health Organization: A Phenomenographic Study of Information Literacy and Knowledge Management at Work. Unpublished Doctoral Dissertation. The Robert Gordon University, Aberdeen (2008)

38. Yates, C., Partridge, H., Bruce, C.: Learning wellness: how ageing australians experience health information literacy. Aust. Library J. **58**(3), 269–285 (2009)
39. Gunton, L.: Religious information literacy: using information to learn in church community. Aust. Library J. **60**(2), 155–164 (2011)
40. Gunton, L., Bruce, C., Davis, K.: Information literacy research: the evolution of the relational approach. information experience. In: Du, J.T., Zhu, Q., Koronios, A. (eds.) Library and Information Science Research in Asia-Oceania: Theory and Practice, pp. 82–101. IGI Global, Hershey (2014)
41. Yates, C., Stoodley, I., Partridge, H., Bruce, C., Cooper, H., Day, G., Edwards, S.L.: Exploring health information use by older australians within everyday life. Libr. Trends **60**, 460–478 (2012)
42. Lundh, A., Limberg, L.: Information practices in elementary school. Information Research, 13(4) (2008). http://www.informationr.net/ir/
43. Sundin, O., Limberg, L., Lundh, A.: Constructing librarians' information literacy expertise in the domain of nursing. J. Librarianship Inf. Sci. **40**(1), 21–30 (2008). doi:10.1177/0961000607086618
44. Tuominen, K., Savolainen, K., Talja, S.: Information literacy as a sociotechnical practice. Library Q. **75**(3), 329–354 (2005). doi:10.1086/497311
45. Lloyd-Zandiotis, A.: Working information: developing a grounded theory of information literacy in the workplace. Unpublished Doctoral Dissertation. University of New England, Armidale (2005)
46. Lloyd, A.: Recasting information literacy as sociocultural practices: implications for library and information science researchers. Information Research, 12(4) (2007). http://www.informationr.net/ir/
47. Veinot, T.: The eyes of the power company: workplace information practices of a vault inspector. Libr. Q. **77**(2), 157–179 (2007). doi:10.1086/517842
48. Kennan, M.A., Lloyd, A., Thompson, K., Qayyum, A.: Settling in: the relationship between information and social inclusion. Aust. Acad. Res. Libr. **42**(3), 180–210 (2011). http://www.tandfonline.com/
49. Walker, C.: The information world of parents: a study of the use and understanding of information by parents of young children. Libr. Trends **60**(3), 546–568 (2012)
50. Lloyd, A., Kennan, M.A., Thompson, K.M., Qayyum, A.: Connecting with new information landscapes: information literacy practices of refugees. J. Documentation **69**(1), 121–144 (2013). doi:10.1108/00220411311295351
51. Workplace. BusinessDictionary.com. http://www.businessdictionary.com/definition/workplace.html
52. Workplace. Oxford Dictionaries. http://www.oxforddictionaries.com/definition/english/workplace
53. Sayyad Abdi, E.: Web Prorfessionals: how do they experience information literacy. Unpublished Doctoral Dissertation. Queensland University of Technology, Brisbane (2013)

# Determining the Value of Information Literacy for Employers

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**Abstract.** Three workplace environments (a large public sector organization; a small private sector company; a small voluntary sector organization) are investigated to determine what factors may be relevant in determining the value of information literacy to these employers. Investments in developing employees' information handling capacity cover four areas: staff; systems; space; and client relations. Returns can be found in efficiency, profitability, staff motivation, customer service and regulatory compliance, all of which may accrue direct or indirect costs. In principle then, returns on investment in information literacy in specific contexts can be calculated or estimated.

**Keywords:** Information literacy · Workplace · Practice · Value · Employment

## 1 Introduction

This paper reports on a project, DeVIL (Determining the Value of Information Literacy), that aimed to identify quantitative and qualitative data that demonstrate the returns on investment in developing information literacy (IL) in workplace settings. What value is added by employing and training individuals who have appropriate and relevant know-how, competency and awareness in the handling of information, in whatever form that takes? The value might be financial, but it might also relate to other factors that are important to enterprises, such as enhanced efficiency, competitive advantage, or employee job satisfaction.

## 2 Background

Recent literature reviews by Williams, Cooper and Wavell [1] and Inskip [2] have discussed the importance of IL in the workplace. The reviews counter the bias in the IL literature toward defining it as information searching competencies as displayed in higher education settings [3, pp. 74–81). Information literacy can be generally defined as the capacity to make *critical judgments* about information and this capacity can be learned. Workplace learning, however, is less structured and more


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collaborative than the higher education environment. The IL skills and know-how that are valued in workplaces are more context-specific, rooted not in standards and generic guidance, but in practice and the "intersubjective agreement" of different stakeholders in the setting [4, 5]. There is a greater emphasis on people (as opposed to texts) as information sources; thus, developing an understanding of workplace IL practice means appreciating the social and informal ways in which information is processed into knowledge, good information management and organization, and data security [1, pp. 2–3]. As Inskip says [2, p. 9]: "This complexity requires a paradigm shift away from information literacy as a list of skills to be acquired and towards an understanding of the information environment in which the practice sits".

Seeking IL in the workplace is also complicated by difficulties with the term 'information literacy' itself. Conley and Gill [6], [2, p. 6] reported that business professionals recognized IL elements, but only when identified separately from the umbrella term. For example, Heichman Taylor [7] reports that "critical thinking" was identified by employers as a key constituent of staff members' capacity to make critical judgments and thus maintain, or steward, local "information landscapes" [4, 8]. "Environmental scanning" [9] was identified as a business process facilitated by these judgments. But these elements are themselves often vaguely defined and their costs and benefits hard to isolate and measure, directly or indirectly.

A full picture of an organisation's IL environment should also account for how the architecture of information systems, and of the physical space of offices, meeting rooms and so on, affect information flows [cf. 10]. One's position in social networks has long been recognized as influencing how easily or not one can access information [e.g. 11], and this is particularly true in workplace environments where tacit knowledge plays a more significant role in making informational judgments than it does in formal education.

Thus, determining the value of information literacy for employers requires more than just an audit of the costs and benefits of training in IL skills as these are typically conceived in the literature. In 2007, de Saulles [12] estimated that poor information literacy cost UK businesses alone £3.7bn per year. Although this figure provides a useful indicator of the overall and potential return on investment in developing IL in workplaces, more detail is required if we are to answer questions such as: what benefits do employers derive from recruiting, retaining and developing individuals who are information literate? What return on investment would they derive by providing relevant training to their employees, and better recognising information literacy, or aspects of it, in the professional and career development of their employees? What does the IL of employees, at all levels add to the performance of enterprises in the private, public, and not-for-profit sectors? As recognised by Williams *et al.*, greater evidence of the impact of IL, expressed in terms that relate to industry and professional priority areas, is urgently needed if business, government and professions are to be convinced of the relevance and significance of IL. This project is intended to help plug that gap in the evidence base.

## 3 Research Design

Our methodology needs to generate data that permit a broad understanding of workplace information environments and the way information literacy is constructed and valued in these environments. The DeVIL project is relatively small-scale and should be seen as only the first stage in a more extensive programme of research into how the value of information literacy can be determined in specific workplace settings. It has taken place between March and July 2015 and been funded by CILIP's information literacy group (ILG). The aim of the project is to perform an initial scan of the workplace IL environment, to determine:

- how employers perceive the value of information know-how, competencies and skills in specific contexts;
- what formal and informal training and staff development programmes take place within the workplace that are, directly or indirectly, oriented towards information;
- what relevant data might be collected by organisations, as part of their everyday operations, that could subsequently be used to calculate or estimate returns on investments into developing information know-how, competencies and skills.

Workplaces are highly diverse, but the scope of the project means we have to be selective with case studies. We investigated three UK organisations have been; all identities have been anonymised.

Case study A is a large, public sector organisation – an inner-city local authority with around 4,000 staff. It is responsible for a diverse portfolio of activities including housing, social care, and management of the local environment, and a very broad spectrum of information flows into, around, and back out of the organisation.

Case study B is a small, private sector company that develops and markets a human resources information system for use in the corporate sector. It has grown in the last ten years from a 'one-man band' to now employing around 30 staff, many of them part-time, and it has a second office in the Netherlands.

Case study C represents the voluntary sector, being a small organisation that acts as an information broker, training centre, and supplier of software solutions to voluntary sector organisations throughout a large metropolitan area. It also has around 30 staff.

We conducted a number of face-to-face interviews at each location, lasting around one hour each. These have been audio-recorded. Subjects are relatively senior officers in each organisation who are responsible for one or more of the following key areas of work, each relevant to our research questions: information policy; information systems; human resources; staff development; or finance. Each interview (with one exception, marked * in Table 1) has been conducted by both investigators and we used dual coding to draw out the key themes discussed in Sect. 4. Where available, we also draw on published documents that outline information policy or strategy. These have also been coded by both investigators.

**Table 1.** Case study details

| **Case A interviewees** | **Case B interviewees** | **Case C interviewees** |
|---|---|---|
| A1: Head of strategy and performance, Housing dept.<br>A2: Strategic Lead, performance and improvement<br>A3*: Head of ICT service integration<br>A4: Deputy Head of ICT, Chief Information Officer<br>A5: Co-ordinator of Corporate Information Governance Group<br>A6: Lead Human Resources advisor, organisation learning<br>A7: Business advisor, finance | B1: Operations manager<br>B2: Human resources manager<br>B3: Finance officer<br>B4: Software development manager | C1: Training manager<br>C2: Software and database manager |
| **Case A documents** | **Case B documents** | **Case C documents** |
| A8: The local authority's "Digital Strategy"<br>A9: "Information in [authority name]" a document drawn up by the CIGG (see A5). | No documents were available from this case. | C3: The organisation's strategic plan 2011-2014<br>C4: The organisation's strategic plan 2014-2016 |

Details on interviewees and documents are presented in Table 1 below. Codes (A1, B4) are used for reference in the results section.

## 4 Summary of Results

The generated data are rich and, for reasons of space, this paper can only summarize them. Four areas of investment have been identified and are each discussed in turn, drawing on data from the interviews and documentary analysis:

- investments in staff development and organizational culture;
- investments in information systems;
- investments in *space*; and,
- investments in outreach and client relations.

### 4.1 Investment in Staff

All three cases invest in staff development and in the fostering of organisational cultures with a direct impact on the way that staff members relate to information. This commitment is set out explicitly in relevant strategic documents: case A's Digital Strategy allows for "education, awareness etc. for staff about the integrity, validity and intent of internet information" [A8] and C's Strategic Plan talks about fostering "an internal culture of experimentation and curiosity" [C3]. But the approaches vary between the organisations.

As might be expected in a large and complex organisation that has to comply with statutory requirements, formal training in IL-related issues takes place in A to address areas that are mandatory for local authorities such as training on protocols and processes needed to ensure data security and confidentiality covering sensitive areas such as child protection; this is what A terms 'transactional' training [A6]. The training may be face-to-face

where it is important for staff to demonstrate appropriate knowledge, but is also done online. Organization A has developed interactive tests that are in the process of being made mandatory on information management and data security [A5]. Transactional learning is also used to develop expertise in specific tools such as Yammer. In some specific cases, high-level information competences are achieved through professional qualifications, notably CISSP (Certified Information Systems Security Professional) [A3]. There is also an expectation that staff will become familiar with statutory and ethical requirements regarding the handling of data, as outlined in A's extensive guidance. A network of different categories of experts, located in different departments, is available to provide advice where this is needed [A3, A5, A9].

C also engages in this sort of training but geared less to their staff than to their client base of voluntary organisations within their city region. C exists to make the local voluntary sector more informed and enable it to use information effectively; it aims to "foster an internal culture of experimentation and curiosity" among its clients. As such, outreach activities, including training courses and briefings (for instance, in data protection), form part of C's efforts to empower its clients, impart reliable information to them, and thereby equip them with appropriate business know-how. [C1, C2, C3]. C also requires its staff members to "[build] intelligence and understanding of and for the voluntary sector – carrying out research, collecting and disseminating information and ideas" [C1].

B is too small a company to run formal training; for an SME of its size, it is not cost-effective to run or to send its staff on courses –instead, the focus is allowing its staff up to 40 h per year to make use of modular, online courses [B2]. However, it runs semi-structured masterclasses where staff members are encouraged to share know-how in groups and where such know-how is demonstrated and explained. It is noteworthy also that it runs an apprenticeship scheme with one individual currently in post. But even for B, it is imperative to ensure that its staff members have the know-how to care for certain types of sensitive information: the company recognises the importance of knowledge of protocols and processes needed to protect the confidentiality of customers' data [B1, B2].

Less formal approaches to acquisition of skills and knowledge – and to the fostering of a culture characterised by extensive information sharing – are characteristic of both A and B. They therefore present similarities in spite of the differences in business purpose and scale. Case A deploys what it terms a 70/20/10 approach to training. 10 % of the overall training activity aims to be 'transactional' (see above), and 20 % takes the form of online courses. The remaining 70 % relies on learning through colleagues, by osmosis and/or learning by doing [A2, A6]. In this spectrum, there is a blurring of the distinction between formal training and the informal acquisition of know-how, over time, through more casual forms of interfacing [A1]. Tools such as Yammer encourage the regular, informal exchange of knowledge, breaking down the formal, hierarchical chains of command and information flow. Communities of practice develop, founded on a culture of openness and transparency and a readiness to share information. Staff are stimulated into using (and learning how to use) delegated means of sharing information, without the need for formal training, because it works for them – and also because they want to keep up with their peers [A1, A2, A4].

For B, given the relative absence of structured training, there is a reliance on staff learning and expanding their knowledge base in less formal ways. The open, collaborative nature of the organisation, along with a strong inbuilt sense of teamwork, facilitates the effective flow of information within the company and between it and its customers [B1]. Having relevant information at hand is important for ensuring good levels of customer service and staff are expected to be all-rounders to deal with the full range of customer interactions – with regards to both technical knowledge and soft skills, such as the ability to communicate with customers in a language which the latter can relate to. It is therefore important for staff to keep themselves constantly informed about evolving customer systems, products, needs, and expectations; about the web environment (particularly important for front-end developers); and also about what their competitors are up to.

### 4.2 Investments in Information Systems

Case A has by far the biggest investment in information systems. The multiplicity and complexity of these systems has led the local authority to push for systemic improvements in three broad areas, both involving the acquisition by staff of information-related skills:

1. Making data more readily available and shareable through systems designed to allow staff to control and manipulate it in a delegated fashion: this allows them to make use of, interpret, and analyse data relating to service delivery, rather than pass it on through the line management chain as would have been the case in the past. There is thus improved management of data by a large number of staff members, and more intelligent and critical use of it to gauge performance and impact [A1, A2, A8].
2. Integrating data so that staff may deploy it in a more seamless and holistic way for the benefit of clients: this means that data about the local authority's clients and/or users that was once scattered is now increasingly brought together to provide a rounded view of the needs of each case. Such a joined-up approach helps to provide a more professional, joined-up service to clients [A3, A5].
3. Deploying information-sharing tools: Yammer was introduced as a deliberate means of changing the way that information is exchanged across the organisation. It is an example of a system being implemented strategically with the very clear aim of effecting the changes in organisational culture outlined above.

For C, investment in information systems is on a much smaller scale. It trains its clients in the use of CiviCRM, contact management software designed to meet their diverse data management needs. The organisation sets up and configures the software according to those needs and provides training accordingly. Case B's core business is developing an information system for use by other organisations but, beyond applications such as financial accounting software, there is no particular use made of information systems to govern the company's work processes.

### 4.3 Investments in Space

In two case studies it was plain that information management and, thus, information literacy was facilitated by the spatial configuration of their premises. Both A and B have open-plan offices and both rely on the nature of the spatial environment to help foster a particular type of working culture that is founded on an aptitude to share information, particularly across departmental or team boundaries. In case A, the local authority has recently moved into a large new building, designed to a high specification to encourage new, less hierarchical ways of working and to provide cost savings on accommodation. The building is smaller than its predecessor as the authority promotes flexible, home and/or off-site working using mobile devices and so the building is not large enough to contain its full complement of staff at any one time. 'Hot-desking' is the norm, and the use of paper has been reduced to a bare minimum. Careful design and use of space helps to create an informal and flexible working environment, designed to capitalise on conversations between small groups of staff members with no fixed work-stations; it encourages agile working and the breaking down of silos. In this way, the physical working environment contributes to culture shift and to the way that information is shared and exchanged [A1].

In the case of B, the office is considerably smaller and has not been specifically designed for the company, but the ethos remains the same: an open space that deliberately [B1, B3] serves as a venue for facilitating links between teams and the sharing of information. Small areas reserved for leisure activities reinforce the informal nature of the environment. For C, however, the creative use of office space to facilitate information sharing is not an evident factor.

### 4.4 Investments in Outreach and Client Relations

Information flows in both directions, between the organization and its customers/clients, must be accounted for when determining the value of information literacy to each. All three organisations are attentive to their client or customer base, and rely on well-informed staff to ensure good relationships with these external stakeholders. For A and C, the empowerment of users is an important factor. Case A has a mandate to reduce digital exclusion and takes steps to develop digital skills in the community, for instance through the use of local "digital champions": residents in housing estates, supported by the local authority, who undertake outreach work to engage with their more digitally-excluded neighbours. Council services, such as libraries and volunteer networks, are also used for such purposes [A4]. A's Digital Strategy states that "By tapping into the rich and diverse talent pool that exists in [the locality] including our volunteers, third sector and local business we can add capacity to develop digital confidence and life skills" [A8].

For C, there is a similar capacity-building imperative, to build and expand the capacity of the voluntary sector to operate in a businesslike way – particularly important in a financial context where voluntary organisations are increasingly being called upon to play a greater role in local service delivery [C1, C2]. Indeed, the very nature of the organisation leads it to capitalise on its ability to nurture its client base; the capacity to impart reliable information is crucial for this.

B also gains from having an information literate customer base, in terms of getting high quality feedback, for instance, about potential new product development. There is thus a relationship between ensuring that customers are well-informed about B's products and their applicability and future business opportunities [B1, B4].

### 4.5 Towards Calculations of Returns on Investment in IL

Figure 1 presents key *value factors* that emerge from across the data; that is, where information literate practices are likely to add value to the three cases study organisations. Each factor represents a business objective for which the investments in information literacy, discussed in Sects. 4.1–4.4, can potentially deliver returns. Value factors under the *profitability* and *efficiency* headings are often expressed quantitatively in terms of direct costs, though the specific data are not always easy to come by either because the organization is too small to generate them [B3, C1, C2] or, at the other end of the scale, because of the size and complexity of case A and its legacy of multiple and not always complementary information systems [A7]. Some data were available from case A: for example, the move to the new office and the parallel work to adopt new information practices (see Sect. 4.3) saved £10 m [A4]. These quantitative data may be available in other cases, though not always.

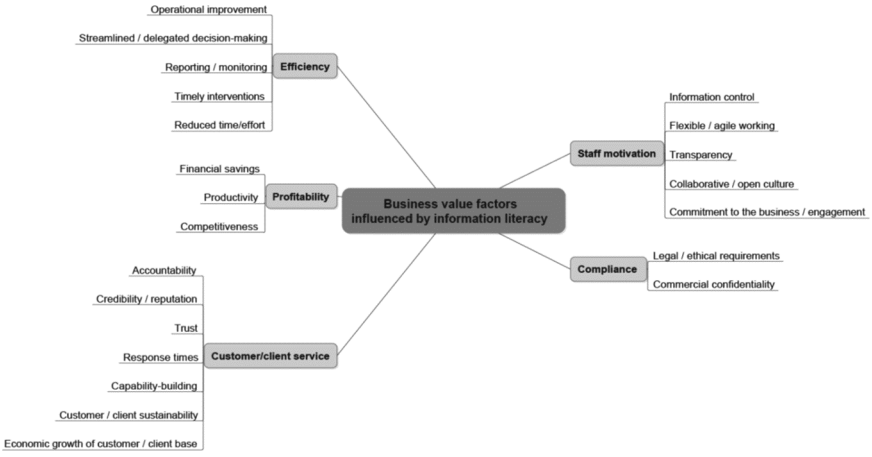


**Fig. 1.** Value factors relevant to information literacy

Other costs are more indirect or represent potential costs. Giving staff greater access to and control of relevant data (and hence business intelligence) allows for improved accountability and enhanced monitoring and reporting; this not only generates more efficiency through time-saving but allows for the potential stripping of management layers resulting from a more devolved way of working [A1, A2, A8]. Failure to meet regulatory standards may result in fines. The local authority in? A had never been found culpable in any breach of data protection standards and thus was not subjected to fines from the UK Information Commissioner [A5] but the potential was there. B and C, at

smaller absolute scales but no less importantly in relative terms, acted as custodians of client data and would both lose valuable credibility and trust if poor information-handling practices on the part of their staff were to result in data loss or breaches of security or privacy [B1, C2]. This would in turn impact on reputation and the companies' ability to acquire repeat or new business from customers.

Staff turnover is an important cost to account for. As noted in Sect. 2, a great deal of the information that is embedded in any workplace landscape is tacit, stored in the minds and embodied in the practices of colleagues [4, 5]. Even in case A, with its substantial investment in information systems, not all the valuable information can be captured and made explicit and staff members' accumulated knowledge of matters such as to whom information requests should be directed would be lost if that person were to leave [A2]. In the smaller organizations this problem is many times more acute. Thus, investments in staff to develop their information know-how are perceived as having returns in the shape of job satisfaction and motivation. Staff who feel valued and that they can develop their careers in the organization are more likely to stay and thus keep their tacit knowledge within the landscape [B2, C1].

Offering effective customer/client service and preserving credibility and trust also brings returns on investment in terms of the organization's interactions with its environment in ways that keep that environment sustainable so the organization can continue to draw resources from it. Local authority A seeks to build information literacy in its residents partly to optimize solutions like new information systems and thus drive internal efficiency gains but it also undertakes this work to enhance their employability, and thus sustain the economic potential of the locality [A8]. C also seeks to increase the capacity of its client base and thus address its own sustainability [C1–C4]. Such returns on investment must be calculated on a much longer term than is typical in direct financial accounting.

## 5 Conclusion

As noted in Sect. 3, the DeVIL project has been a small-scale, preliminary investigation of how the value of information literacy to employers can be determined. Our interviewees have helped us establish a range of areas in which organizations must invest to promote information literacy among both their staff and their client/customer base. They also identified areas of practice in which returns on these investments may accrue, directly or indirectly. At this stage we have created crude maps of the organizational areas in which returns on investments in IL can be expected. These are akin to "base maps" of, say, urban areas over which further, quantitative information, such as levels of employment, or property prices, can later be overlaid.

Limitations to what we have done thus far must be acknowledged as these suggest areas in which this research should now be developed. Firstly, these base maps have been constructed through data generated by a range of different stakeholders in three quite different organizations and thus capture something of the potential variation in how the value of IL can be perceived [cf. 3, pp. 160–165]. Missing, however, are the voices of 'on the ground' staff and the clients/customers: at best, our interviewees have

acted as proxies for these perceptions. This does not invalidate our initial conclusions, but does show one way in which they can be further enhanced.

Due to the context-specific nature of all information landscapes and, hence, all workplace IL practice, it would be an epistemological mistake to seek generic rules that can be applied without consideration for the unique features of given settings [3, pp. 164–165]. What we seek to create is a *tool*, but like any tool, its relevance and effectiveness can only be judged *in practice*, undertaken by those on the ground. To work in this way, the tool must be flexible and adaptable, able to identify – but not dictate – the data that exist in given settings and allow calculations of returns on investment to be made. Section 4 of this paper summarises the broad *range* of factors that come into play when determining the value of IL to employers but further research, in specific workplaces, will be needed in order to use these maps as the base for more context-specific data, and generally, to hone the tool and the insights that it provides.

## References

1. Williams, D., Cooper, K., Wavell, C.: Information Literacy in the Workplace: An Annotated Bibliography. Robert Gordon University/InformAll, Aberdeen (2014)
2. Inskip, C.: Information Literacy is for Life, not Just for a Good Degree: A Literature Review. CILIP, London (2014)
3. Whitworth, A.: Radical Information Literacy: Reclaiming the Political Heart of the IL Movement. Chandos, Oxford (2014)
4. Lloyd, A.: Information Literacy Landscapes: Information Literacy in Education. Workplace and Everyday Contexts. Chandos, London (2010)
5. Lloyd, A.: Information literacy as a socially enacted practice: sensitising themes for an emerging perspective of people-in-practice. J. Documentation **68**, 772–783 (2012)
6. Conley, T., Gill, E.: Information literacy for undergraduate business students: examining value, relevancy and implications for the new century. J. Bus. Finance Librarianship **16**, 213–228 (2011)
7. Taylor, L.H.: Information literacy in subject-specific vocabularies: a path to critical thinking. Coll. Undergraduate Libr. **15**, 14–158 (2008)
8. Wenger, E., White, N., Smith, J.: Digital Habitats: Stewarding Technology for Communities. CPSquare, Portland (2009)
9. Zhang, X., Majid, S., Foo, S.: Environmental scanning: an application of information literacy skills at the workplace. J. Inf. Sci. **36**, 719–732 (2010)
10. Tagliaventi, M., Mattarelli, E.: The role of networks of practice, value sharing, and operational proximity in knowledge flows between professional groups. Hum. Relat. **59**(3), 291–319 (2006)
11. Granovetter, M.: The strength of weak ties. Am. J. Sociol. **78**, 1360–1380 (1973)
12. De Saulles, M.: Information literacy amongst UK SMEs: an information policy gap. Aslib Proceedings **59**, 68–79 (2007)

# Information Literacy, Leadership and Management

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**Abstract.** One of the dominant features of successful development of information literacy is effective leadership and good management that is important at various levels of the university (at top management level, library level, school and faculty level, department level and programme level) and could enormously influence the development of information literacy. Therefore, a study was designed to investigate the views and understanding of top and middle managers on their activities and competencies in academic libraries. A constructivist approach and grounded theory methodology was used in this study. Semi-structured interviews were conducted with top and middle managers of seven Estonian academic libraries. This paper presents an overview of how information literacy and leadership is discussed in the library and information science literature, and selected results of the research project that shows how top and middle managers perceive the role of information literacy in their leadership role, activities and competencies.

**Keywords:** Information literacy · Leadership · Management · Academic libraries · Grounded theory

## 1 Introduction

Virkus [1] examined the ways in which information-related competencies are being developed within European higher education institutions of open and distance learning and found that one of the dominant features of successful development of information literacy was effective leadership and good management. Although leadership and management have received some attention in different information literacy frameworks and guidelines and by some authors [2–7], and there is an increasing interest in leadership in the library and information profession [8–11], it is not an issue which has gotten much attention in information literacy research. The focus is more on how to get management support within universities rather than how to demonstrate influential leadership in libraries [12–14].

Roberts and Rowley [10] highlighted that both public and academic library sectors are concerned with leadership and there is also a suggestion in the literature that senior library staff are not necessarily always ready for leadership. Mullins [14] finds that leadership qualities are scarce, with senior managers focusing too much on library skills and not enough on leadership. Both Mullins [14] and O'Connor [15] suggest that the library and information profession has been too 'narrow', too focused on 'the ordinary


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and the mundane', and that staff need to consider the intelligences that they require to pursue their work and lives, and to succeed as leaders [1], [10, p. 8].

Kaarst-Brown et al. [16] explored the relationship between a library's organizational culture and its effectiveness and found that leadership has an important role. Collis and van der Wende [17, p. 15] exploring change in the higher education context highlight the importance of leadership in the change process and note that "the profile of an institution is not only influenced by its history and demographics but also by its current leaders" and leadership, and the internal power structure is "also an important background dimension in a university's change process". Reding [18, p. 3] concludes: "Real reforms, however, can only take place when these reforms are accepted and supported by the academic community, the institutional leadership, students and staff".

Virkus [1] found in her research that good leaders and managers are required to develop information literacy policies and strategies, to make a difference, to build efficient teams, inspire and support these teams, and to be able to achieve objectives. Leadership can influence the establishment of good collaboration and partnerships, the initiation of information literacy programmes and courses, the image of the library and librarian, the organizational and library culture, staff development, and research. She found that a critical role for leaders and managers is to support the development process with new ideas, themes and projects. Good leaders and managers are important at various levels of the university (at the top management level, library level, school and faculty level, department level and programme level) and could enormously influence the development of information literacy by playing a critical role in the process. Influential leaders were most often in this study the initiators and driving forces behind information literacy initiatives categorized as 'good practice'. It was believed that the strength of the leadership, combined with clarity of the vision will influence the change process enormously [1, p. 255].

In the educational context, leadership is an important theme. Applying innovative ways of teaching and learning and assessment also needs champions and educational leaders. Instructional leaders could inspire educational teams, lead good practices and projects and promote innovative educational ideas both within the university and to the wider community. It was found that academics and course team leaders played critical roles, particularly in terms of the instructional leadership required to integrate information literacy into the curriculum [1].

It was found that leadership in libraries required a set of qualities and skills that would allow collaboration at many levels and from many disciplines within a university. Leaders should be able to motivate, inspire, and induce their staff or teams to move forward while having a broad knowledge of educational and university policy and developments, financial opportunities, and faculty issues. Leadership capabilities were frequently connected with management capabilities. Some librarians even wondered whether there are enough good leaders within the library profession at all. The influence of library managers and leaders was regarded as being critical in all stages of the development of information literacy including the initiation, motivation and facilitation, resource allocation, development, implementation and dissemination of results within an academic community. Several research participants stated that leaders are also needed in the field of research; research leaders who initiate new research projects, find new

and challenging research topics and areas, form good research teams and are able to find funding for the information literacy research [1].

However, it was found that in European higher education institutions of open and distance learning there were a few enthusiastic leaders to support the development process of information literacy. Institutional and governmental support, however, through clear and effective policies and commitment to human and physical resource development to achieve the efficient development of information literacy is of utmost importance [1,19, 20].

Several authors confirm that the policy and strategy dimension of information literacy has not gotten sufficient attention in the academic literature [20–22]. Virkus [19] has reviewed the literature related to strategy and policy aspects of information literacy.

With this background this study was designed to investigate the views and understanding of top and middle managers on their activities and competencies, including information literacy, in academic libraries. There are many approaches and definitions of information literacy [1,19]. However, in this study, information literacy is defined as the skills, knowledge, attitudes, experience, attributes, and behaviour that an individual needs to find, evaluate and use information effectively [19, p. 470].

## 2 Methodology

This research takes a constructivist approach and uses a grounded theory research strategy. Constructivist theory suggests that humans construct knowledge and meaning from their experiences. This expresses the belief that there exist multiple socially constructed realities and reality is interpreted by individuals. Knowledge is created in interaction between the investigator and the research participant. The knower and the known form a dialectic unit and knowledge is inherently subjective, inherently structured by the subjectivity of the researcher [1, p.130], [23, 24]. Thus, the constructivist approach is sensitive to the specific context and uses various methods to understand how people have experienced and "made sense of their practices from their perspective" [1, p.130], [25, p. xii].

Grounded theory, developed by Glaser and Strauss [26] in the 1960 s and drawing on symbolic interactionism is both a strategy for doing research and a particular style of analysing data arising from research [27, p.191]. Charmaz [28–30] developed grounded theory further and proposed a constructivist approach to grounded theory. This approach makes the following assumptions: (1) reality is multiple, processual, and constructed – but constructed under particular conditions; (2) the research process emerges from interactions; (3) it takes into account the researcher's positionality, as well as that of the research participants; (4) the researcher and researched co-construct the data - data are a product of the research process, not simply observed objects of it. Researchers are part of the research situation, and their positions, privileges, perspectives, and interactions affect it. Thus, research always reflects value positions. The problem becomes identifying these positions and weighing their effect on research practice, not denying their existence [30, p.402]. Rather than being a *tabula rasa,* social constructionists also advocate recognizing prior knowledge and theoretical preconcep-

tions and subjecting them to rigorous scrutiny. Grounded theorists' awareness of the relativism in research practice fosters their reflexivity about how they construct their actions. Rather than assuming that theory emerges from data, constructionists assume that researchers construct categories of the data. Instead of aiming to achieve parsimonious explanations and generalizations devoid of context, constructionists see participants' views and voices as integral to the analysis and its presentation. Charmaz believes that acknowledging differences between objectivist and constructionist grounded theory offer researchers a frame to clarify their starting assumptions and research actions [30, p. 402,1, pp. 165–167].

The comparative analysis was done after the coding stage of the study. In the first stage of comparison, knowledge and competencies related to information literacy were identified on the basis of statements of leaders of Estonian academic libraries about their role and competencies. The second stage of comparative analyses included comparison of six basic information literacy skills given in the International Federation of Library Associations (IFLA) Guidelines on information literacy [31] with the skills mentioned by leaders of Estonian academic libraries. The results of this comparison are presented in Table 1.

**Table 1.** Information literacy skills of IFLA and relevant skills mentioned by the leaders of Estonian academic libraries.

| IFLA information literacy skills | Relevant skills mentioned by the leaders of Estonian academic libraries |
|---|---|
| Identify information need | Statements about a need for wide knowledge about different areas of information environment, politics and social life |
| Effectively search for information | Awareness of developments and processes in the library and information field in the world and search for relevant information |
| Analyze and interpret information | Having relevant and sufficient information for decision-making |
| Evaluate the accuracy and reliability of the information | Understanding what information is appropriate for sharing |
| Communicate and present the information | Teamwork, communication from top to bottom and vice versa, presentation skills |
| Utilize information for achieving actions and results | Using knowledge about developments in the library and information field to achieve their organizational goals and objectives. |

Semi-structured interviews are used for data gathering in this research. The interviewees are top and middle managers of seven Estonian academic libraries: Tartu University Library, Tallinn University of Technology Library, Academic Library of Tallinn University, Estonian Academy of Arts Library, Library of the Estonian Academy of Music and Theatre, Library of Estonian University of Life Sciences and National Library of Estonia. The number of research participants is 50–55 top and middle managers.

The interview questions were divided into two parts; both parts have three sections. In part one, the interviewed leaders have to answer questions about themselves. The second part of the interview includes questions where leaders have to answer about and consider other level leaders. The views on and understanding of the activities and competencies of other level leaders and managers were explored, because the presumption of this study was that leaders of all levels constitute a team, and therefore need distinct understanding of the role of other team members in the library leadership process.

Sections of part one include: the leader's role, needed competencies and the educational background of the leader. Questions about the leader's role gather data about the role image and common activities of the leaders in their working days. Questions about competencies are developed to gather data about leaders' views on the skills and knowledge they need for fulfilling the role of the leader. In Sect. 2 there are questions about the leader's views on library and information competence – how academic library leaders perceive the library and information science as a professional field from a leadership perspective. In the Sect. 3 leaders introduce their educational background and assess different educational areas for the leader's role. In this section leaders are asked to assess the library and information science education offered in Estonian universities from the point of view of the academic library leader.

Sections 1 and 2 of part two are identical to the relevant sections of part one: Sect. 1 is about the leader's role, and Sect. 2 is about competencies. Section 3 includes questions about the expected educational background for the leader.

The interviews were transcribed and data was analysed using the method of constant comparative analysis. This paper presents the preliminary analysis of the results of this study from the information literacy perspective. Thus, some selected results of this research project are presented.

## 3 Results and Discussion

The term 'information literacy' is rarely used by the top managers of Estonian academic libraries when they talk about their role and competencies, and everyday work practices. However, both top and middle managers mentioned skills that are part of information literacy, for example, information seeking skills, information handling and analysis skills, gathering, arranging and communicating information, decision-making that is based on adequate and appropriate information while talking about their everyday work. One top manager used the term '*openness to information*'. Top and middle managers referred frequently to information overload and the ability to cope with it. One inter-

viewee notes: *"There is a continuous need to be familiar with professional literature. You need to know and compare your situation with other institutions, to know where you are now and what will be the future possibilities … to find good ideas and how to solve one or another problem"*. However, the term 'information literacy' was never used.

It should be mentioned, however, that middle managers of Estonian academic libraries were much more familiar with the concept of information literacy than the interviewed top managers and related it more often to their everyday work practices. It might be explained in terms of the function of their everyday work tasks that were more closely connected with different aspects of information literacy. However, they also used different terms to describe information literacy. For example, having wide knowledge of information handling, management and information work, good communication skills, finding and using relevant information, information based decision-making, awareness of information processes and developments, information analysis and synthesis.

Christiansen et al. [32] believe that different conceptions, language, and assumptions about information literacy, can hinder the development of information literacy. Virkus [1] also found that 'information literacy' was not part of the vocabulary of the leaders and managers of European higher open and distance learning institutions. O'Sullivan [33] notes that the business and management world does not use the same language as librarians in talking about skills needed in the knowledge-based economy.

The top and middle managers of seven Estonian academic libraries who were interviewed highlighted the following knowledge and skills for effective management and leadership: wide knowledge not only in the library and information world, but also about political, economic and social life, general management, strategic management and planning, change management, human resource management, conflict management, negotiation, financial management, fundraising, public administration, marketing, information technology, use of the language of business and management, and communication.

Information sharing and communication was one of the most discussed topics in the interview process. All interviewees agreed that information sharing and communication are the most important skills for the manager. The middle managers believed that knowledge about developments in the library and information field must be communicated by top managers. This is important for employees to understand developments in their own library, as well. For example, one interviewee mentioned "*Communication is very important for developing it [library], you must be able to distribute your ideas and thoughts to every person …*". Another aspect of communication that was mentioned by middle managers was that everything that happens in the organization must be communicated to the staff. However, some problematic aspects occur here – how to communicate the decisions of the top management when they contain delicate information, which may cause uncertainty or excitement among the staff. One middle level manager noticed: "*Communication skills … Because I've also noticed that when the leader wants to say a kind of thought, it's for all kinds of levels, even at the national level, and then he talks and talks and talks, and you still cannot understand what he wants to say and his voice never ends, and you still cannot get the point, so it's not the kind of thing which you run a huge respect for this man. For*

*this, of course, if you're a manager, it is very important that people have to respect you…. So it is good if they have the charisma and even better if they have very good communicative skills"*. Internal communication was mostly problem for middle managers.

Several middle managers highlighted the importance of presentation skills and expressed the view that top managers of Estonian libraries do not have good presentation skills. One interviewee noted: "*Whenever there is some kind of event, in which the library director have to have an opening speech, for example, to speak introductory words, it could not stand criticism, in my mind. I always look forward to, that it would be something more, something radiant. It is this sparkle that is often missing"*.

The top and middle managers of academic libraries also highlighted the importance of knowledge about educational trends.

The top and middle managers mentioned frequently that the most important skill in their leadership role is the teamwork skill. For example, one interviewee noted: *"The most difficult is perhaps that if you do not have a team, or you do not have anybody to discuss your ideas, or they do not come along. Perhaps this is the most difficult when you are totally alone with some initiatives. You definitely need teamwork skills"*. Another mentioned: "*A very important skill is to manage people. Making a very good team of people and motivating people is a very important activity, you should also make people happy*".

Financial management and fundraising skills were also quite frequently mentioned. One interviewee expressed it in this way: "*The leaders must deal a lot with the library funding, they must all ensure that the institution manages financially. They should always look for money, deal with fundraising, well, they should observe how the library remains in its budget that the deficit would not be. This is one very important thing for each leader or manager"*.

There were different opinions about whether or not library and information science education including information literacy is important for library leaders and managers. It was evident that library managers who had library and information science education found it very useful for their position, but other leaders valued more other education they had acquired, for example, history, humanities or management of culture. For example, a leader with library and information science background noted: "*Of course, library and information science education is very important for the library leader. You can't manage library without these knowledge and skills. The management is not so universal phenomenon that you can manage whatever institution – library, boot factory, bread factory or whatsoever…. You have to know the institution you are leading and its main work processes"*. One middle level manager mentioned: *"I'm the only middle level manager in my library who has the library and information science educational background. Sometimes I feel that I have to explain so many basic concepts of the librarianship to some people who should know these things themselves. … And I feel that if they have had library education it would have been much easier to work with them"*.

Generally, the top and middle managers of Estonian academic libraries stated that for the leader it is very important to have a wider knowledge about library and information fields – about processes, developments, and new trends and directions. They agreed that they should be able to analyze the information and use it for the effective

development of their libraries. However, they did not relate it always with library and information science education.

One reason why top managers of Estonian academic libraries often favoured management concepts and skills might be that they participated quite often in different management training courses. These training courses are mostly guided by management professionals who talk in management terms and business language. The top managers of academic libraries take on the same language, and think about management in terms of business.

However, to be an efficient leader and manager, they have to utilize a lot of skills including information literacy – they must understand the information need, search process, analyze and interpret the information, share the information with their colleagues and then utilize information and knowledge to achieve their organizational goals and objectives.

Table 1 presents a comparison of six basic information literacy skills with knowledge and competencies mentioned by leaders of Estonian academic libraries.

Most of the interviewees agreed that for a manager of the academic library it is essential to have a wide knowledge of different areas, for example, politics, economics, and social life, in addition to the library and information field. This statement shows that both top and middle managers were well aware of their information needs. In addition, a number of top and middle managers discussed the need to familiarize himself/herself with the developments of the library and information field, not only in Estonia but also in other countries. It also refers to the need to have skills to effectively search for, find and use information. Several interviewees stated the importance of decision-making in their everyday work practice. However, efficient decision-making depends on the ability to identify relevant information from the mass of data and information available. One interviewee said "*He/she must have knowledge to make decisions*" and another added *"He/she must be able to get such kind of data, that he/she is capable of making decisions"*.

Thus, the top and middle managers of Estonian academic libraries acknowledged the role of information literacy although the term was not used. They needed knowledge about processes in library and information world, and also wide knowledge about the environment in which libraries function. This knowledge gave them background and ideas for developing their organizational goals. Moreover, the top and middle managers of Estonian academic libraries considered information-related competencies inevitable in their competencies and in their role as a leader.

## 4 Conclusion

The top and middle managers of Estonian academic libraries are aware of the importance of information literacy and relate several components of information literacy to their everyday professional practice. However, they never use the term 'information literacy'. They talk about skills that are relevant to information literacy, but use different terms that often originate from business and management. Thus, it should be said that in statements of top and middle managers about their role and competencies, information-related competencies have an important role although it is not always explicitly recognized.

## References


1. Virkus, S.: Development of information-related competencies in european higher open and distance learning: an exploration of contextual factors, Ph.D. thesis, Manchester Metropolitan University, Manchester (2011)
2. CETUS: The Academic Library in the Information Age: Changing Roles. (Discussion Series). Consortium for Educational Technology for University Systems, Seal Beach (1997). http://www.gvsu.edu/library/librarylights/winter02/ChangingRoles.html
3. Haycock, K.: Fostering collaboration, leadership and information literacy: common behaviors of uncommon principals and faculties. NASSP Bull. **83**(605), 82–87 (1999)
4. ACRL: Characteristics of programs of information literacy that illustrate best practices: a guideline best practices initiative institute for information literacy. Approved by the ACRL Board, June 2003. Association of College and Research Libraries (2003). http://www.ala.org/ala/mgrps/divs/acrl/standards/characteristics.cfm
5. Bundy, A. (ed.): Australian and New Zealand Information Literacy Framework: Principles, Standards and Practice, 2nd edn. Australian and New Zealand Institute for Information Literacy, Adelaide (2004). http://www.caul.edu.au/
6. McGuinness, C.: Exploring strategies for integrated information literacy. Commun. Inf. Literacy **1**(1), 26–38 (2007)
7. Saunders, L.: Information Literacy as a Learning Outcome: The Perspective of Institutional Accreditation. Libraries Unlimited, Santa Barbara (2011)
8. Dewey, B.I.: Leadership and university libraries: building to scale at the interface of cultures. J. Libr. Adm. **42**(1), 41–50 (2005)
9. Ritchie, A., Walker, C.: Continuing Professional Development: Pathways to Leadership in the Library and Information World. K. G. Saur, Munich (2007)
10. Roberts, S., Rowley, J.: Leadership: The Challenge for the Information Profession. Facet Publishing, London (2008)
11. Rowley, J., Roberts, S.: Influential leadership for academic libraries. In: Griffiths, J.R., Craven, J. (eds.) Access, Delivery, Performance: The Future of Libraries Without Walls, pp. 197–214. Facet Publishing, London (2009)
12. Snavely, L., Cooper, N.: Information literacy debate. J. Acad. Libr. **23**(1), 9–14 (1997)
13. Iannuzzi, P.: Faculty development and information literacy: establishing campus partnerships. Ref. Serv. Rev. **26**(3/4), 97–102 (1998)
14. Mullins, J.: Are public libraries led or managed. Libr. Rev. **55**(4), 237–248 (2005)
15. O'Connor, S.: The heretical library manager for the future. Libr. Manag. **28**(1–2), 62–71 (2007)
16. Kaarst-Brown, M.L., Nicholson, S., Von Dran, G.M., Stanton, J.M.: Organizational culture of libraries as a strategic resource. Libr. Trends **53**(1), 33–53 (2004)
17. Collis, B., van der Wende, M.: Models of Technology and Change in Higher Education: An International Comparative Survey on the Current and Future Use of ICT in Higher Education. Twente: Center for Higher Education Policy Studies (CHEPS). Report (December 2002). http://doc.utwente.nl/44610/1/ictrapport.pdf
18. Reding, V.: Tuning educational structures in Europe: from Prague to Berlin, the EU contribution. In: Opening Address at the Tuning Closing Conference, Brussels, 31 May 2002. http://europa.eu.int/commdgs/education_culture
19. Virkus, S.: Development of information-related competencies in European ODL institutions: senior managers' view. New Libr. World **107**(11/12), 467–481 (2006)
20. Virkus, S.: Information literacy from the policy and strategy perspective. Nord. J. Inf. Lit. High. Educ. **4**, 16–37 (2012)

21. Basili, C.: A framework for analysing and comparing information literacy policies in European countries. Libr. Trends **60**(2), 395–418 (2011)
22. Whitworth, A.: Empowerment or instrumental progressivism? Analyzing information literacy policies. Libr. Trends **60**(2), 312–337 (2011)
23. Denzin, N.K., Lincoln, Y.S.: Introduction: the discipline and practice of qualitative research. In: Denzin, N.K., Lincoln, Y.S. (eds.) The Landscape of Qualitative Research: Theories and Issues, pp. 1–45. Sage, Thousand Oaks (2003)
24. Badley, G.: Reading an academic journal is like doing ethnography. Forum: Qual. Soc. Res. (Forum Qualitative Sozialforschung) **5**(1) (2004). http://www.qualitative-research.net/index.php/fqs/article/view/660/1428
25. Ezzy, D.: Qualitative Analysis: Practice and Innovation. Routledge, London (2002)
26. Glaser, B., Strauss, A.: The Discovery of Grounded Theory. Weidenfield & Nicolson, London (1967)
27. Robson, C.: Real World Research: A Resource for Social Scientists and Practitioner-researchers, 2nd edn. Blackwell, Oxford (2002)
28. Charmaz, K.: Grounded theory: objectivist and constructivist methods. In: Denzin, N.K., Lincoln, Y.S. (eds.) Handbook of Qualitative Research, 2nd edn, pp. 509–535. Sage, Thousand Oaks (2000)
29. Charmaz, K.: Constructing Grounded Theory: A Practice Guide Through Qualitative Analysis. Sage, London (2006)
30. Charmaz, K.: Constructionism and the grounded theory method. In: Holstein, J.A., Gubrium, J.F. (eds.) Handbook of Constructionist Research, pp. 397–412. Guilford Press, New York (2008)
31. IFLA: Guidelines on information literacy (2006). http://www.ifla.org/files/assets/information-literacy/publications/ifla-guidelines-en.pdf
32. Christiansen, L., Stombler, M., Thaxton, L.: A report on librarian-faculty relations from a sociological perspective. J. Acad. Libr. **30**(2), 116–121 (2004)
33. O'Sullivan, C.: Is information literacy relevant in the real world? Ref. Serv. Rev. **30**(1), 7–14 (2002)

# Understanding and Use of Information Literacy in the Industrial Project Management

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**Abstract.** The contribution presents an example of transferring information literacy competencies from a Ph.D. academic environment into the industrial environment in the field of polymeric chemistry. In addition, the results of a study including research, collection, ranking, and testing of available tools for project management of projects in the field of injection molding will be presented with exploration of methods and techniques for problems solving from brainstorming to the TRIZ system. The experiences gained through leading of projects in an industrial environment with awareness of importance of information literacy will be presented and discussed, including some recommendations for project management: Project documentation should be transformed to the "knowledge database of the company"; Process of "the right" information transfer inside the project team needs to be controlled; Transition from "traditional" problem solving to inventive solving of problems; and, People competences should be constantly upgraded.

**Keywords:** Information literacy · Project management · Industry · Injection molding · Systematic approach

## 1 Introduction

Research and development projects are one of the most important ways of implementing new technologies, services, and products inside a company, in its production, and in collaboration with other companies [1]. Short development times, high technical demands, and a pressure to achieve milestones are just some of the issues that a project manager needs to work on daily. There are different tools and applications available to help and support management of a particular project, regarding: - ways of project team collaborations/meetings; organization of project documentation (notes of project team meetings, meetings with customers, technical documentation, etc), - project status and overview, - information exchange. With all available commercial tools the information management seems simple; however, it becomes complex and a challenge in real industrial situations.


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Polymer chemistry is a branch of chemistry that deals with the chemical synthesis, properties, and application of polymers: high molecular compounds formed by polymerization of monomers. It is one of the three main sub-disciplines of polymer science. In general, different types of polymers can be divided into two groups: natural-biopolymers and synthetic polymers. Natural-biopolymers are produced by living organisms and include sub-groups like structural proteins (e.g. collagen, keratin), functional proteins (e.g. enzymes), structural polysaccharides (such as cellulose, chitin), and energy storage polysaccharides (e.g. starch, inulin, glycogen). On the other hand, synthetic polymers are human-made polymers, mainly synthesized from petroleum. They can be classified into four main categories: thermoplastics, thermosets, elastomers, and synthetic fibres. When someone studies these polymers in the academic environment, one mainly works with theories of their formation, their history and origin, chemical structure, synthesis, and possible applications. One also gets familiar with some practical preparation and processing of commonly used polymers. In the industry, all this knowledge should be successfully used and applied to solve daily problems, concerning the production, use, or the development of new products. Here is where information literacy plays an important role. Knowledge and skills of information literacy are mainly not included in the chemical programs at Slovenian Universities as a special study course. Understanding all standards and principles of information literacy makes the basis for its transfer into industrial environments [2]. This is most recognized at the top of the model of information science by Rowley, shown in Fig. 1, [3].

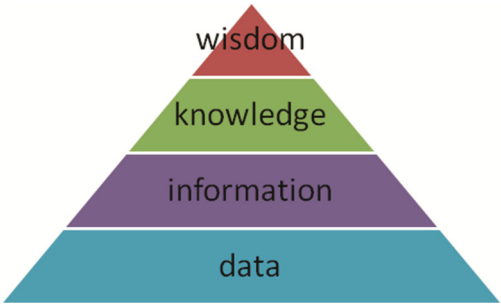


**Fig. 1.** Hierarchy of knowledge [3]

In the academic environment, information is mainly connected to the research while in the industrial settings it is linked to the business and money. This makes a big difference. During a person's studies at the universities they have a lot of licence-available accesses to the scientific information: libraries, information systems like Web of Science, Science Direct, Scifinder Scholar, etc., with all their contents. In smaller industrial systems, these become payable and therefore often unavailable on a daily basis. From the academic-research point of view, any result of an experiment is acceptable: positive or negative. Both can be further explored and explained. In the industry, there is no place for negative results and no time to explore them further. Even the good results are in most of cases just applied with no further experimentation. Many times practical decisions need to be done daily are based on temporary available information.

Injection molding is one of the techniques to process thermoplastics. It includes the use of an injection machine, mold (tool), and materials (thermoplastic polymers), as shown in Fig. 2.

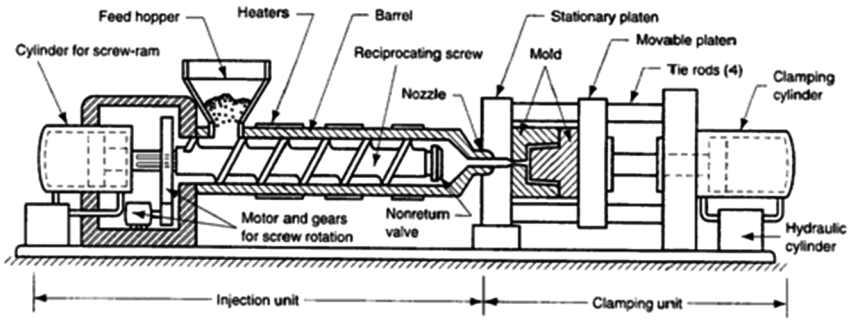


**Fig. 2.** Injection molding [4]

Usually, the produced plastic parts belong to some final products. It could be said that they are frequently just assembly parts. Their development and transfer to the production is carried out through company projects. In many cases this involves customers and suppliers – a whole chain. Team working and project collaboration is essential for the success. The project leader/manager is often in a dilemma regarding how to lead a new project, especially when it comes to the documentation and tracking of the progress of the project. In general, there are a lot of tools available for this purpose but they do not fulfil all the needs and expectations for the specific/special projects. As a consequence, companies usually create their own systems of project management to support their activities.

In this contribution, I used IL standards [5] to address and present examples of applications from the above described topics concerning a real-life industrial environment. I will show that the integration of IL competency standards into industrial research and development can help to find the right solutions at the right time.

## 2 Materials and Methods

I examined three types of materials that presented real-problems from the industrial environment were: plastic gear and its radial runout, plastic part warpage, and the project documentation system.

I used the following software tools: Sigmasoft, Moldex3D, Solidworks Simpoe plastics, Microsoft Project, Project Libre, and Project.net (Fig. 6).

My methods included IL standards competences in skills, brainstorming, statistical analysis with Minitab, and six sigma approaches.

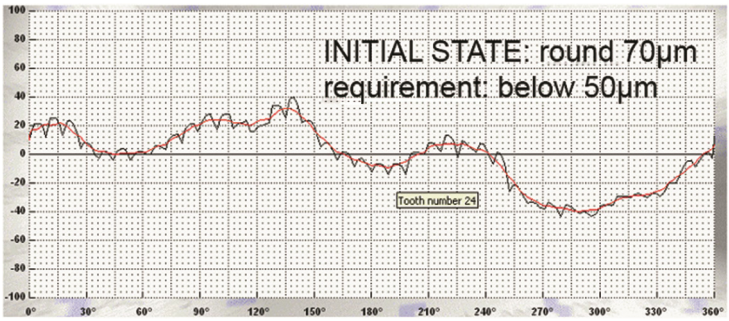


**Fig. 3.** Plastic gear and its radial runout – the initial state

## 3 Results and Discussion

### 3.1 Information Literacy: From a Ph.D. Academic Environment into Industrial Environment in the Field of Polymer Chemistry

When going from an academic environment to the industrial area, the focus of interest becomes different: the fundamental study and research transcends to problem solving and innovation.

**Project Example: Plastic Gears and their Radial Runout.** This challenge takes place after many years of different trials to solve the problem. The aim is to run the production of a selected part with both nests of a tool, illustrated in Fig. 3. The tool produces two parts-gears at once. One part was always out of allowed tolerance; meaning its measured radial runout was above allowed 50 µm. Radial runout is the distance between maximum and minimum of curve, shown as an example in Fig. 3. It is an important characteristic of gears that results in an effective center distance variation. Consequently, it influences the function of the gear to transmit smooth motion under load from one shaft to another. In the past it happened that one or two times the system worked, but no one knew why or how. It was also not possible to repeat positive results. Many times researchers? said: "we did what we could, but it still does not work."

Having a background of information literacy and information science, I applied an approach that lead, step by step, to the practical solution, according to the ACRL IL standards, as follows:

1. Determines the Nature and Extent of the Information Needed: The problem of radial runout was systematically reviewed. First the process of injection molding was checked and analyzed, including the process parameters and tools. Then the parts and its measurements were explored. This was the basis for defining the problem and the needed additional information.
2. Access Needed Information Effectively and Efficiently: To obtain the needed information about the measurement device and its measurement protocol, all available documentation was collected, analysed. Also, the producer of equipment was contacted.

3. Evaluates Information and its Sources Critically and Incorporates it into Knowledge and Values: Analysis and evaluation of gathered information lead to a deeper understanding of measurement itself and of the measurement principle of the device. Based on that, in collaboration with the producer of equipment, the measuring device was upgraded with specific software in such way that it was possible to get the needed information for the tool correction.
4. Uses Information Effectively to Accomplish a Specific Purpose: After having a measurement device with the desired information as an output it was possible to correct the tool and get the problem solved.
5. Understands Economic, Legal and Social Issues, Accesses and Uses Information Ethically and Legally: The gained knowledge and experience was used and successfully implemented on other similar products also.

Following the steps of IL competency standards for Higher Education in searching, analyzing, extracting, collecting, and combining information of the control equipment, plastic part properties, was quality methods was a process that helped to understand the problem and define right experiments, tool corrections and the optimization protocol. This systematic approach took about 2 months and the solution was implemented successfully (Fig. 4).

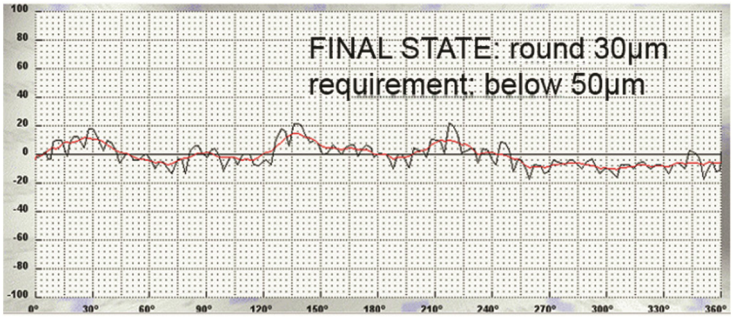


**Fig. 4.** Plastic gear and its radial runout – the final state

Making this change has created to a company an economic benefit of approximately 35.000 EUR per year. The production of this part is planned for at least next 3–4 years, which practically means more than 100.000 EUR of savings.

### 3.2 Information Literacy: Project Management in Injection Molding

In project management it is essential to have a good real time overview of the project status. We use our own specialized application in Lotus Notes for the official documentation (e.g., APQP, Drawings, and specifications). We explored different available tools for the collaboration and overview purposes, summarized in Table 1.

**Table 1.** Comparison of selected software tools to support project management

| | Licence | Issue tracking system | Scheduling | Reporting and analyses | Web-based |
|---|---|---|---|---|---|
| Microsoft project | Proprietary | No | Yes | Yes | No |
| Project-Libre | CPAL | No | Yes | Yes | No |
| Project.net | GPL | Yes | Yes | Yes | Yes |

We evaluated the following criteria in the testing period: Simplicity to use; Connectivity to devices; User interface; and Making changes. The results are presented in Fig. 5.

The results actually showed that all of the selected tools can be used; the differences arise from personal points of view and from the past experiences with such tools. Knowledge of information literacy enables us to go one step ahead and focus only on what we identified for the most important: "transfer of information inside and outside of project team." With awareness of that, we use ProjectLibre only for preparation of projects (e.g., plan and main milestones). We follow the following process for daily work on open projects: Weekly or daily project team meetings; making notes of each meeting in our special database created in the Lotus Notes application; saving all relevant project documents in a folder on the "backup server."

### 3.3 Information Literacy: A Systematic Approach to Problem Solving and Innovating from Every Day Brainstorming to the TRIZ System

This challenge is connected to the problem of plastic part warpage, defined as a dimensional distortion in a molded product after it is ejected from the mold at the end of the injection molding process. We wanted to find a new way for solving this problem of plastic warpage based on our knowledge of information literacy. Without knowledge of information searching and processing, we would probably work in the old way of solving the problem with trial and errors in production. For this purpose, the research was done and we conducted a comparison of available software tools for the simulation of injection molding to see how to manage and prevent the warpage defects. We tested and evaluated three software possibilities: Sigmasoft, moldex3D, and Solidworks Simpoe Plastics.

We defined the following criteria in evaluating selected software:

- capabilities
- user interface
- technical support for simulations production
- technical support for analysis
- real 3D simulation
- having an option of DOE (Design of Experiments)

Some examples of simulation process and results are presented on Figs. 7 and 8.

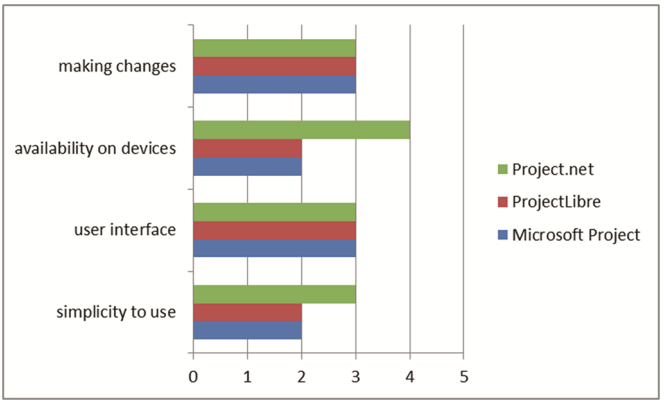


**Fig. 5.** Evaluation of tested software tools using Likert Scale

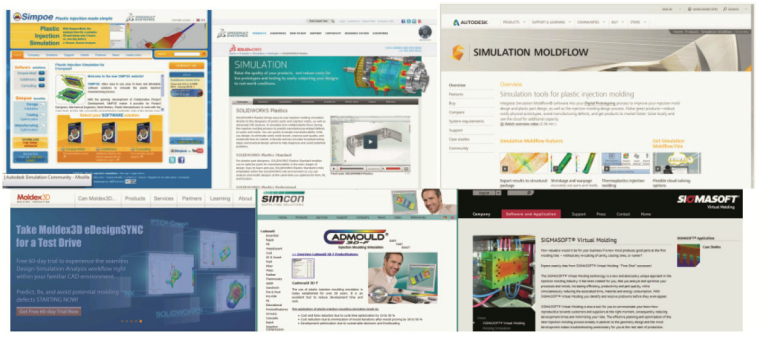


**Fig. 6.** Finding available software tools on the market

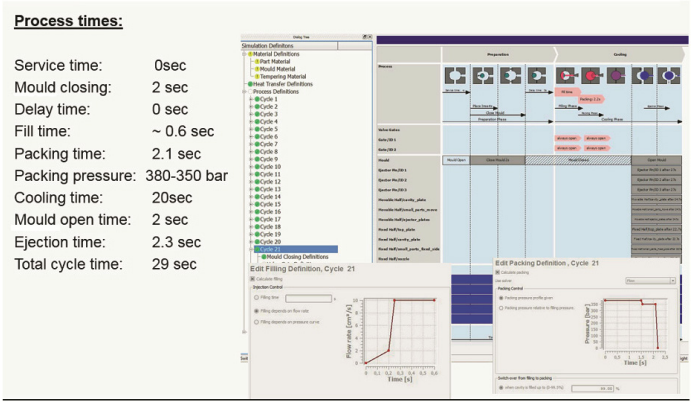


**Fig. 7.** Examples of simulation process and results - I

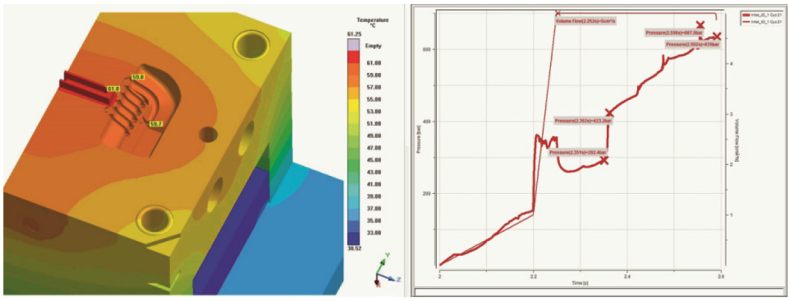

**Fig. 8.** Examples of simulation process and results - II

At any position on the project timeline, from design of the product, and ordering of the tool, to transfer to the production, it is a great advantage to see how the filling, packing, shrinkage, or warpage of a part will be done. At the beginning it helps to check the feasibility of a design, to test different changes, and to prevent problems that could arise in future development and in transfer to the production. When ordering the tool, simulation can be used for checking its efficiency. If a simulation is not used at the beginning or by the ordering of tool, it still can be used to solve problems in the production. However, this last choice is connected to the highest costs of making corrections and optimizations.

Implementation of a simulation tool is still in progress, but the main idea is to transcend the trial and error approach that can cost a company a lot of money and, instead, use the TRIZ system – the systematic approach to the problem solving and innovations [6].

## 4 Conclusions

Information literacy – its awareness and understanding - plays an important role in the industrial environment and helps in solving different practical problems in innovation and development. As it has been shown briefly in the above examples, IL competences and skills need to be applied at higher cognitive levels such as use of knowledge, analysis, synthesis and evaluation.

We will further present and discuss the experiences we gained through leading of projects in an industrial environment with awareness of the importance of information literacy at the conference, including some recommendations for project management. These recommendations include: Project documentation should be transformed to the "knowledge database of the company"; Process of "the right" information transfer inside the project team needs to be controlled; Transition from "traditional" problem solving to inventive solving of problems; and, People competences should be constantly upgraded.

## References

1. Šumiga, B.: Information approaches in the design of chemical microencapsulation processes, Ph.D. Dissertation, University of Ljubljana, Ljubljana (2013)
2. Boh, B., Šumiga, B.: Vzpodbujanje informacijske pismenosti študentov v naravoslovju in tehniki z reševanjem študijsko-raziskovalnih problemov = Enhancing Information Literacy of Students in Science and Technology by Solving Study and Research Problems. In: OREL, Mojca (ur.). Mednarodna konferenca InfoKomTeh 2011, Ljubljana, 3. November 2011 = International Conference InfoKomTeh 2011, 3rd November 2011. Nova Vizija Tehnologij Prihodnosti: Zbornik Referatov: Conference Proceedings. Polhov Gradec: Eduvision (2011)
3. Rowley, J.: The wisdom hierarchy: representations of the DIKW hierarchy. J. Inf. Sci. **33**, 163–180 (2007)
4. Elite machinery systems (2015). http://www.elitemachinerysystems.com/plastic_injection_molding.php
5. Iannuzzi, P., Eisenber, M., Farmer, D., Gibson, C., Goetsch, L.A., Lessin, B., Lindauer, B.G., Rader, H.B., Ratteray, O., Jenkins, A.H.: Information Literacy Competency Standards for Higher Education. American Library Association, Association of Academic and Research Libraries, Chicago (2000)
6. Altschuler, G.: "And Suddenly the Inventor Appeared" TRIZ, the Theory of Inventive Problem Solving. Technical Innovation Center Inc, Worcester (2004)

# Some Principles of the Durability of the Informative Professional Practices

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**Abstract.** The objective of this contribution is to develop the premises of an organization of the durability of the practices of information in professional context. We shall try to produce some key elements to begin the consideration of a design that accompanies the durability of the practices of information in professional context. To do it, this contribution will compare an analysis of a corpus on the fundamental question of the durability, with a set of elements which we collected from conversations and analyses on information systems with architects specializing in eco-construction in Aquitaine. Even though these actors in the sector of eco-constructive architecture (architects, engineers, suppliers, manufacturers), have already established informative practices, they still tend to organize and keep the information in a limited, sporadic, sometimes even risky and disjointed ways.

**Keywords:** Sustainability · Pactice of information · Professional community · Eco-constructive architecture · Support of the knowledge

## 1 Introduction

First of all, this contribution will examine the issue of sustainability of information practices. I will attempt to define the parameters of sustainability borrowed from related sciences and from the information and communication sciences to which I belong. I will refer to the empirical research I have been conducting in recent months with French eco-constructive architecture professionals (architects, engineers, project managers, contractors). I will then propose a definition and eight principles for considering sustainability of information (systems, devices and managerial modes) as a mode of information management and organization.

## 2 Purpose and Methods

The material under development has been produced over recent months by combining three modes of data collection: (1) semi-structured individual interviews focused on the academic and professional course of our sample; (2) the clarification of professional information practices, reports of visits to work sites (agencies, offices, training premises); and (3) the extraction and analysis of data from the personal information systems


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of the subjects in our sample[1]. Eco-constructive architecture is of particular interest for various reasons.

Here are three of them:

- The various agencies process and store professional information without any involvement from information professionals; the main characteristic of the activity of eco-construction architects and stakeholders is to respond to calls for tenders and calls for proposals, which requires mobilizing the collection of data, information, and past experiences in a very short period of time.
- Most professionals I have met and monitored during the study period admit that their information practices remain very chaotic or even "hand-crafted", even though more method, rigor and discipline would allow them to save time and be more effective in their daily activities.
- All of them report much wasted energy, resources and time in trying to organize their information system, with the sensation of not working methodically or sustainably.

## 3 Research Context

From all of our findings, it is clear we are dealing with a professional area where informational activity is at the heart of professional concerns and awareness [1]. In my opinion, informational activity can be seen as the interaction of individuals with an informational environment. According to the principle of object-oriented activity theory [2], this interaction is motivated. It transforms the "raw material" object (a web document, a book extract or an article, information provided by an expert, etc.) into a meaningful object (for example, the retrieved information is organized according to the different aspects of the subject), and then into a potentially shared or jointly built object.

For a very long time, information practices were over-analyzed in their individual dimension. Many studies then presented information practices as very individual forms of the relation to information. However, information practices involve human factors and environmental factors that influence the use of information and the interaction of individuals with sources and information research systems. Such interactions are essential to any form of access to information. From all these observations, my assumption is that it is nevertheless necessary to determine the most significant practices to promote sustainability. A collaborative managerial mode could then be defined to organize resources and services for professionals of the industry under study.

## 4 Research Questions

In recent decades, the issue of sustainability has been raised in many industries and scientific sectors. The common view is that this concept originally comes from the field

[1] I draw inspiration from Brigitte Guyot (2006 and 2007), who asked stakeholders to perform an information search on a commonly used source. They had to present to the investigator the organization of their files and their electronic desktop which condenses and summarizes their activity. The way they organize their tasks is revealed by the simple fact of naming their files.

of environmental management and conservation, particularly the context of sustainable development. After examining a wide range of works on the principle of sustainability, I noted although the word is the same, in its nominal or adjectival form (sustainability and/or sustainable), the notion of sustainability takes on extremely variable meanings and intentions, according to the aims and referents of the authors. Therefore, it seemed useful and necessary to define sustainability in the broad field of information and the more restricted frame of information practices. Like any exploratory undertaking, the task is extremely delicate because it obliges the researcher to import definitions and epistemological boundaries from various sectors in which sustainability-related intentions can be very heterogeneous. Strictly speaking, sustainability in its primary generic meaning refers to the question of "duration", the search for a balance maintained over time, leading to ways of apprehending forms of being that tend towards an equilibrium, that are stable and ensure a balance within the referred environment. The English term of "sustainability" goes beyond the mere idea of time and conjures up notions of rationality, management, activity-programming, anticipation of situations, and resistance to group trends. It constitutes a much richer and more complex concept than the French term of "durabilité" [3], which essentially refers to the notion of duration. Therefore, the strength of this concept for information and communication scientists who question professional practices in situ, through "sustainable questioning", is to go beyond current definitions and boundaries. To achieve this, they rely on the expertise and reflexive work of various sciences that have included sustainability in their scope of understanding of the complexity of uses and practices. Three categories of sciences seem to have particularly questioned the notion of sustainability: management sciences, environmental sciences, and economic and social sciences. By comparing and contrasting some of the approaches and trends in these sciences, I will attempt to provide an overview of the recurrent principles in this work in order to demonstrate the impact that such studies have on the way information practices are conceived of in the professional sector.

## 5 Conceptual Delimitation of Sustainability: The Process of Informational Sustainability

After reading about many approaches, mainly from the three sciences I just mentioned, I believe that eight key dimensions help us to understand and enrich the concept of information practices, while designing new components for a system to track information practices in professional situations. These eight trends complement each other but do not equate with each other, and they enrich the managerial approach of information systems for information practices.

### 5.1 Principle 1: Sustainability and Responsibility

The concept of sustainability intrinsically focuses on a responsible principle seeking to implement and combine three objectives. The first objective is to maintain the integrity of the environment to ensure the health, welfare and safety of the community members by seeking to preserve their vital ecosystems. The second aim is to ensure a principle of

social and informational equity, which favors the growth of communities and the respect of diversity. At the same time, it ensures the balance and development of the individuals composing the system or organization under study. The last objective is to support innovative and progressive undertakings that ensure for the group under observation not only the renewal of their practices but also their development, in line with new market trends and information practices. Responsibility is shared at both individual and collective levels, one never being considered without the other.

### 5.2 Principle 2: Sustainability and Rationalities

In essence, rationality is anchored in two key principles outlined. The so-called rationality of the stakeholder has an impact on the strategic dimension, particularly the choice of locations, and on the tactics dimension, namely the choice of people. This dual component of rationality is all the more meaningful when one examines information practices. In recent years, the professional world has shown that the generic question of sustainability has been especially questioned in companies following the trend of Corporate Social Responsibilities (CSR) [4]. The constructivist approach suggests that the construction of a professional information system is a negotiated - and thus negotiable - act and space, which would make it "sustainable" because it is supported by a majority of the stakeholders. This constructivist responsible approach requires considering the company or the company network in a social and economic embeddedness, where all the priorities and decision-making is the result of collegial relations and reflection. Beyond the observed perimeter, the company's rationality is embedded in a concerted manner with all the stakeholders (not only business stakeholders but also the public authorities, civil society and so on).

### 5.3 Principle 3: Sustainability and Performativity

Another dimension of sustainability concerns the search for the best performativity of the group or company. The concept of sustainability is mainly based on three types of performance:

- Economic performance: the stakeholders of the field of study I have been analyzing for several months link the issue of sustainability of information practices to the search for the best economic performance. That is, organizing and structuring information practices fundamentally makes sense only if it helps improve turnover, dividend and growth, particularly vis-à-vis their direct competitors.
- Environmental performance: professional and information practices should help reduce a set of costs in terms of energy, consumption of fungibles, subscription costs, etc.
- Social performance: the reinforcement of rational and sustainable information practices should ultimately bring them closer to other businesses and communities in order to create communities of practitioners, informal networks of mutual training, and the exchange of innovative practices.

### 5.4 Principle 4: Sustainability and Collaboration

By cooperation, the requirement of a certain level of agreement and understanding between the stakeholders, even if they do not have to agree on everything. However, without a shared understanding and a common interest in collaboration, it has little chance of succeeding. It remains difficult, delicate and complex to maintain a shared arrangement, particularly in the large-scale networks and organizations [5]. Drawing on the work of Liechti and Sumi, it can be hypothesized that a sustainable and collaborative approach in informational contexts would imply four levels of awareness:

- The awareness of belonging to a group and respecting it in order to exchange and disseminate information
- The awareness of the workplace where the stakeholders share a common area known to all. This can be a physical or digital space where they bring and discuss their findings, their results or even their joint creation
- Contextual awareness, which allows each member of a sector, through his/her activities, to feel that are participating in a form of public good that contributes to its growth
- Peripheral awareness, which can be summarized as the ability of each stakeholder to search for and process information on the periphery of the main area, which could eventually provide input for the main activity and the priorities involved.

### 5.5 Principle 5: Sustainability and Viability of the Information System

The sustainability of information practices also stems from the stability and balance of the information system to which the stakeholders mainly refer. Indeed, the sustainability of information practices cannot be examined without imagining the viability of the information systems in question. Durand [6] emphasizes the fact that dynamic (information) systems are not those seeking "an optimal solution" from an a priori standard. They are the ones which respect constraints at every moment and integrate decisions in time, adapting to evolutions without anticipating the future. Thus, the viability theory approach privileges the respect of constraints, rather than the search for specific balances of a priori evolutions. Many information systems have viability defects. They can be classified according to four weak signals:

- The lack of knowledge of practitioners (including their personal level of information and knowledge on emerging themes of eco-construction)
- The difficulty in identifying a set of weak signals from the work environment
- The difficulty in making their personal information system operate with that of major networks and professional information providers
- A tendency to reproduce previous failures owing to their inability to organize a database of histories and experiences that have led to difficulties or failures in the past.

### 5.6 Principle 6: Sustainability and Stability

Sustainability of information and communication technology includes the idea of the search for stable technical solutions. Indeed, stability helps in solving a set of necessary tasks without aiming at extreme novelty vis-à-vis technology markets. Wirth's law states that software slows down operating systems more rapidly than hardware becomes faster. The term "bloatware" refers to a software using an excessive amount of system resources but also a software accumulating a significant amount of disparate features, some of which are never used. In a sustainable effort, it would be more efficient and logical to have software that provide a set of common functions and features for the same sector of activity and offers the option of additional functions according to management and classified information needs. Professionals should not be guided by pre-supposed professional information needs or by producers and developers of the software market, but according to their true information and management needs. This reflexive way of looking at the question leads us to organize times for observing good practices and developing tracking devices to identify them. Beyond this identification and that of the appropriate software, there is a need to evaluate sustainable information needs. The question of the stability of systems and techniques amounts to questioning professionals on their own criteria for obsolescence.

### 5.7 Principle 7: Sustainability and Longevity: The Tracking System of Committed Sustainable Activities

Sustainable information practices are *de facto* subjected to the systematic recording of the approaches and processes involved. A periodical analysis is also performed on the information selected for the implementation of a project, which is ultimately recorded and stored. Indeed, the goal of longevity is to generate an information system that keeps track of projects (successes or failures) in order to make adjustments and/or changes in practices in new similar situations. Therefore, information on the monitoring of activities may be recorded with variable frequency depending on the activity sector: daily, weekly, monthly or seasonal. This longitudinal tracking process through information management goes hand in hand with the evaluation process and must be conducted in a participatory manner involving all the beneficiaries (customers, partners, associated communities).

### 5.8 Principle 8: Assessing Sustainability

The objective of the sustainability of information practices in a human collective is more likely to be attained if the project adopts a participatory approach, since the beneficiaries develop the abilities, skills and confidence they need in their activities. Sustainability can therefore be understood as the continuation of the development of a community by its members once external support has ceased. From then on, regular evaluation should be performed in order to assess the progress made in activities linked to the project and compliance with previously set objectives. Readjustments on information practices could then be made in the event of any deviation from the expected outcomes. Evaluation

should thus cover the entire process of research and appropriation of information by the stakeholders across the entire chain of activities (Fig. 1).

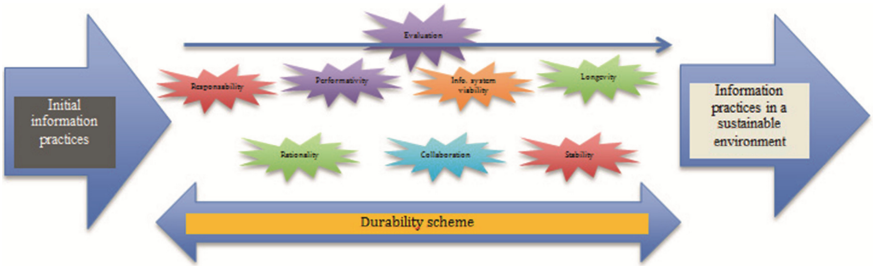


**Fig. 1.** "Sustainability Scheme" for sustainable professional information practices (Source: Liquète, 2015)

## 6 To Conclude

In 2007, Marcon [7] stated that social ties lead to the creation of activities, which can persist even when the initial social ties disappear. We thus seek to learn from personal information practices and consider a collective cognitive level. In the wake of the "situated actions" approach, more particularly that of C. Wright Mills, its full role should be given to the identification and analysis of individual actions since the stakeholder is no longer a mere agent of social reproduction bearing strong social determinism and simply executing strategies and actions designed in advance. Stakeholders make progress and interact with a high degree of freedom, interpretation and representation, which makes them partly responsible for their activity and network. The current difficulty that may be seen is that there is no organization, durability or rationally decided ways of working on them together, especially since it is uncertain whether an individual who is immersed in his work can still carry out this editorial activity "to move from one to me or one to them to reach one to us" *(« à passer d'un à moi ou un à eux pour aboutir à un à nous »)* [8].

The criteria of selectivity, conservation, storage and dissemination of data will be defined after observing practices and analyzing professional histories and information systems. The goal is to achieve the sustainability of information as I have defined it in this paper. More than a conclusion, my goal is to show that the principle of sustainability applied to information practices and the structuring of information systems requires us to design extremely complex site architectures and offers, thereby allowing methods of creating and storing data to be remembered. This goal can be achieved by combining systems that track what individuals produce while encouraging the development of a pedagogical approach for furthering the growth of knowledge. Implicitly, the sustainability plan I have outlined would help researchers to identify criteria and factors that make them more sustainable in a dynamic and functional information system.

## References

1. Liquète, V., Gardiès, C., Fabre, I.: Représentations et Organisation des Savoirs Dans des Communautés d'Intérêts Emergents. Etude des Pratiques Informationnelles Emancipées. In: Balicco, L., Clavier, V., Paganelli, C. (eds.) Evolutions Technologiques et Information Professionnelle. Pratiques, Acteurs et Documents. Colloque international du GRESEC, Grenoble, 10-11 décembre 2009. (Actes parus sur cédérom) (2009)
2. Engeström, Y.: Expansive learning at work. toward an activity theoretical Reconceptualization. J. Educ. Work **14**(1), 133–156 (2001)
3. Bridgland, A., Whitehead, M.: Perspectives on … information literacy in the "E" environment. an approach for sustainability. J. Acad. Librarianship **31**(1), 54–59 (2005)
4. Vidal, R.: Les Systèmes d'Information et les Technologies de l'Information et de la Communication. La Revue des Sciences de Gestion **3**(137), 231–232 (2008)
5. Ben Abdallah, N.: Réflexions sur l'Analyse des Pratiques Informationnelles Collaboratives. Les Cahiers du Numérique **8**(1), 131–158 (2012)
6. Durand, M.-H., Martin, S., Saint-Pierre, P.: Viabilité et Développement Durable. Natures Sciences Sociétés **20**(3), 271–285 (2012)
7. Marcon, C.: Analyse de Réseaux en Intelligence Economique. Éléments pour une Approche Méthodologique. Market Manag. **7**(4), 110–112 (2007)
8. Guyot, B.: L'Activité aux Prises avec des Systèmes ou Dispositifs d'Information. Etudes de communication: Langages, Information, Médiations **33**, 9–18 (2009)

# An Ecological Approach to Collaborative Knowledge Management in Small Professional Communities: Sustainable Information Practices for Sustainable Work

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**Abstract.** A research project on knowledge management in small companies specialized in green architecture is focused on the construction of a shared body of knowledge in a specific community of practice. We have conducted an inquiry, interviewed and observed the information systems of 30 professionals. We have tried to characterize their information practices according to their aim to "think locally and act globally". Organizational information processes are related to information literacy and create sustainable information management in communities of practice. Information and communication practices as well as a need for education, management methods and innovative knowledge strategies in the community exist. Three dimensions are taken into consideration: cognitive, technological, socio-political. The overall information ecosystem includes services, structures, people and resources. Some organizational principles are necessary for a sustainable knowledge construction process: reliance, transaction, cognitive accessibility to information.

**Keywords:** Knowledge management · Sustainable information · Information ecosystem · Cognitive accessibility

## 1 Introduction

Knowledge management is traditionally located in the context of organizations [1], large companies and public services, which have human, technical and financial sufficiency. It is based on a process of knowledge industrialization which takes into consideration information governance within the theoretical framework of communication sciences. In economic sectors, which are heavily regulated by market rules, and impose a binding apparatus, production and circulation of information are channelled and organized, but poorly distributed. Knowledge management taps into channels that remain inaccessible to small companies whose networking is based on communities of practice or interest.

This economic and normative logic is not necessarily congruent with the social and political one calling for a redistribution of goods and knowledge, or with reticular technology used to share information and to create a public space. Beyond a normative definition of public space as a deliberative sphere dominated by a social group in


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Habermas' theory [2], John Dewey's theory of public [3] focuses on learning processes to live together and gives way to a pragmatic approach of participation and construction of citizenship. On the other hand, the approach of political activists and protest movements relate technical and ideological trends of collective action with the disappearance of the mass media monopoly of communication [4] in a "Postmedia era consisting of a single appropriation, collective and interactive use of information machines, communication, intelligence, art and culture".

The knowledge economy refers both to a new discipline in the field of economics and to an historical period that saw the emergence of an economic model based on the value of the information for the production of knowledge innovation. The capitalist model of knowledge economy, which relies heavily on the private appropriation of ideas and creation, has long been questioned by civil society and by researchers in several disciplines, information experts and geographers who observe the emergence of new territorial dynamics around the themes of open innovation, crowdfunding, collaborative management.

By combining a systemic approach of information in knowledge management and a communication approach of information practices in communities, we propose a reflexion on the feasible conditions of a participatory and open management of knowledge that would allow the emergence of dialogical spaces for learning and action, the transition from economy to ecology of information [5] and knowledge, from a closed to an open standard system. The issue of information in relation to ecology is more often questioned in a logic of engineering, in terms of use of information and communications technology targeting material saving, of environmental monitoring or implementation of public policies. Research shows that information and communication technology can encourage cross partnership and participation. But they focus mainly on the issue of communication tools and not on information practices, including diversity, according to Merzeau [6], a "socio-technical ecosystem in which the user is the heart and nervous system". The communicational approach of triviality proposed by Jeanneret [7], which links social logic, appropriation of cultural objects and symbolic knowledge, is an interesting track. To engage in this reflection, we first describe the particular case of a community of practice to map the areas and information networks for learning. Secondly, we design an opening on alternative spaces and strategies for knowledge transfer. Finally, we suggest some guidelines to put these proposals in operation.

## 2 The Economy of Knowledge in a Community of Practice

As part of research into knowledge management in learning professional contexts, the RUDII (Representations, uses, development, engineering of information) research team has observed communities of practice and analysed the emergence of information and communication strategies and management of innovative knowledge. From the identification and modelling of information practices, we question the possibility of building support tools for knowledge construction by reversing the "top-down" dominant approach that offers key tools in an economic conception of innovation aiming to improve productivity.

### 2.1 A Research Question: Information Practices in Knowledge Construction

The issue of knowledge management, which is the topic of research and technological development in organizations, cannot be treated uniformly in all economic and social sectors. The choice of the research team to observe the eco-design community in the field of construction is based on the existence of huge information needs for some professionals who are gathered around a common objective related to environmental concerns, with various cultures and individual professional practices, located in small, interdependent companies. This community builds its information system from various sources, which are rarely publicized, in independent and informal practices without the mediation of information professionals. Such a dynamic begins with personal information systems. The research project focused on 10 small companies specialized in green architecture. We carried out research, interviewing and observing the information systems of 30 architects, retailers and builders. We have tried to characterize information practices regarding the professionals' aim to "think locally and act globally". Organizational information processes are related to information literacy in order to create sustainable information management for communities of practice.

From a theoretical point of view, we anchor our work on a socio-constructivist perspective, and we consider a set of elements querying the shared process of knowledge building within a professional community. This approach considers that the information formats developed and circulating among peers illustrate a professional information culture. Then we analyse knowledge from the elements of socially constructed reality by members of the community, through their own experience. This question leads us to identify the favorite information sources for the actors, the information research sharing and validation methods, the selection criteria and the forms of rewriting and broadcast/storage used. We try to understand, within the emergence of shared information environments, the ability to co-build management devices, and to share and organise knowledge. Ben Abdallah [8] shows that the studies of information practices are often focused on individuals and neglect the collaborative dimension of information activity. Engeström's theory of the activity reintroduces this dimension, taking into account the interactions between individuals within groups and between groups and artifacts, the actor in the workplace, his representation system and his personal information literacy within the work activity [9] and the overall information ecosystem [10] which includes services, structures, people and resources.

The research, from a methodological point of view, is based several approaches. A sociological approach from surveys is used to analyse professional contexts, practices (research, treatment, communication) and representations (maturity). A semio-pragmatic approach identifies the components of the knowledge construction. A documentary approach analyses the personal information systems by connecting them with the informational material produced by communities. A communication approach of spaces and informational ecosystems seeks to identify acts of social construction of reality [11] through the themes, vocabulary, semiotic discourse structures and information arrangements. Semi-structured interviews were used to capture the informational and documentary requirements, to observe how people seek, manage and disseminate information. The first part of the research identified

exactly, with business partners in the fields of observation, the central informational topics. In the second part, we analysed, with professionals, during interviews, their personal information system. The research team has identified a need for education, management methods, and innovative knowledge strategies in the community. Three dimensions have been taken into consideration: cognitive -information governance-, technological -learning objects and mediation-, socio-political -information architecture-.

## 2.2 The Identification of Active Participatory Practices but Weak Knowledge Management

Research has helped to draw up a map of searched for and used information types and modalities. Traditional media information (magazines, exhibitions, books), business information produced by building material companies, and institutional information produced by professional organizations and some technical centers, are very dominant. This first stage of the research has identified shared watch areas: energy management, sourcing and implementation of building materials (including origin, methods of production and distribution, and health impact), planning, and the issue of transport and forms of cooperation. All this information is highly institutionalized, filtered and mediated by organizations, and structured according to economic and political criteria. Some sources are underused, such as scientific information related to research, and technical information related to the experience of professionals, which is generally disseminated in training institutions. Professionals usually develop informational tinkering practices from heterogeneous sources of information such as technical documents and meetings. Legal information is very expensive. The information practices identified are essentially based on research and gathering but not as much on treatment or distribution. The socio-cognitive hybridization possibilities are low, as well as cooperation and regulatory practices in networks that are weak regarding the quantity, complexity and cost of public and private data for informational and professional activities. This description of information practices and mapping of an emerging community of practice does not reveal exceptional discovery as part of a business field where competition creates isolation and where economic disparities are important. But it remains interesting as emblematic of a closed representation of the information environment in the personal and collective ecosystem that reflects on the gap between actual practices, the information environment of reference and the shared information culture.

Field observation shows that some practices exist: thematic information monitoring, classification through the establishment of databases, indexing and information management that meet organizational and individual cognitive styles with recurring features. We also notice the use of paper and the Internet, parallel to classification implementing elaborate coding systems with hierarchical thematic indexed clusters: thematic color codes, alphanumeric codes (architecture, urbanism, consulting/design: colors, characters, environments, textures…) for digital folders and subfolders, chronologic rankings. Among all stakeholders, the information classification system corresponds to a typology of activities. Thus, for example, taking notes in conferences (scientific information is too expensive in the retail versions) can be arranged by some professionals in order to be reused for tenders.

Can also be found in personal information systems, some educational bases, easy to understand documents to show to buildings' owners or to employees. Thus, rankings correspond to action objectives. In collective organizations, some professionals have also established internal networks with servers on which information is necessarily structured with precision. A person can belong to multiple networks based on its activities (planning/construction, private/public command, types of projects, etc.). Databases are structured within and between networks based on activities. These databases are free, retrieved or constructed.

## 3 Conditions of Participation

The collision between social network practices, a code of values based on the community and isolated information practices, produces a contradiction between two logics: a logic of movement, and a logic of storage and closure. In the first, the information is shared, in the second, it is protected. It is therefore essential to focus on the dynamics and interactions through three principles of action that determine participation: openness, accessibility and reliance.

### 3.1 The Principle of Openness: Public Areas of Knowledge

In the professional community that we studied, information and knowledge management in business operates through competition and closure. The professionals express the weight of acculturation in schooling and training time, during which they have been transmitted the professions' "rules of the art", based on identity, legitimacy and expertise. These rules close the information ecosystems and thereby the technical, scientific and ideological reference field. The metaphor of "enclosures" can easily be used here. The professionals from the observed group deplore the existence of closed systems which they do not always have the means to enter, they will not easily manage to leave and which do not correspond to their beliefs. The community dimension is limited to professional practices, technical devices and equipment and a system of common signs. In the process of communication with the public, this community dimension also remains marginal, because professionals do not have time to disseminate information. The social space/time is not conducive to knowledge sharing for economic reasons (the highly competitive nature of the building sector) and for ideological reasons (the unlikelihood of sharing in the professional community of architects), although these reasons are inconsistent with the reference values of eco-design.

These comments refer to the question of knowledge that one is entitled to think in terms of community. Elinor Ostrom did so with the theory of commons, common knowledge recovery and the idea of co-construction from shared information. She [12] shows that new "enclosures" create a private appropriation of knowledge. Common knowledge, defined by Hess [13] as "resources shared by a group of people who are vulnerable to degradation and enclosures," therefore requires new governance for protection. This theory inspires social movement as we know it: open source, open archives, creative commons, open data. Elinor Ostrom has proposed governance principles that ensure the robustness of community management

systems, sustainability, through common rules of procedures and management, conflict management, mediation, adaptation.

The open data can be considered as an opportunity to offer an open and collaborative construction or participatory and "common knowledge" [14]. Open data have special characteristics in the information economy, being heterogeneous, free (even if they have a production cost for the community), open and usable, but may have no cognitive value without treatment for their integration in information activities. The provision does not guarantee reuse by organizations other than those which that have the industrial strength to handle it. The metaphor of transparency does not guarantee the absence of selectivity about which data can be opened and displayed. It is, furthermore, a political choice regarding spaces and socio-technical treatment needed -identification of objects, extraction, processing- which design the possible uses. The data liberation movement is based on the search for a form of disintermediation and "democratization" of information, but the need for mediation or informational acculturation remains a central issue for all actors, producers and data users. The open data movement is still offering the opportunity to all citizens to have access to what was non-public information or of a commercial nature, which is particularly rich and useful to professionals in the environmental field, as demonstrated by the example of the city of Montreal [15]. The state and local authorities have adopted a policy giving the opportunity to work on research for data mediation solutions, for the development of information devices likely to create knowledge and for use by professionals.

### 3.2 The Principle of Accessibility

Digital accessibility refers to the cognitive ability to access information available through technology. Accessibility, according to UNESCO's Information for all program, is related to the cognitive abilities of individuals to be able to use new technologies, availability, affordability and adaptability. These three dimensions are based on financial and material capabilities. The ability to access the main digital information is not a guarantee of a better acquisition of professional knowledge. Access to information is also conditioned by the possession of powerful interoperable tools. The dimension of interoperability between information devices or systems that actors use is the main problem they face. The multiplicity of computers deployed on different work fields which are places of collection of scattered information, is one of the difficulties of access to sustainable information. A final difficulty concerns the type of information, mostly professional and business that actors cannot acquire without funds.

### 3.3 The Principle of Reliance: Informational Transaction and Democratic Participation

Reliance means that we have to think of the network in a dynamic logic of information sharing strategies, rather than silos, circulation and discussion rather than deliberation. It thus suggests that we no longer consider the systems as static objects but rather understand the relationship of operations and systems. It requires the construction of cultural links between different worlds beyond disciplinary boundaries and some cognitive flexibility.

Manuel Zacklad, opening the debate on the transactional approach inspired by Dewey and Bentley, proposes to focus on the uses of information in various contexts, not only organizations but also communities of practice and informal groups in which there are "distributed practices" [16]. Dewey and Bentley [17] described three stages for the design of human actions in the environment: first, the primitive conception of self-action, second, interaction, and finally, transaction. Zask [18] shows that the individual transaction as a condition to the sustainability of human action system, is possible only in the context of social and political participation, as opposed to traditional expertise. John Dewey explains the pragmatic conception of participatory democracy as the continuous creation of a public engaged in action, which learns from the survey and shared experience, stressing that there is "not knowledge without the development of a community and no community without the development of shared knowledge". For John Dewey, democracy is experimental since participation is the only means everyone has to develop existence, an existence which is based on exchange and cooperation for fear of being dominated by a self-proclaimed authority. Information is a source of "empowerment", providing the means of collective and individual action. Information allows people to build and share perception, understanding and action on the environment on a collaborative basis.

Our research showed that the professionals, in their information practices, still prefer reading on paper or "closed" documents in solitary and vertical perspective of knowledge construction that contradicts the values held by their common project. They do not have many opportunities for searching, reading, writing or digital networking. Digital reading puts the focus on the link in the text (in hypertext) between readers. It is useful for sharing work between people and sense constructing through social ties. Social networks can thus be used for their ability to converge the intentionalities around the same project. The fragmentation of attention can change the scale and expertise to upset hierarchies. Information literacy means empowerment in keeping with the values and the regime of authority to make choices, understand and interact. Rieder [19] also shows that the discursive web architectures make new social morphologies possible. He uses the metaphor of foam to designate mediated proximity of isolated individuals and membrane to refer to information filtering capabilities (insulation).

Social networks are likely to play an important role in information monitoring and collaborative information sharing for knowledge and innovation, apart from centralized platforms produced by institutions or economic actors. They also promote communication about professional activity. They are however only poorly integrated with competitive uses of information that fall outside of a form of digital sociability. Beyond the personal situation of competition in the architecture profession, it seems that poor integration to social networks cannot be explained by a controlled strategy but by the socio-communicational context and acculturation.

These principles lead us to the problem of coordination. Our project draws some tracks still to invest concretely.

## 4 For a Knowledge Ecology

The term knowledge ecology is used by Edgar Morin [20] but also in the managerial discourse that produces analytical models of interaction processes and knowledge distribution in companies [21]. The idea of collective creation of knowledge in an innovation goal is not new nor particularly linked to sharing objective. It was popularized in 1983 by Henry Chesbrough with the term "open innovation", which emphasizes the importance of interaction in the new knowledge creation process in companies. The expression of knowledge ecology invites one to consider, beyond the socio-technical and engineering devices in the organization, the contextual dimensions, including cultural knowledge, with the procedural dimensions of information processing.

### 4.1 Informational Trust

The establishment of a knowledge co-construction process takes a number of characteristics that Maurel and Aida [22] called informational confidence. It is based on quality criteria (relevance, reliability, credibility, authenticity, richness, accessibility) and symbolic value. The choice of structuring information resources often consists of configuring metadata and standardization of uses from that Simonnot [23] refers to as the "system paradigm", a concept of access to information centred on functioning applications requiring the information seeker a rational and stable model. The "actor paradigm", in contrast, allows to imagine hybrid fittings between men, machines, networks, to make visible the invisible, but also bring the existing storage resources on collaborative or community spaces with logical documentary tools for information sharing.

The governance of information in communities of practice poses particular problems related to the impossibility of identifying all stakeholders and to set boundaries to information systems, whereas the context of use of the information -size the group, leadership, degree of trust between the actors- is very important. Cooperative strategies depend on communication opportunities between actors.

### 4.2 Technical Equipment

The technical equipment of knowledge management is based on interactions and modes of regulation. Vincent Liquète proposes to call informational ecosystem the system based on people, structures, services and documents. It operates on an "operating" information system [24] for the establishment of interactions needed to manage projects and dialogue among different professional cultures through documents that are "boundary objects". This system is oriented towards activity, while the personal information system is oriented towards the actors and built according to their needs, and the overall system is oriented towards organizations by combining the spontaneous information networks with institutional networks [25]. In this system, the ranking is based on the praxeological rationality that includes the construction of knowledge in the psychosocial context, highlighting the link, and in the cultural context highlighting the meaning and technical context rewarding action.

Four main functions appear in the framework of the organization of this equipment, with respect to types of activity: training, project management, communication via a

relational database, information watch. The professionals must be able to customize the resources, in a sustainable way. The boundary objects can be defined as "an arrangement which allows different groups to work together without consensus" [26]. These artefacts (software, procedures, classifications, etc.) allow the transfer of elements of one practice to another with the characteristics of modularity, abstraction, versatility, and standardization. The projects themselves are communicational objects. These boundary objects pass within a community through information networks. The handling of this tool needs a cultural substrate that allows a shared representation of the construction of knowledge.

### 4.3 Development of a Culture of Critical and Participatory Information

Lack of information literacy in the initial curriculum is a recurring feature and is deplored by the actors themselves, who are often self-taught and develop effective tinkering practices. Yet information literacy appears to be the prerequisite for participation, particularly when writing technical documents is at the centre of professional practices. Stalder and Delamotte [27] remind us that it has a tactical dimension centred on the professional act, an action-centred dimension of intellectual technology, and a structural dimension centred on the communication device. We can add a critical dimension ("radical") that Andrew Whitworth describes, seeing in information literacy the means for a real intellectual decolonization and redistribution of power by seeking a dialogic, polyphonic, dynamic and critical objectivity [28]. Finally, this literacy is necessarily transversal and plural, it is a transculture [29]. A training device can include several types of abilities: tracking and collection, selection and evaluation, organization and recording (personal memories and shared work), implementation, rewriting, self-evaluation, self-learning, cooperation, communication, planning.

## 5 Conclusion

Professionals who have been the subject of our investigation questioned the industrial, rationalist, capitalist model, from the point of view of information, industrialization of culture, attention and knowledge, to favour a logic of crafts, tinkering and companionship. They try to rely on a long time-shared experience, not only shared information. However, they perceive the difficulty of sticking to this slow pace of a reenchanted world in a competitive environment where the risk of dischronicity could exclude them from the action. The search for a knowledge ecology inscribed in space, time and relations is a complex project and process to be built.

## References

1. Ermine, J.L.: La Gestion des Connaissances. Hermès-Lavoisier, Paris (2003)
2. Habermas, J.: L'Espace Public. Payot, Paris (1988)
3. Dewey, J., Melvin, L.R.: The Public and its Problems: An Essay in Political Inquiry. Penn State Press, University park (2012)

4. Guattari, F.: Vers une Ere pos-Média. In: Terminal, 51 (1990). http://www.revue-chimeres.fr/drupal_chimeres/files/termin51.pdf
5. Davenport, T.: Information Ecology: Mastering the Information and Knowledge Environment. Oxford University Press, New York (1997)
6. Merzeau, L.: L'Intelligence de l'Usager, Séminaire INRIA 2010: L'Usager Numérique. ADBS, 9-37, Paris (2010)
7. Jeanneret, Y.: Penser la Trivialité. Vol.1: La Vie Triviale des Etres Culturels. Hermès-Lavoisier, Paris (2008)
8. Ben Abdalla, N.: Réflexions sur l'Analyse des Pratiques Informationnelles Collaboratives, Les Cahiers du Numérique, 8(1), 131–158 (2012)
9. Engeström, Y.: Expansive learning at work: toawards an activity theoretical reconceptualisation. J. Educ. Work **14**(1), 133–156 (2001)
10. Liquète, V.: Préserver la Durabilité des Pratiques Informationnelles des Acteurs de l'Architecture Eco-Constructive: des Pratiques Informationnelles à une Mémoire Collective de Travail. Colloque COSSI Culture de l'Information et Pratiques Informationnelles Durables, Moncton (2013)
11. Austin, J.L.: Quand Dire, c'est Faire. Seuil, Paris (1970)
12. Hess, C., Ostrom, E.: Understanding Knowledge as a Commons: From Theory to Practice. MIT Press, Boston (2007)
13. Hess, C.: Inscrire les Communs de la Connaissance dans les Priorités de Recherche. In: VECAM (Coord.). Libres Savoirs: les Biens Communs de la Connaissance. Produire Collectivement, Partager et Diffuser les Connaissances au XXIe siècle. C&F éd., Caen (2011) http://vecam.org/rubrique135.html
14. Le Crosnier, H., Besnier, J-M. Le Numérique Peut-il Aider à Résoudre les Inégalités qu'il Engendre? Centre International de Philosophie Politique Appliquée, Séminaires IGEP, 1(5), (2014) http://cippa.paris-sorbonne.fr/?page_id=799
15. Mercier, D: Ouvert? données ouvertes. In: Les carnets de Diane Mercier Gouvernement Ouvert et Savoir Libre (2014) http://dianemercier.com/ouvert-donnees-ouvertes-gouvernement-ouvert-et-savoir-libre
16. Zacklad, M.: Une Théorisation Communicationnelle et Documentaire des TIC. In: Brossaud, C., Reber, B. (eds.) Humanités Numériques 2: Socio-Informatique et Démocratie Cognitive, pp. 20–35. Hermès Science Publications, Paris (2007)
17. Dewey, J., Bentley, A.F.: Knowing and the Known. Beacon Press, Boston (1960)
18. Zask, J.: Participer. Essai sur les Formes Démocratiques de la Participation, Le Bord de l'eau, Paris (2011)
19. Rieder, B.: Démocratiser la Recherche en Ligne? De la Critique à une Conception Orientée Société. In: Grivel, L. (ed.) La Recherche d'Information en Contexte: Outils et Usages Applicatifs, pp. 253–276. Hermès-Lavoisier, Paris (2011)
20. Morin, E.: La Méthode 4. Les Idées, leur Habitat, leur Vie, leurs Moeurs, leur Organisation. Seuil, Paris (1991)
21. Liang, T.P.: Technologies de l'Information, Diversité des Connaissances et Performance de l'Entreprise. In Fondation CIGREF, Les Essentiels du Programme ISD (2012) http://www.fondation-cigref.org/publications-numeriques/vagueB/ebook-integrale-VagueB/files/assets/basic-html/page131.html
22. Maurel, D., Chebbi, A.: La Perception de la Confiance Informationnelle. Communication et Organisation **42**, 73–90 (2012)
23. Simonnot, B.: L'Accès à l'Information en Ligne: Moteurs Dispositifs et Médiations. Hermès-Lavoisier, Paris (2012)

24. Albaladejo, A.: Une Utopie Nécessaire: l'Interaction par le Dialogue entre Savoirs des Agriculteurs et Savoirs des Techniciens en vue de la Gestion Durable de l'Environnement In: Albaladejo, A. & al. (ed.), La Mise à l'Epreuve. Le Transfert des Connaissances Scientifiques en Question, pp. 233–264. Quae, Versailles (2009)
25. Lehmans, A., Soumagnac, K. : Pratiques Informationnelles dans une Communauté Professionnelle: les Conditions d'Emergence de la Durabilité des Ecosystèmes Informationnels, In: Colloque COSSI Culture de l'Information et Pratiques Informationnelles Durables, Moncton (2013)
26. Star, S.: Ceci n'est pas un Objet-Frontière! Réflexions sur l'Origine d'un Concept. Revue Anthropologie des Connaissances **4**, 18–35 (2010)
27. Stalder, A., Delamotte, E.: Informer, s'Informer en Contextes Professionnels: une Approche par le Document Technique. In: Liquete, V. (ed.) Cultures de l'Information, pp. 91–113. CNRS Editions, Paris (2012)
28. Whitworth, A.: Radical Information Literacy: Reclaiming the Political Heart of the IL Movement, Oxford: Chandos (2014)
29. Mallowan, M.: Intelligence et Transculture de l'Information. Communication & Organisation **2**(42), 27–48 (2012)

# ICT Competences and Digital Literacy

# Digital Information Literacy: A Case Study in Oslo Public Library

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**Abstract.** This paper examines the digital information literacy (DIL) of public library professionals in Norway and explores the ways to improve their skills as well as identify barriers to improvement. The case study method was used and semi-structured face-to-face interviews were conducted with twenty public library professionals. The knowledge sharing approach was visible among the staff, but the slow adaptation of technology, and organizational, personal, and technological barriers were hindering the DIL development. Online training modules, mapping the staff competencies, assessment of the staff needs, advanced and customized training programs, long-term strategies, and decentralized initiatives were suggested for the improvement of DIL.

**Keywords:** Information literacy · Digital information literacy · Public library · Librarians · Oslo public library · Deichmanske bibliotek

## 1 Introduction

Although it is widely assumed that the Net Generation is skilful with the latest technology, and finding and using information, this is not always the case. Students often experience difficulties in evaluating and using information [1–5] and therefore they need proper digital information literacy (DIL). The public library is driven by the information and cultural requirements of the general public. Their users' requirements are wide-ranging; their age, previous learning experience and ability is not homogeneous and their attitudes of learning are very diverse [6, 7]. Therefore, the difficulties of the aged or adult users to use information in a digital environment can be easily understood and public libraries are changing to address their users' requests for digital information services [8, 9].

Sveum and Tveter [10] indicated that two major Norwegian governmental reports, Library Reform 2014 [11] and Cultural Heritage for All – Digitization in the Archive, Library and Museum sector [12] were prepared to create the Norwegian nationwide library through a network of cooperating libraries, across municipal borders, and to


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create easy access to digital content. Aabø [13] found that Norwegian public libraries are widely in use, as 52 % of all citizens visit a public library during a year, and except for cinemas, this is the highest percentage for any cultural institution. On average, each inhabitant visits the library five times a year [14]. Aabø [13] also indicated that the Norwegians are highly satisfied with the services of public libraries, and the service ranks third out of 52 public services. Kuhlthau [15] indicated that in the information search process, the public librarian works as an adviser, tutor or counsellor. The librarian has the role of mediator [2], which Kuhlthau defined as 'a person who assists, guides, enables, and otherwise intervenes in another person's information search process' [15, p. 107]. In addition, rapid change of information technologies (IT) requires library professionals to use a dynamic understanding of information literacy (IL) and to be open to the diversity of information sources that can be utilized by their patrons [16].

No research was identified that investigated the DIL of public library professionals in Norway. Hall [17] stated that public libraries are the most important places for a community to connect them with information. They help the community to read, interpret, and produce information that is appropriate as well as valuable to the community. Therefore, it is important to identify how public library professionals practice and acquire DIL, and prospects and barriers to improve their DIL.

The purpose of this study was to investigate practice, strength, weakness, influence, and the challenges of DIL of the public library professionals. The focus was on how the public library professionals perceive their DIL, what kind of DIL practice they are engaged in, how they can improve their skills, and what kind of barriers to the improvement of their skills exist. The research questions were: (a) what are the library personnel's experiences of learning DIL in the public library environment? (b) what are the prospects and barriers to improve the DIL of public library personnel?

The public library professional is defined as a person who is engaged in the library activities as paid occupation. This paper is an advanced version of the master thesis of Khatun [18].

## 2 Literature Review

### 2.1 Information Literacy and Digital Information Literacy

Considerable effort has been made by researchers in many parts of the world to define IL. Several overviews and analysis of the concept of IL have been published [19–22]. According to the Society of College, National and University Libraries, "Information Literacy is an umbrella term which encompasses concepts such as digital, visual and media literacies, academic literacy, information handling, information skills, data curation and data management" [23, p. 3]. Different authors define IL in various ways and it is related to information, literacy, competency, skill, learning and knowing [21, 24]. In this study, IL is defined as the ability to identify, locate, access, evaluate appropriate sources of information to meet the information need, as well as effectively and ethically use information resources regardless of format.

DIL is one aspect of IL that is very relevant for the 21st century [25]. However, there is very little information available about how to develop DIL among the public library

professionals. Illinois Mathematics and Science Academy [26, p. 2] mentioned that DIL involves "knowing how digital information is different from print information; having the skills to use specialized tools for finding digital information; and developing the dispositions needed in the digital information environment". Martin [27, p. 19] defined DIL as the "awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources". Hegarty et al. [28, p. 7] described DIL as a subset of IL and gave a following definition: "the ability to recognize the need for, access, and evaluate electronic information. The digitally literate can confidently use, manage, create, quote and share sources of digital information in an effective way". Garcia et al. [29] referred to DIL as tools and skills needed to conduct library research to introduce information resources that are relevant for personal and professional lives as well as for lifelong learning. Jeffrey et al. [30, p. 385] pointed out that "the digitally literate can confidently use, manage, create, quote, and share sources of digital information in an effective way that demonstrates an understanding and acknowledgement of the cultural, ethical, economic, legal, and social aspects of information". The authors of this paper agree that DIL is a subset of IL. In this study, the term DIL has been defined as an ability to access, evaluate, use, manage, communicate, and share digital information and sources in an effective and efficient way.

### 2.2 Information Literacy and the Public Library

Public libraries play a vital role in supporting learning processes through library professionals [31, 32]. However, it raises the question about the library professionals' role in the learning process and how far they can take their role as learning providers. The European Commission's memorandum identifies three types of learning: formal, non-formal, and informal learning. Formal learning usually takes place in educational institutions (e.g. schools, high schools, and universities) while non-formal learning typically takes place in the workplace or in organizations and complements formal learning. Informal learning is a 'natural accompaniment to everyday life' [33]. This informal learning is a predominant type of learning in public libraries which supports self-directed learning [34]. There is an increased emphasis on librarians knowing their own role in this learning process [34–36]. Although the librarians are not trained as educators, they need to know how to identify the users' needs and subsequently support them in their learning processes [2].

Several researchers [17, 37, 38] agree that public libraries have an important role to play in raising IL levels within their communities. Bruce and Lampson [37] found that public librarians have difficulty articulating the difference between IL and IT literacy. Bruce and Lampson [37] and Hall [17] focused on the ability of public libraries to use existing links within their communities to move into roles of advocacy. Harding [38] indicated that IL is often interchangeable with "lifelong learning" and "user education" in the literature, but these three concepts are inherently distinct, although related. De Groot and Branch [39] found that public libraries are very active proponents of childhood literacy and face increased demands as school libraries suffer due to low funding or even elimination. Lai [40] indicated that people who have not received formal

IL instruction can be reached by public libraries in the form of adult learning and lifelong learning. Thus, it is clear that the public library plays an important educational role, yet the potential benefit of IL in the public library environment has not been acknowledged. In fact, there is a lack of research on IL and public libraries.

### 2.3 Implication of Digital Information Literacy in Public Libraries

Bruce and Lampson [37] identified a range of factors that affect IL instruction and efforts in public libraries. Julien [41] indicated that Canadian public libraries were approaching IL instruction and defined the factors that limit IL implementation. De Jager and Nassimbeni [42] stated that public library staff have indeed made a difference in the IL of their respective communities. Koltay [43] examined the role of IL and digital literacy under the circumstances and challenges of the Web 2.0 environment, and indicated that users require literacies similar to services traditionally offered by academic, special and public libraries. Nielsen and Borlund [2] found that public libraries play an important role in developing IL and guide their users through the information seeking process. Hall [17] expressed the view that public libraries can reach out to all who wish to be lifelong learners rather than just the institutionally educated elite. Lai [40] indicated that Canadian public libraries value their role as IL training providers, and pay careful attention to staff development by offering various training approaches in order to provide efficient IL instruction for the public. Lai also indicated that Canadian public libraries build partnerships with other organizations to extend their IL teaching responsibilities. Further, Tavares et al. [44] found that IL helps to solve social problems as the users are able to identify, classify, and prioritize information needs and use information in order to suggest solutions. The library users can develop collaborative problem solving skills and heighten a sense of citizenship. However, Robertson [45] notes that library staff face financial barriers to achieve DIL in their own time to keep current in the workplace, and they prefer hands on learning in the workplace and training from peers.

Thus, the literature review indicates that researchers have explored different aspects of IL in public libraries, including attitudes towards IL, assessment of how a public library develops IL in the community, and challenges faced by public libraries to facilitate IL in the Web 2.0 environment. However, only some researchers have stressed training needs and strategic approaches to the development of IL among public library staff. [40, 44, 45]. The literature review revealed that no study investigated DIL of public library professionals in Norway and therefore this study was initiated.

## 3 Methodology

This study used a qualitative approach to gain insight into participants' opinions, feelings, emotions, and experiences. The Oslo public library (known as *Deichmanske Bibliotek*) was the research site that has approximately 300 employees spread over 16 branches in the Oslo municipality. The Main Library, and seven branches, namely Furuset, Grünerløkka, Holmlia, Gamle Oslo, Lambertseter, Majorstuen and Stovner were investigated in this study.

A case study method was used as a research strategy. In Yin's [46] terms, the case study logic proceeds sequentially and each case provides an increasingly accurate understanding of the question at hand. Semi-structured face-to-face interviews were conducted with twenty public library professionals. To maintain a balance between native and immigrant dense localities, branches were selected accordingly. The interviews were recorded and transcribed. Significant parts of the conversations are stated in the narrative forms, and quoted directly from the transcribed script.

## 4 Results

Twenty library professionals from the Oslo Public Library participated in this study. One-fourth of them were female, while the rest were male. The majority of participants were older than 53 years. The interviewees included: head of the branch, consultant cum trainer, children's librarian, program manager, and special librarians who were directly involved in DIL programs. The majority of them had a professional degree in library and information science while the others attended library related courses. The majority of interviewees had work experience in the public library, and a few of them had experience also in other types of library. All interviewees were familiar with IT, although the use of IT varied due to the nature of their job.

The first research question explored the DIL learning experiences of public librarians, what kind of training they had received, who conducted the training, how the trainings were conducted, and effectiveness of the training in the workplace. However, the interviewees noted that there is no exact term for IL in the Norwegian language, but the term IL as well as DIL are well known to the library professionals. The main elements covered by these terms in practice were the ability to find and critically evaluate information within the learning and information and communication technology (ICT) based context.

The interviewees focused on four kinds of learning processes: (a) self-learning, (b) learning by doing, (c) learning by sharing and (d) learning through training. The majority of them emphasized self-learning and expressed that they learnt DIL themselves to fulfil the requirement of their personal development. For example, Interviewee 1 stated: *"We try to learn to find out how to use it in our work because we are involved in the process"*. The reasons behind this practice were the lack of time and appropriate training courses. Young professionals who grew-up with digital technologies were more enthusiastic about learning on their own. For example, Interviewee 5 mentioned: "*I mostly find it myself …I have grown up with the digital world … I started with computers when I was eight years old*".

The librarians felt inadequately prepared for an instructional role due to lack of formal training. Sometimes they had to start without any training and they learnt DIL by doing. The majority of interviewees indicated that they did not have a formal DIL education. For example, Interviewee 4 commented: "*I have learned something about information literacy in bachelor level, but for digital information literacy most of the things I am doing here in the library, I learnt by doing*". A learning by sharing approach was identified as one of the most effective ways to learn DIL. The library professionals

did not receive any training in either IL theory or IL instruction and they mainly learnt from each other. For instance, Interviewee 5 mentioned: "*We can learn a lot from our colleagues as well as just talking to each other and helping each other"*. Sometimes a few library professionals were sent to formal training sessions, and after returning they shared and taught others. In addition, every branch library had experts in different fields, and they worked as 'a kind of information organism'; they knew who had expertise in a particular area, and they helped to find each other when there was a need. For example, when any confusion arose about the digital content of English literature, they referred to that person who knew better about it. They also learnt from users who were specialists in a particular area and overcame the time and resource barriers to attend formal training programs.

The Main library arranged the training courses, but some branch libraries conducted their own training programs according to their needs. Sometimes library professionals went to external training courses. The training courses were mostly related to the basic skills of computers and software; sometimes, specialized training was provided on different databases and the latest technologies. The training opportunities were limited by funding, staffing, and internal support by library administrators, and there was no specialized training on DIL. Some of the interviewees believed that whenever new services were introduced, the documentation helped a lot to improve their DIL.

Learning experiences of the interviewed library staff differed from each other depending on their age and association with ICT. The staff who were less interested in ICT and spent less time with it at home and workplace, mostly faced difficulties in providing ICT-based services. Moreover, they felt stressed when they were sent to ICT training courses. However, professionals who were aware of ICT developments did not fear learning new things and found it easier and interesting to learn. However, almost everybody mentioned that learning is time consuming.

The study also explored what kind of training was effective for the library professionals, and suggestions were sought about how to provide effective training on DIL. The majority of the interviewees expressed the view that the combination of formal training and practice was the most effective way of learning DIL. There should be sufficient opportunities to practice the learning afterwards at the branch. For example, Interviewee 6 expressed: "*I have been in many courses where I learnt something and when I came back, I did not have the same equipment or access to information to practice*". In some cases, advanced level training was not fruitful when the required access or technologies were not available in the branch libraries. It was expected that the main library provides training for trainers and later these trainers provide training at their respective branch, face to face or customized training according to the need of the branch.

The majority of the interviewees believed that online learning or distance education is an effective way of training. However, no online training courses had been arranged yet and interviewees had not used online modules. For example, Interviewee 20 indicated: *"Online learning … I mean what is called distance education or we may say it distance training… we can manage time, according to our convenience to learn in an effective way*". There was no training policy or strategy for DIL, not even a short-term one. For example, Interviewee 10 indicated: "… *there is a lack of long-term training*

*strategy*". However, a training strategy is essential to raise the level of DIL of the library staff.

The second research question investigated how DIL of public library staff could be improved, what were the barriers, and how these barriers could be overcome. The interviewees indicated three kinds of barriers: (a) Organizational barriers, (b) Personal barriers, and (c) Technological barriers to the improvement of DIL. Several organizational barriers like inadequate budget, resources, staff, advanced training programs, and infrastructure hindered the improvement of the library professionals' DIL. The branch libraries were functioning with a small number of staff, and were not always able to send staff to the training due to scarcity of budget or the need to get a replacement for those who wanted to go for training. For example, Interviewee 7 mentioned: "*We have not enough budget to take somebody (as replacement)… there has to be someone keeping the library open*".

The interviewees expressed the wish to attend at some advanced level training course outside the library, but it was not often possible, as external training courses were expensive and there was a budgetary limitation. For example, Interviewee 9 stated, "*We do not really have the money to pay for somebody to go for expensive courses*". According to one-third of interviewees, funding was not always a problem and self-motivation was also required. For example, Interviewee 17 stated: "*Staff have to keep themselves updated as well, because one cannot expect that government can provide everything he needs, should get responsibility himself as well*".

The majority of the interviewees wanted advanced level training, but the training offered was often at a very basic level. However, sometimes advanced level training programs were not suitable for some branches, because users do not need that kind of services. For example, Interviewee 16 stated, "*I have been in a very good course some time ago at the parliament library. But I did not get so many questions afterwards, so I forgot a bit how it works"*. The nature of services and the need of the local people are very different from branch to branch; therefore, the expertise in DIL should respond to the need. For example, Interviewee 13 stated "*We have to specialize ourselves on the users living in this area, so perhaps we should pick those training programs which are relevant for us, more than doing everything*".

Personal barriers were also mentioned as a major obstacle for improving DIL. Some librarians were not interested in following recent ICT developments. Being accustomed to repetitive work for several years, some library professionals had lost the enthusiasm to learn anything new. For example, Interviewee 12 mentioned: "*…here half of the staff members are above 60 years... I think they are not really open minded about digital literacies … they are not interested in going further"*. Furthermore, they feared new knowledge that might create a new kind of job responsibility.

Technological advancement seems to develop slowly in the public library system. The interviewees agreed that rapid technological changes are obstacles to DIL development. For example, sometimes old computers are not compatible with new software and old games do not work on new computers. The interviewees suggested adequate allocation of funding, training, recruitment, knowledge sharing, needs assessment of the staff and recruitment of DIL experts to overcome the existing obstacles to developing library professionals' DIL. They also emphasized several issues, like increasing knowl-

edge sharing among colleagues, continuous monitoring of staff performance, and encouragement to have DIL expertise.

The interviewees suggested that the library management should consult with the staff and identify what level of competency they want among their staff. There should be provision of specialization of staff members in each branch instead of giving training on everything to every staff member. There was a need to map what kind of DIL is needed by the staff and then develop their needed expertise. It was noted that there should be at least one staff member in each branch who could provide dedicated DIL training to other colleagues and users. Library staff need updated competencies in accordance with the changing information environment. Recruitment of digital information literate staff was also suggested.

The majority of the interviewees were in favour of decentralized initiatives to improve DIL. A small number of interviewees noted that the initiatives should come from the municipality authority, while others indicated that the main library should take the major responsibility for the development of DIL. As different branches face different kinds of user needs, the branch manager along with the staff can decide on the best way to implement DIL in the respective branch. The needed initiatives should be taken by the branch library according to the local needs in cooperation with the main library and the municipality.

## 5 Conclusions

There were visible differences between library professionals who were experts and non-experts in DIL. The library professionals were able to manage basic DIL shortcomings by sharing their knowledge and skills with other colleagues when required. The learning experiences of the library professionals differed from each other depending on their age and association with ICT. Young library professionals were more enthusiastic about learning ICT and DIL, while aged professionals preferred a sharing approach. The sharing approach also helped the library professionals to overcome the lack of time and resources needed for formal training courses. Apart from searching techniques in different databases, no specialized training on DIL for the public library professionals was available. It was believed that an online module for learning DIL might be an effective and convenient way to improve the DIL of library staff. For the advanced level DIL, formal training followed by practice was found to be the most effective learning method. Organizational, personal, and technological barriers were identified as the major obstacles to DIL improvement. Allocation of funds, recruitment of digital information literate staff, needs assessment of existing staff, encouragement of knowledge sharing, providing customized and advanced training were found to be potential components to overcome the existing barriers. The respective branch library should take the necessary initiatives in cooperation with the main library and the Oslo municipality to cope with changing circumstances in the information and knowledge society. A policy and long-term strategy are needed to raise the level of DIL of Oslo Public Library professionals. Sustainable IL education in public libraries will depend on more dynamic leadership and on a vision of a new model of the public library.

## References


1. Rowlands, I., Nicholas, D., Williams, P., Huntington, P., Fieldhouse, M., Gunter, B., Withey, R., Jamali, H.R., Dobrowolski, T., Tenopir, C.: The Google generation: the information behaviour of the researcher of the future. Aslib Proc. **60**, 290–310 (2008)
2. Nielsen, B.G., Borlund, P.: Information literacy, learning, and the public library: a study of danish high school students. J. Librariansh. Inf. Sci. **43**, 106–119 (2011)
3. Fawley, N., Krysak, N.: Information literacy opportunities within the discovery tool environment. Coll. Undergrad. Libr. **19**, 207–214 (2012)
4. Virkus, S., Bamigbola, A.A.: Educational use of web 2.0 tools: a phenomenographical study. In: Information and Society: Proceedings of the Department of Information and Library Studies, pp. 255–265. University of Latvia, Riga (2013)
5. Virkus, S., Bamigbola, A.A.: Students' conceptions and experiences of web 2.0 Tools. New Libr. World **112**, 479–489 (2011)
6. McCook, K.D.L.P.: Introduction to Public Librarianship. Neal-Schuman Publishers Inc., New York (2011)
7. Hernon, P., Matthews, J.R.: Reflecting on the Future of Academic and Public Libraries. American Library Association, USA (2013)
8. Merkley, C.: Hands on digital information literacy training from peers is preferred by public service library staff. Evid. Based Libr. Inf. Pract. **9**, 58–60 (2014)
9. Robertson, R.: Reframing Ourselves: Digital Information Literacy Skills of Frontline Public Library Staff. Libr. Inf. Assoc. N. Z. 53 (2014)
10. Sveum, T., Tveter, F.: Norwegian public libraries and governmental reports: visions and economic realities. New Libr. World **113**, 351–363 (2012)
11. ABM-Utvikling: Library Reform 2014: Part I-Strategies and Initiatives. English Edition. ABM-U, Oslo (2006)
12. Norsk Digitale Bibliotek: Cultural Heritage for all: on Digitisation, Digital Preservation and Digital Dissemination in the Archive, Library and Museum Sector: a Report. ABM-Utvikling, Oslo (2006)
13. Aabø, S.: The value of public libraries: a socioeconomic analysis. In: Belotti, M. (ed.) Verso un'Economia della Biblioteca: Finanziamenti, Programmazione e Valorizzazione in Tempo di Crisi, pp. 169–176. Editrice Bibliografica, Milano (2011)
14. Oslo Public Library: Deichmanske Bibliotek/Oslo Public Library, https://www.deichman.no/side/in-english
15. Kuhlthau, C.C.: Seeking Meaning: A Process Approach to Library and Information Services, 2nd edn. Libraries Unlimited, Westport, CT (2004)
16. Stern, C., Kaur, T.: Developing theory-based, practical information literacy training for adults. Int. Inf. Libr. Rev. **42**, 69–74 (2010)
17. Hall, R.: Public Praxis: a vision for critical information literacy in public libraries. Public Libr. Q. **29**, 162–175 (2010)
18. Khatun, M.: Digital Information Literacy of the Oslo Public Library Professionals, MA Thesis, Tallinn University, Tallinn (2013)
19. Behrens, S.J.: A conceptual analysis and historical overview of information literacy. Coll. Res. Libr. **55**(4), 309–322 (1994)
20. Bawden, D.: Information and digital literacies: a review of concepts. J. Doc. **57**, 218–259 (2001)
21. Virkus, S.: Information literacy in Europe: a literature. Inf. Res. **8**(4), 1–56 (2003)
22. Horton Jr., F.W.: Understanding Information Literacy: a Primer. UNESCO, Paris (2008). http://unesdoc.unesco.org/images/0015/001570/157020E.pdf

23. SCONUL: The SCONUL Seven Pillars of Information Literacy: Core Model for Higher Education. Society of College, National and University libraries, UK (2011)
24. Virkus, S.: Information literacy from the policy and strategy perspective. Nord. J. Inf. Lit. High. Educ. **4**(1), 16–37 (2012)
25. WikiEducator: DIL/Development of DIL definition (DoDD). http://wikieducator.org/DIL/Development_of_DIL_definition_(DoDD)
26. Mathematics, I., Academy, S.: 21st Century Information Fluency: Assessing Students' Knowledge and Skill. Illinois Mathematics and Science Academy, Illinois (2006)
27. Martin, A.: Literacies for the Digital Age. In: Martin, A., Madigan, D. (eds.) Digital Literacies for Learning, pp. 3–25. Facet publishing, London (2006)
28. Hegarty, B., Penman, M., Kelly, O., Jeffrey, L., Coburn, D., McDonald, J.: Digital Information Literacy: Supported Development of Capability in Tertiary Environments, pp. 1–303. Ministry of Education, Wellington, New Zealand. (2010)
29. Garcia, L.K., Walstrum, M., Morrison, R.: From Embedded to Integrated: Digital Information Literacy and New Teaching Models for Academic Librarian. In: ACRL National Conference 2011, Philadelphia (2011)
30. Jeffrey, L., Hegarty, B., Kelly, O., Penman, M., Coburn, D., McDonald, J.: Developing digital information literacy in higher education: obstacles and supports. J. Inf. Technol. Educ. Res. **10**, 383–413 (2011)
31. Jaeger, P.T., Fleischmann, K.R.: Public libraries, values, trust, and e-government. Inf. Technol. Libr. **26**, 34–43 (2013)
32. Yılmaz, B., Soylu, D.: The role of public libraries in information literacy in Turkey: a study of a provincial public library. In: Kurbanoğlu, S., Špiranec, S., Grassian, E., Mizrachi, D., Catts, R. (eds.) ECIL 2014. CCIS, vol. 492, pp. 642–651. Springer, Heidelberg (2014)
33. Commission, E.: A Memorandum on Lifelong Learning. Commission of the European Communities, Brussels (2000)
34. McNicol, S., Dalton, P.: Public libraries: Supporting the Learning Process. Centre for Information Research Faculty of Computing, Information and English University of Central England in Birmingham, UK (2003)
35. Spacey, R., Goulding, A.: Learner Support in UK Public Libraries. In: Aslib Proceedings, pp. 344–355. Emerald Group Publishing Limited (2004)
36. Ashcroft, L., Farrow, J., Watts, C.: Public libraries and adult learners. Libr. Manag. **28**, 125–138 (2007)
37. Bruce, H., Lampson, M.: Information professionals as agents for information literacy. Educ. Inf. **20**, 81–106 (2002)
38. Harding, J.: Information literacy and the public library. Australia's Public Libr. Inf. Serv. **21**, 157 (2008)
39. De Groot, J., Branch, J.: Solid foundations: a primer on the crucial, critical, and key roles of school and public libraries in children's development. Libr. Trends. **58**, 51–62 (2009)
40. Lai, H.-J.: Information Literacy training in public libraries: a Case from Canada. Educ. Technol. Soc. **14**, 81–88 (2011)
41. Julien, H.: Making a dent? information literacy instruction in Canada's public libraries. Proc. Am. Soc. Inf. Sci. Technol. **43**, 1–6 (2006)
42. De Jager, K., Nassimbeni, M.: Information literacy in practice: engaging public library workers in Rural South Africa. IFLA J. **33**, 313–322 (2007)
43. Koltay, T.: The media and the literacies: media literacy, information literacy. Digital Literacy. Media Cult. Soc. **33**, 211–221 (2011)

44. Tavares, R.B., Hepworth, M., Costa, S.M.D.S.: Investigating citizens' information needs through participative research: a pilot study in Candangolândia, Brazil. Inf. Dev. **27**, 125–138 (2011)
45. Robertson, R.: Identification of Strategies to Improve Digital Information Literacy Skills Amongst Frontline Public Library Staff (2012). http://hdl.handle.net/10063/2360
46. Yin, R.K.: Case Study Research: Design and Methods. SAGE Publications Inc, Los Angeles (2013)

# Digital Literacy of School Leaders: What Impacts in Schools? Results of Two Studies from Portugal

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**Abstract.** This paper presents the results from two studies concerning a project conducted in secondary Portuguese schools. The first study is focused on the school members responsible for the development of projects related to digital literacies. The second study is a case study that aims to understand the perceptions and use of technologies by teachers and students. Through these studies it is possible to identify the skills profile of school leaders, particularly in terms of digital literacy, and to relate this profile with the local implementation of pedagogical practices involving digital technologies. The results show that as a consequence of the implementation of the Technological Plan for Education, schools were equipped with appropriate technological resources and teachers developed digital literacy skills. Skilled leaders in digital literacy revealed encouraging attitudes towards their colleagues and students. These leaders have a transformational leadership profile that, according to literature, generates a better environment for the involvement of different educational actors.

**Keywords:** School leadership · Transformational leadership · Digital literacy · Technological plan for education

## 1 Introduction

Since the beginning of this century, profound changes have been introduced in educational institutions in Portugal. We can highlight the growing autonomy, the widespread use of technology in all school activities, and the implementation of school networks. The Technological Plan for Education (2007–2010) defined a set of objectives that led to the introduction of technology at schools, including the internet in high-speed broadband and ICT skills training and certification for teachers [1]. The development of skills in information and communication technologies (ICT) and their integration in the teaching-learning processes became unavoidable objectives of educational systems in Portugal and Europe [2, 3]. A first phase, with a focus on access and investment in infrastructure, shifted progressively towards an effort on the development of digital competences "embedding the use of ICT in broader educational strategies" [2].

This scenario has transformed the professional teacher practices within the classroom context. Nowadays, teachers are more confident in using ICT, more positive about ICT's


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impact on students' learning, and organize ICT based activities more often than they did before [3]. But this new context also put additional responsibilities on school leaders including the demand to develop digital competences at different levels. The literature stresses the importance of leaders in the school arena as school leadership has been identified as a crucial factor for the introduction of innovation in schools [4, 5], namely for the penetration of ICT in classrooms [2]. So it is important to understand how their competences in digital literacy are reflected in local political decisions and how school leaders themselves act in terms of pedagogical innovation related to the use of digital technologies.

## 2 Conceptual Background

### 2.1 Digital Literacy

Digital literacy is a concept that is discussed in different contexts – for example, in education or information studies – and has acquired different nuances, according to various viewpoints. In an article written at the beginning of this century, Bawden connected digital literacy with the competences to read and understand hipertextual and multimedia texts. He stated that information literacy and digital literacy were central issues for lifelong learning, knowledge management, and the growth of the information society [6]. More recently, in a review of the concept, Littlejohn, Beetham, and McGill described digital literacy as "the capabilities required to thrive in and beyond education, in an age when digital forms of information and communication predominate" [7].

The definitions proposed by ALA (2011) [8] in the context of documentation and information sciences and by Futurelab (2009) [9], with a focus on education, also offer a special relevance. As expressed by ALA, digital literacy involves the competence not only to use technologies appropriately, namely to communicate and collaborate with peers and colleagues, but also to understand the relationship between technology and lifelong learning [8]. The implications for the school context and for school leaders concerning their role on the integration of technologies in teaching and learning are significant because it puts attention on the social dimensions of digital literacy and on the importance of a long-term perspective.

Digital literacy is linked with critical thinking and we have to consider that it is an essential life skill in the actual circumstances where the digital environment enlarges its sphere of influence. Taking into account these new challenges, Futurelab claims that "learners and teachers need to make sense of how technologies can be used within subjects and to understand how such technologies affect what we know about those subjects." With this perspective in mind, the authors affirm that digital literacy means "knowing how technology and media affect the ways in which we go about finding things out, communicating with one another, and gaining knowledge and understanding" [9]. They consider that it is important to understand "how technologies and media can shape and influence the ways in which school subjects can be taught and learnt" [9]. In this context digital literacy is a decisive element for schools and a determining factor for those who work in education.

### 2.2 Innovation and Technologies

There is a tacit recognition about the importance that school has in the development of intellectual tools that enable students to understand the networked world in which they are growing. In this sense, The Horizon Report Europe: 2014 Schools Edition points out a range of challenges for education over the next five years and distinguishes among: (i) "Solvable challenges", where students with low digital competencies and the integration of ICT in Teacher Education are included; (ii) "wicked challenges" connected with the acceptance of students as co-designers of learning and with supporting complex thinking and communication; (iii) "Difficult Challenges" related to the creation of authentic learning opportunities and the promotion of formal and non-formal learning in hybrid learning contexts [10].

With regard to this range of challenges it is accepted that it is difficult to solve the student's participation in the design of their learning pathways as this is felt to be inherently disruptive. This participation implies that institutions offer flexible curricula so that students become more responsible for their own learning process and the teacher encourages and guides the development of students' learning pathways [11]. This option is related to the role of teachers as mentors and, according to this concept, teachers encourage students by explaining their learning needs through self-regulation and reflection, making them thus responsible in their learning process.

While recognizing that digital technologies are favourable to learning which, in fact, has contributed to its rapid spread and adoption, the changes in school, at classroom level, are carried out slowly [12]. On the one hand, the effects of using digital technologies to enhance learning outcomes lack strong evidence and, on the other hand, the debate on how to use them has not ended yet. Should technologies be a support to traditional pedagogies or do we need to design a radically different pedagogy, based on social skills and new digital literacies?

In Portugal, most schools are connected and equipped with technology but there is a lack of teacher training programs that integrate digital pedagogies based on research that shows how students learn in these new environments. According to Fullan [13], pedagogical innovations have three dimensions: the use of new resources and technologies, the use of new strategies or pedagogical activities, and the changing of beliefs by the participants. To consider that a change corresponds effectively to an innovation it is essential to use new materials and digital technologies, which implies new teaching methodologies [13, 14]. And the innovation that does not include changes in the three mentioned dimensions is probably not significant [13] because innovation involves changes in conceptions and practices.

We should invest in the reformulation of concepts and in the study of innovation in digital environments together with research carried out on digital practices in various learning scenarios. There is still a way to go where the school leaders have a key role in defining and creating best practices and helping the implementation of innovative practices focused on the future, to support those involved in learning in digital contexts.

### 2.3 Transformational Leadership – What Meaning?

Research on educational leadership in the last two decades reveals a variety of models, that Hallinger [15] groups in two perspectives - instructional and transformational. Transformational leadership can assume various names, like shared leadership, teacher leadership, distributed leadership, and transformational leadership.

Transformational leadership had repercussions in the educational community during the 1990s as a way of reacting to top-down policies that prevailed in the 1980s and were aimed at introducing change. According to Hallinger [15], these models are rooted in a perception of the needs of each participant rather than in coordination and control and recognize that the principal by him/herself is not able to provide the leadership that creates these conditions. Transformational leadership, rather than instructional leadership, calls for a greater capacity of the leader in dealing with ambiguity and uncertainty and to live with the process of change [16]. These models are interested in developing the ability to innovate in the organization and build internal capacity of the school, making it able to choose their purposes and sustain change in teaching and learning practices.

Transformational leaders are concerned with creating a climate in which teachers engage in continuous learning and in sharing knowledge. They work together with others, identifying personal goals, and trying to connect them with the goals of school organization. Studies such as those conducted by Leithwood and Jantzi [17] show that, in these models, the results are reflected in changing behaviours and in adopting new teaching strategies; that is, changes occur in the conceptions and professional practices. This leadership model is associated with the notion of distributed leadership that aims to develop a vision and a shared commitment by the community for innovation within the school. In the words of Hallinger [15], the transformational model is centred on the projection of the future with expanding aspirations of the members of the school organization.

Several studies [18, 19] show that transformational leadership has an impact on teachers' perceptions about school conditions, on their commitment to change, and on organizational learning that takes place, highlighting, among other things, the improvement of educational processes and students' outcomes. At the same time, this is a crucial factor for large-scale reforms and innovation [5, 20]. The Technological Plan for Education is an example of such kind of educational reforms.

## 3 Methodology

The national policy for the integration of ICT in Portuguese schools was improved in 2007 with the implementation of the Technological Plan for Education (TPE) that included, among other measures, the allocation of an ICT coordinator in each school and the development of teachers' digital skills.

The studies we present are integrated in a larger research project aiming to examine schools leadership and the implementation of ICT in teaching and learning within the context of the development of the TPE. This project has a design based on two dimensions. The first one is a large-scale study where we sent a questionnaire to

100 ICT coordinators in secondary schools, corresponding to 20 % of the total number of coordinators in the country, following procedures to establish a representative sample. At the same time, we conducted several case studies in different secondary schools. These in-depth studies intended to identify how technologies are used in the classroom, highlighting possible pedagogical innovations. With these two dimensions of the project we, could compare the wider view of the situation of the use of ICT in schools, through the perspective of ICT coordinators, with the more tangible context of classroom real practices.

In the case studies we collected data through interviews with principals and questionnaires to teachers and students at the beginning and end of the school year. Additionally, we recorded observation records in a diary/logbook. Our studies fall within the qualitative paradigm and assume a constructive interpretative approach [21]. We described the particular characteristics of each case to try to explain the importance of leadership, the contexts where new technologies are used, and also the implementation of pedagogical innovations in the classroom. Qualitative research is recommended for the analysis of concrete cases in their specific time and space and based on the activities of people in their own contexts [22]. It is essential to contextualize the situation due to the influence of the historical, social, cultural, and even physical landscape. Each school has particular characteristics in terms of teaching staff, students, and the socio-economic context in which it is integrated. So it is important to understand how these different contexts may influence and are related to different practices and innovations.

## 4 Results

### 4.1 Large-Scale Study

We distributed the questionnaire in 2012 to 100 ICT coordinators. The survey instrument had two parts. We designed one part to examine the relationship between the ICT coordinator profile (technological, organizational, and pedagogical) and the achievement of TPE major goals in schools. We based the second part on the "Multifactor Leadership Questionnaire" (MLQ) from Avoilo and Bass [23, 24] to identify the leadership profile of these ICT coordinators. The MLQ is widely used in the educational context and identifies three types of leadership: Transformational, Transactional, and Passive-Avoidant. Our research followed predominantly a correlational design [25]. For this article we focus on specific data related with the technological and pedagogical profile of the coordinators that is then crossed with their leadership profile. Taking into account the limitations of space we have decided to summarize the main findings.

Most of the ICT coordinators who participated in the survey were men (28.6 % female teachers and 71.4 % male teachers) having more than 30 years old with the greatest number between 40–49 years old. Concerning their educational level, 55 % graduated; 23 % had a master's degree, 17 % had specialized training/post-graduation, and a small percentage had a doctorate (3 %). The largest group of teachers had 16–24 years of teaching service and were ICT coordinators since 2009, when the position was created.

Significant for this article is the way this group of teachers evaluated their own digital competencies and how they used ICT in teaching.

Table 1 shows that the highest frequency of responses indicated that these coordinators felt that they possess the specified skills, most at a high or very high level. Some acquired those skills in initial training (15 %), but most part of them said that they developed these competences during continuous teacher training (27 %), post-graduate programs (19 %), or self-training (34 %). This is an important aspect because it shows that continuous teacher training has a relevant role but self-training appears as a personal solution for the development of these competences. This may be due a lack of other possibilities, for instance a low offering of teacher training programs.

**Table 1.** ICT coordinators' digital competencies and pedagogical use of ICT

| Item | % | | | | | |
|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 |
| Use of ICT in the teaching/learning process | 0.0 | 0.0 | 2.0 | 15.0 | 47.0 | 36.0 |
| Use of ICT to develop a significant and active learning process | 0.0 | 0.0 | 1.0 | 18.0 | 49.0 | 32.0 |
| Use of ICT to promote a lifelong learning culture | 0.0 | 0.0 | 4.0 | 12.0 | 54.0 | 30.0 |
| Use of ICT to develop collaborative work with other teachers | 0.0 | 0.0 | 2.0 | 19.0 | 46.0 | 33.0 |

* Scale: 0 = Never; 1 = Rarely; 2 = Occasionally; 3 = Sometimes; 4 = Frequently; 5 = Very often

We analysed the answers of these ICT coordinators to the MLQ to construct the leadership profile. It was possible to identify an emphasis on transformational leadership although the two groups had different averages. Group 1 has a transformational and transactional leadership with higher averages (3.28 and 2.96, respectively) than group 2 (with 2.29 for transformational leadership and 2.15 for transactional). For a more complete analyses of data see [26]. Sample responses from items with scores higher than 3 on a four-point scale provide examples how respondents illustrated their transformational leadership. They stated, for example: "I go behind self-interest for the good of the group"; "I provide others with new ways of looking at puzzling things", or "I consider others as individuals having their own needs, capabilities and aspirations." Leaders were more apt to show characteristics of individual consideration and intellectual stimulation and were less likely to be charismatic and inspirational.

### 4.2 Case Studies

For this article we focus on a case study conducted at an urban secondary school founded in 1837, with a strong ethos based on "Quality, Tradition and Innovation." The school has about 2500 students and the current principal has managed the school for 20 years. The school has a stable teaching staff and teachers have much experience, commonly over 20 years. Currently in Portugal, schools show a tendency to be split into two groups:

those schools focused on regular education and for students who follow to higher education and schools that mainly offer vocational education. The school where the study was conducted belongs to the first group.

The school has a website, uses Moodle, Facebook, and several class blogs. There are two classrooms for ICT, six computer labs, mobile labs, one interactive whiteboard, and wire-less. In the interview, the principal mentioned the presence of a computer in each classroom and stressed the relevance of the use of ICT with students. He characterised himself as frequently using technological tools. This scenario is in line with the results of other recent studies [27]. The school promotes regular training activities on various technological aspects within the school environment with the support of ICT teachers. These training sessions are based on suggestions from the school teachers who, at the beginning of the school year, indicate the specific areas of training they want to develop throughout the year.

Eight teachers in the scientific areas (mathematics, physics, chemistry, and biology) participated in this case study. They teach regular classes and vocational/professional programmes. They answered a questionnaire and we observed their classes. This group has varying degrees of affinity with technology. For example, one of the teachers had already been an ICT instructor and another had a graduate degree in the field of technology. Students also participated in a survey: 79 students responded, ranging in age between 15 and 18 years old. We asked both groups a number of questions including questions about the technologies they used in the classroom and in what situations/activities.

Teachers and students considered that the computer, internet, projector, and the graphing calculator were the most used technologies in the classroom. Teachers also reported the use of sensors, simulations, games, and geometric programs such as Cabri and GeoGebra. Teachers and students agreed that technological resources were used mainly in exercises and problem solving and in the preparation and presentation of practical work. While teachers also mentioned that they used technology for the promotion of research and exploration, students did not appreciate this use to the same degree perhaps due to the school context of science teaching or because they lacked a clear understanding of the terms used in the survey.

Teachers pointed out that the main advantages for the use of ICT has to do with helping the students establish an easier relationship between theory and practice. It also increased students' motivation and interest for the courses and enabled a better visualization of the concepts to be acquired. They emphasize that students enjoy using technologies and become more involved in the subjects when these are approached by using ICT support. Teachers use the technology because they believe that ICT promoted student engagement, facilitated learning and skills development, and encouraged collaborative work among students.

At the end of the year, teachers mentioned a positive relation between their students with technologies. The students also considered positive their experience with the use of technology but expressed a negative opinion on the usefulness of new technologies in the case of group work.

## 5 Discussion

Our analysis of data collected from multiple sources revealed several similarities between the views expressed by ICT coordinators of the large-scale study and by teachers participating in the case study. Both groups have a positive view about the use of technologies in teaching and learning and state that they use technologies frequently. Having a larger perspective about what is done in their schools, ICT coordinators think that there is still a way to go to develop a broader appropriation of technologies in the schools, as shown in Table 2.

**Table 2.** Potentials of the use of ICT in schools

| Item | % | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| ICT allows students to get better results | 1.0 | 4.2 | 20.8 | 46.9 | 27.1 |
| ICT allows students to incorporate ICT in the learning process in a more secure and ethical way | 1.0 | 3.1 | 36.5 | 46.9 | 12.5 |
| ICT allows teachers to improve their pedagogical work | 1.1 | 3.2 | 27.4 | 50.5 | 17.9 |
| ICT is used with all its pedagogical potential by teachers in your school | 4.2 | 14.6 | 37.5 | 31.3 | 12.5 |
| ICT is used with all its pedagogical potential to involve more the students in learning activities | 2.1 | 11.6 | 42.1 | 33.7 | 10.5 |

* Scale: 1- Strongly disagree; 2- Disagree; 3- Neutral; 4- Agree; 5- Strongly agree

We have to say that in the last years, due to the economic crisis that Portugal has been confronted with, the investment in education has been drastically reduced and the Technological Plan for Education was suspended. So, a bigger responsibility is put on local leaders. Continuous training on the pedagogical use of technologies is more dependent on schools' dynamics and culture. The school participating in the case study is an example of such a committed school but not all schools have the same conditions for the development of a culture where digital literacy is realized as an essential life skill. Even among ICT coordinators, which we consider a group with a special disposition for the use of technologies, this is not a general condition (see Table 1) or, at least, those coordinators do not have the appropriate conditions for greater use in their schools. The principal of the analysed school explicitly mentioned the economic constraints that make the regular maintenance of the technological equipment difficult.

Nevertheless, we can identify several pedagogical innovations that teachers are implementing with the use of digital technologies. These innovations are contributing

to the change in the roles of teachers and students, enabling student-centred learning. Another important change in the teaching and learning process relates to the promotion of collaborative work between teachers, between the teacher and his/her students, and among students. Both teachers and students recognize that the use of these technologies is motivating learning, providing new experiences that would otherwise be out of reach. Teachers also think that technologies enable students to take some control over their individual learning process.

Of course, the availability of technological resources, as well as the leadership view about the importance of teachers continuous training in the field was an important factor for personal investment of teachers in the use of technologies in the classroom. This situation confirms other findings. Confident and supportive teachers are needed to effectively use ICT infrastructure and exploit its potential: the more teachers are confident in using ICT, the more they report frequent ICT-based activities during lessons across all grades [3]. It seems clear that the sustainability of innovation requires a reinforcement of teacher training directly connected to teaching needs, thus relating digital literacies and multiliteracies with a specific subject matter.

Concerning the leadership profile of the ICT coordinators, through the application of the MLQ from Bass and Avolio [23] it was possible to identify that these coordinators follow the view developed by the authors that every leader develops a bit of each of transformational and transactional styles, considering that the two styles complement each other. The ICT coordinators as well as the principal that was interviewed developed leadership attitudes that encouraged others to innovate and to keep motivated, namely concerning the pedagogical use of technologies. Results show that these leaders are aware of the importance of digital literacy, taking into account its implications in today's society, where learning is an ongoing process in line with the observations proposed by Futurelab [9], for example.

In the present context it is important to mention that educational policies do not always nourish these innovative processes that need to be developed in a consistent and sustainable way, as pointed out by international reports [3, 10]. Due to economic constraints but also to some educational perspectives that grow today in education in Portugal – like a strong emphasis on examinations and in some instrumental dimensions of education – the dynamics that have been initiated in the beginning of the century may not get the desirable scale. Consequently we risk not be moving to the necessary mastery of digital literacies as required nowadays.

## References

1. Resolução do Conselho de Ministros n.º 137/2007 [Resolution of the Cabinet of Ministers]: Diário da República, 1.ª série, n.º 180, 18 de Setembro (2007)
2. ICT Cluster: Learning, Innovation and ICT. Lessons Learned by the ICT Cluster Education & Training 2010 Programme. Van den Brande Lieve (EC - DG EAC), Brussels (2010) http://www.icde.org/filestore/Resources/Reports/KeyLessonsICTclusterReport.pdf

3. European Commission, European School, University of Liege - Psychology and Education: Survey of Schools: ICT in Education. Benchmarking Access, Use and Attitudes to Technology in Europe's Schools. FINAL REPORT- A Study Prepared for the European Commission DG Communications Networks, Content & Technology. Digital Agenda for Europe. Luxembourg: European Commission (2013). https://ec.europa.eu/digital-agenda/sites/digital-agenda/files/KK-31-13-401-EN-N.pdf
4. Eurydice: Key Data on Learning and Innovation through ICT at School in Europe 2011. Education, Audiovisual and Culture Executive Agency - Eurydice, Brussels (2011. http://eacea.ec.europa.eu/education/Eurydice/documents/key_data_series/129EN.pdf
5. Geijsel, F., Sleegers, P., Berg, R.: The need for transformational leadership in large-scale innovation: the case of the Netherlands. In: paper presented at the Annual meeting of the American Educational Research Association, ED 426458 (1998)
6. Bawden, D.: Information and digital literacies: a review of concepts. J. Doc. **57**(2), 218–259 (2001)
7. Littlejohn, A., Beetham, H., McGill, L.: Learning at the digital frontier: a review of digital literacies in theory and practice. J. Comput. Assist. Learn. **28**, 547–556 (2012)
8. ALA Digital Literacy Taskforce (2011). http://connect.ala.org/node/181197
9. Hague, C., Williamson, B., Futurelab: Digital Participation, Digital Literacy, and School Subjects. A Review of the Policies, Literature and Evidence (2009). http://www.futurelab.org.uk/projects/digital-participation
10. Johnson, L., Adams Becker, S., Estrada, V., Freeman, A., Kampylis, P., Vuorikari, R., Punie, Y.: Horizon Report Europe: 2014 Schools Edition. Publications Office of the European Union, and Austin, Texas, The New Media Consortium, Luxembourg (2014). https://ec.europa.eu/jrc/sites/default/files/2014-nmc-horizon-report-eu-en_online.pdf
11. Koenen, A.-K., Dochy, F., Berghmans, I.: A phenomenographic analysis of the implementation of competence-based education in higher education. Teaching Teach. Educ. **50**, 1–12 (2015)
12. Livingstone, S.: Critical Reflections on the Benefits of ICT in Education. Oxford Rev. Educ. **38**(1), 9–24 (2012)
13. Fullan, M.: The NEW Meaning of Educational Change. Routledge, London (2007)
14. Oliveira, I., Courela, C.: Mudança e Inovação em Educação: O Compromisso dos Professores. [Change and Innovation in Education: Teachers' Compromisse]. Interacções **27**, 97–117 (2013)
15. Hallinger, P.: Leading educational change: reflections on the practice of instructional and transformational leadership. Cambridge J. Educ. **33**(3), 329–352 (2003)
16. Jackson, D.: The school improvement journey: perspectives on leadership. School Leadersh. Manage. **20**(1), 61–78 (2000)
17. Leithwood, K., Jantzi, D.: The relative effects of principal and teacher sources of leadership on student engagement with school. Educ. Admin. Q. **35**, 679–706 (1999)
18. Day, C., Harris, A., Hadfield, M.: Challenging the orthodoxy of effective school leadership. Int. J. Leadersh. Educ. **4**(1), 39–56 (2001)
19. Fullan, M.: The change leader. Educ. Leadersh. **59**(8), 16–20 (2002)
20. Leithwood, K., Jantzi, D.: Transformational school leadership for large-scale reform: effects on students, teachers and their classroom practices. School Effectiveness School Improv. **17**(2), 201–227 (2006)
21. Denzi, N., Lincoln, Y.: The Sage Handbook of Qualitative Research. Sage Publications, Thousand Oaks (2005)
22. Flick, U.: An Introduction to Qualitative Research, 3rd edn. Sage, London, Thousand Oaks, New Delhi (2006)

23. Bass, B.M., Avoilo, B.J.: Improving Organizational Effectiveness Trough Transformational Leadership. Sage Publications, California (1994)
24. Avoilo, B.J., Bass, B.M.: Multifactor Leadership Questionnaire. Mynd Garden, Palo Alto (1995)
25. Tuckman, B., Harper, B.: Conducting Educational Research, 6th edn. Rowman & Littlefield Publishers, Lanham (2012)
26. Gonçalves, S., Bastos, G., Botelho, M.C.: A liderança do plano tecnológico de educação nas escolas: as percepções dos coordenadores PTE [technological plan for education leadership: coordinators perceptions]. In: Atas do XII Congresso SPCE: Ciências da Educação: Espaços de Investigação, Reflexão e Ação Interdisciplinar. UTAD, Vila Real, pp. 1116–1127 (2015)
27. Piedade, J., Pedro, N.: Tecnologias digitais na gestão escolar: práticas, proficiência e necessidades de formação dos diretores escolares em portugal [digital technologies in school management: practices, proficiency and training needs of principals in Portugal]. Revista Portuguesa de Educação **27**(2), 109–133 (2014)

# Information and Communication Technology (ICT) Utilisation Skills of Undergraduate Law Students in Nigerian University Law Libraries

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**Abstract.** The paper investigated ICT utilisation skill of undergraduate law students in Nigerian university law libraries. The objectives of the study were to determine whether ICT sources were available to law students; the frequency of use thereof; how the students sought information on the Internet and the challenges faced by law students using ICT sources in the law libraries. The sampling size consisted of 12 universities, 1534 law students, 12 deans and 12 librarians. Questionnaires were administered to the students, and semi-structured interviews were used to collect data from deans and librarians. Observation was also done in the 12 law libraries. Data collected were analysed with Excel Statistical version, while data from the interviews were transcribed and arranged into themes for content analysis. Findings revealed that 90 % of the respondents were ICT literate and could independently search information using ICT facilities from the Internet, though most of the students neither accessed nor used the law library ICT sources. The paper recommends that ICT skill training is included in the law curriculum as a compulsory subject of the law faculties.

**Keywords:** ICT utilisation skill · Undergraduate law students · Law libraries · Nigerian universities

## 1 Introduction

Law students need to actively use library information services and other available information sources in order to meet their information requirements. For law students to achieve this, all information services provided must be optimally utilised, because these students require active search skill to access information both at school, home and in their future roles as lawyers. The introduction of ICT into the traditional law library setting has transformed the kind of library information resources housed within the university law libraries. These libraries now subscribe to a variety of electronic information resources which were not previously used to disseminate legal information before ICT was introduced to the libraries [1].


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The law libraries in Nigerian universities are currently moving from the traditional way of disseminating manual services to the use of electronic systems, with the aid of computer and Internet networks. The application of electronic information resources in law libraries has positively influenced service delivery in the areas of storage, retrieval and dissemination of information sources. It brought about different tools and techniques with which students and other users can access online and offline information. The electronic information resources available for services delivery in university law libraries in Nigeria as identified by Ossai [2] include: e-books, Internet, computer systems and law databases. The availability, accessibility, and use of these resources in law libraries aim at enhancing the research and learning process of law students. Doherty [3] explained that the law library users agreed that using law databases made research work easier and more interesting to do. This is because accessing legal material through ICT for lecture preparation and law students' assignments could be effortlessly carried out without stress, as the only requirement was imputing correct keywords into the computer system to download information from the Internet or law databases [3].

However, scholars have established that law students were noted for not utilising electronic resources available in law libraries [4–7]. Even when an adequate ICT service is available in university law libraries, inaccessibility of the e-library to Nigerian law students and lack of ICT search skills by some of these students tend to prevent the students from utilizing the resources. Olorunfemi et al. [1] determined that law students of a university did not access available ICT facilities in their libraries, mainly due to the fact that to access online information for their academic requirements, it is essential for them to possess ICT utilisation skills to access and use legal information. Based on this premise, the paper investigated "ICT utilisation skill of undergraduate law students in Nigerian university law libraries."

## 2 Literature Reviewed

The use of ICT sources in the libraries has been found to improve usability of information sources, especially for new and inexperienced users [8, p. 647]. This is due to the significant role that electronic information resources play in effectively processing and disseminating information to professionals and students [9]. Electronic information sources are characteristically very easy to access information, when compared to print sources. This is why students widely use electronic information resources to support print information sources in their studies, as it constitute an important source of information widely embraced by different libraries to process and disseminate information to their users all over the world [10].

Libraries, irrespective of their purpose, are incorporating electronic resources into the services provide to users for effective and reliable information. The age of total reliance on print information sources has passed, and volumes of print information sources are being converted to electronic format [11]. The introduction of ICT into the service environment heralded new innovative web-based services such as online information requests or reference services. The law libraries thus provide law students with a set of technology, sources and resources to serve the mission of the academic staff and

students [9]. Most law libraries provide computer workstations for law students to access library catalogue and legal sources available in the electronic law libraries. However, Internet availability is not common in most Nigerian law libraries due to the lack of stable electricity to power ICT facilities [12], while some of the law libraries are not connected to the Internet due to inadequate funds to subscribe to broad bandwidth and Internet service providers.

Studies have also shown that law students' underutilisation of electronic information resources is a global phenomenon. Harkers [13, p. 79] in the study "Information is cheap, but meaning is expensive…" found that law students and new attorneys lacked ICT utilisation skills, and therefore struggled to locate relevant information sources to resolve their legal problems. Anderson [15, p. 2] and Woxland [16, p. 451] established that "law students lacked ICT search skills even after they have completed the usual first-year course in legal research". Another study by Young and Blanco [17] expressed the legal professionals' view concerning the information search skill of law students who were serving in their law offices. Young and Blanco [17] discovered that law students were generally not well prepared to perform legal research and writing at the expected level due to their research related difficulties, failing especially in making use of secondary sources. In Nigeria, Ossai [2] in a study established that most of the law students investigated claimed to heavily rely on library information resources in the course of their academic programs. However, it was found that majority of the law students struggled to locate or identify suitable library information resources. This is an indication of inadequate knowledge of ICT know-how, hence many of the students were not able to locate relevant sources using ICT resources.

The inability of lawyers to utilise ICT was traced to the traditional teaching practice in law schools, where law students were not taught how to carry out independent research that enable them to utilise ICT in law libraries [7]. According to Barkan [4, p. 403], the curriculum of legal education, ranked legal research very low in priority, when compared to other law courses. This seemed to account for the poor utilisation of ICT facilities by the law students. Likewise, the traditional teaching method did not seemed to encourage law students to utilise law library electronic information resources. In 2001, Mock [18, p. 554] found that the law faculties failed to create ICT awareness in their students and the students could not realise the importance of utilising digital information resources for their academic goals. This implies that law teachers do not adequately prepare the students for future practices and the challenges in legal workplace, due to the pedagogical method employed. A study by Akpoghome and Idiegbeyan-Ose [19] also found that law students were not encouraged to use ICT resources due to the teaching methods adopted in teaching undergraduate law students. Khan and Bhatti [20, p. 1] investigated the information seeking behaviour of legal practitioners and found out that most of the law faculty members were not satisfied with the resources, services and ICT facilities (computers and Internet) provided by the colleges law library. Ogba [21, p. 4] also confirmed these reports, as the study found that the law teachers in Nigerian universities also used the traditional teaching methods to impart legal knowledge to law students as they teach through direct reading from law textbooks. Oke-Samuel [22, p. 139] discovered that academic and vocational stages of Nigerian legal education were conducted through lectures and note-taking. Ogba [21, p. 5] also reported that law students

depended on their lecture notes, browse the library shelves instead of using OPAC and also use print law texts. Ogba's [21] finding supported Tunkel [7], Barkan [4, p. 403], and Lawal [23] report that, law teachers did not encourage utilisation of electronic information sources in electronic law libraries. However, Lawal et al's, [24, p. 101] study equally revealed that law graduate students in Nigeria lacked the skill to effectively utilise electronic information resources, which might be due to the challenges faced utilising the law libraries at their undergraduate level.

The study of Noor-Ul-Amin [25, p. 38] revealed some of the problems faced in the implementation and utilisation of ICT in education, learning and skills. The problems included limited infrastructure, lack of Internet connectivity, insufficient computers, lack of electronic resources and legal databases, slow broadband, the increased number of undergraduate law students, change in user expectations, high pressure to provide support and training for electronic products, Internet connectivity problems, dwindling fund, shortage of hardware and software Goldman [26, p. 414]. Additional problems identified included insufficient fund allocations, inadequate manpower, the prohibitive cost of importing hardware, software and ICT accessories, inadequate qualified library and technical staffs, lack of computer literate staff, inadequate ICT search skill, limited period in which ICT resources could be used by law students, lack of a maintenance culture, lack of staff commitment, poor library resources, software breakdowns and obsolete software and lack of technical staff [11], Adegbore [27], Adetimirin [30], Akpoghome and Idiegbeyan-Ose [19], Osunade and Ojo [28, p. 20]. All of these problems are serving as contributing factors to underutilization of electronic resources in Nigerian university law libraries.

## 3 Research Objectives

- To investigate the ICT utilisation skills of undergraduate law students in Nigerian university law libraries.
- To establish the available ICT sources that are frequently used by law students in Nigerian university law libraries.
- To investigate how information is sought on the Internet in academic law libraries.
- To understand the challenges faced by law students utilising the law library ICT sources.

## 4 Methodology

This paper employed a descriptive survey research method to investigate the ICT utilisation skill of law students in Nigerian Universities. The sampling frame consisted of 34 universities that offer law degrees, 7219 law students in their second to fifth year, 391 law deans and 12 law librarians. A purposive sampling technique was used to select 24 key informants, and 1534 law students. Open and close ended questions were used to elicit responses from law students, and semi-structured interviews were used to collect information from the key informants. One thousand, five hundred and thirty four questionnaires were administered to law students, and 1260 received back giving a response

rate of 82 %. The observation method was used to compliment the questionnaire and interview methods. Formal observation of the law libraries and students' ICT skill were done. Questionnaire data was analysed with Excel Statistical version, using simple frequency counts and percentages. Data from key informants was analysed with content analysis. The 12 universities were: Ambrose Alli University, Ekiti State University, Imo State University, Kogi State University, Nasarawa State University, Obafemi Awolowo University, Olabisi Onabanjo University, University of Benin, University of Calabar, University of Ibadan, University of Ilorin and University of Nigeria.

## 5 Discussion of Findings

Discussions of the findings are presented in Sects. 5.1, 5.2, 5.3, 5.4 and 5.5 below.

### 5.1 ICT Availability in Law Libraries

While ICT may be available in law libraries, they may not necessarily be available for students to use. This question therefore examined whether the respondents were aware of available ICT resources, such as network computers in the law libraries, for students' utilisation. The responses are indicated below (Fig. 1).

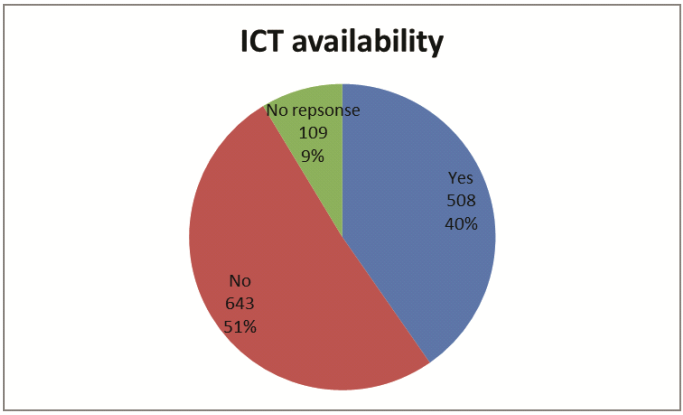


**Fig. 1.** ICT availability for student utilisation in the law libraries (N = 1260)

According to the majority (643; 51 %) of the respondents, ICTs were not available in their law libraries for law student utilisation, while 508 (40 %) affirmed that they were available for utilisation. A total of 100 (9 %) did not respond to this question. This is an indication that 60 % of the respondents were not aware of the ICT that were available in their libraries for students' utilisation. Therefore, it can be inferred that 60 % of the students did not used Internet and are probably not skilled enough to effectively use ICT facilities available in the university law libraries.

### 5.2 Skill to Effectively Search for Information on the Internet in Law Libraries

Respondents were asked to offer their views on their ability to effectively search the Internet for information. The question therefore asked whether the respondents had the necessary ICT skill to effectively search for information sources on the Internet. The respondents were provided with two options: 'Yes' and 'No'. An overwhelming majority (681; 90 %) claimed to have the necessary ICT skill to search for information on the Internet, while only 73 (10 %) indicated that they lacked the required skill to search for information on the Internet. To verify the students' claim, 100 law students were observed under controlled conditions to assess their information seeking abilities using computers. Respondents were taken to functioning cyber cafés and business centres outside the university campuses where they were asked to search and retrieve information using the Internet. Variables observed during the test included: the general operation of the computer, the ability to operate the browser, the ability to generate/type applicable (general or specific) keywords, the ability to find applicable sources/databases, the ability to download documents from a database, the ability to use subscribed databases, and the ability to save a document onto a hard drive or a flash disk and email it to themselves and to others.

The highest ranking scores were: 'operation of computer' (80 %), 'ability to operate browser' (67 %), and the 'ability to generate and type applicable keywords' (59 %). Fifty-five percent were able to download documents in text or articles from the Internet and were able to use databases. However, 45 % of the respondents could not find appropriate sources/databases on the Internet. The results suggested that some of the law students' perceptions of their abilities to effectively search the Internet were not reflected in real life search situations to find sources on the Internet, and in the electronic sources.

### 5.3 Methods Used to Gain ICT Utilisation Skill

The 619 (49 %) law students in the previous question who indicated that they could search for information using ICT sources were asked to elaborate on how they had obtained their information utilisation skill. The aim of the question was to gain an understanding of where and how law students obtained their ICT utilisation skill. Because the respondents were required to indicate their answers in their own words, the responses were categorized into themes. Four themes were identified from the responses, as listed in the following table.

Based on the above responses, the majority, (276; 45 %) of the respondents had learnt their ICT skill in computer training schools. They attended a formal training course prior to attending university or as part of their university program. The formal training course appeared to have been aimed at teaching computer skill, although some of the respondents indicated that Internet skill were also part of the course. The next largest group of 250 (40 %) was self-taught. The effort to teach themselves mostly took place at home where they had access to a computer. A few stated that they had attained their skill by spending time in the electronic libraries to teach themselves how to source information. While 48 (8 %) explained that they had learnt their skill by attending a library skill course offered at their university. Some of these respondents indicated that the library search

skill course was compulsory during their first year at the university. The law deans (8) explained that the library search skill course "The Use of Library" is a compulsory course in their universities, which librarians are responsible to impart library search skill to the students. The eight deans also mentioned a Computer Appreciation course as a compulsory course integrated into the law curriculum, normally taught by the librarians. However, the law librarians corroborated that they teach students how to use the library skill, and computer appreciation course (Table 1).

**Table 1.** Methods used to gain ICT utilization skill (N = 619)

| Method used | N | % |
|---|---|---|
| Attended computer schools | 276 | 45 |
| Learnt to use the computer/library through self-effort | 250 | 40 |
| Attended a compulsory university course called 'Use of the Library' | 48 | 8 |
| Through assistance from friends and family members on campus | 45 | 7 |

A total of 45 (7 %) of respondents indicated that they were taught by friends or family. In the case of family, it was normally the older siblings who were already on campus that showed them how to search for information. Some of the remarks of the respondents on how and where they had acquired their information seeking skill were as follows:

- I went to a computer training school where I learnt computer appreciations like: typing, designing, spiral binding and photocopying.
- I learnt it from a computer institute in my home town.
- From using a personal computer, through friends and regular visits to the cyber café.
- From using the Internet and the library.
- From elementary and secondary educational institutions, also through own PC use.
- I learnt using computers before coming to the Faculty of Law and the library skill I learnt during my first year and in the "Legal Method" class."
- In secondary school through computer classes.
- Personally during the strike period and my breaks, I was into computer networking.

The report implied that law students have prior knowledge of computer application through different means before or after entering the universities in Nigeria.

### 5.4 How Information Is Sought on the Internet in Academic Law Libraries

Respondents were asked to indicate how they search the Internet for information. They were provided with a list of five options to choose from. The aim of this question was to determine their information search processes. Sixty four respondents did not respond to this question. The following table represents their information search processes on the Internet (Table 2).

**Table 2.** How information on the Internet is sought in law libraries (N = 745)

| Search method | N | % |
|---|---|---|
| I search independently | 684 | 92 |
| I search with the assistance of friends | 171 | 23 |
| I ask assistance from librarians | 65 | 9 |
| I ask librarians to search for me | 35 | 5 |
| Other (Specify) | 0 | 0 |
| No response | 64 | 9 |

Virtually all of the respondents indicated that they sought information on the Internet independently (648; 92 %). One hundred and seventy- one (23 %) indicated that they would sometimes search with the help of friends, 69 (9 %) sometimes asked librarians for assistance, 35 (5 %) asked librarians to search for information for them, and 64 (9 %) did not respond to this question. The result also indicated that 90 % of the law students believed that they could independently search for information from the Internet without help.

### 5.5 Frequency of Internet Used

Law students were requested to state how often they use the Internet to find academic related information in the law library. The law students could choose between "daily", "weekly", "only when necessary", or "I do not use the Internet". Table 3, summarised the responses of the law students' according to their frequency of Internet use.

**Table 3.** Frequency of Internet utilisation (N = 1260)

| Frequency | N | % |
|---|---|---|
| Only when necessary | 419 | 33 |
| I do not use the Internet | 352 | 28 |
| Weekly | 181 | 15 |
| Daily | 154 | 12 |
| No response | 154 | 12 |
| **Total** | 1260 | 100 |

Four hundred and nineteen (33 %) of the respondents reported that they only used the Internet when necessary to find academic related information, 352 (28 %) reported that they did not use the Internet, 181 (15 %) used the Internet weekly, 154 (12 %) used the Internet on a daily basis, and 154 (12 %) respondents did not respond to this question.

The results showed that respondents did not frequently utilise the Internet as they only use it to access information when there was need for them to access information from the Internet.

## 6 Conclusions

The paper concludes that a large number of law students in Nigerian universities have a high level of ICT utilisation skill to access information from the electronic libraries. The results also indicated that 92 % of the law students believed that they could independently search for information from the Internet without help. However, findings showed that law students' perceptions of their abilities to effectively search the Internet did not reflect in a real life search situation to find law sources on the Internet and in other electronic resources. Although 45 % of the respondents learnt ICT and Internet skill in formal training schools and 40 % of them taught themselves the skill to use ICT. The results also indicated that the majority of the respondents did not frequently utilise the Internet as 33 % used the Internet only when there was a specific need for them to access information from the Internet. Nevertheless, access to electronic information through the academic law libraries was shown to be problematic due to constraints such as: lack of accessibility to ICT sources, like networked computers, unstable power source, inadequate human resources, and lack of electronic resources.

## 7 Recommendations

The paper provides the following recommendations:

- The law students should be strongly encouraged to learn the skill to use ICT in Nigerian universities.
- More electronic information resources should be provided for use in law libraries.
- Adequate funds should be provided to procure the required ICT resources in the law libraries for the use of law students.
- ICT skill training should be included in the law faculty curriculum as a compulsory subject for all undergraduate law students from the first year to the final year at the universities.

## References

1. Olorunfemi, D.Y., Mostert, B.J. Ocholla, D.N.: Information Seeking Behaviour of Law Students in a Developing Country: A Literature Review. In: A Standing Conference of Eastern, Central and Southern Africa. pp. 440–446. Library and Information Associations, Kenya (2012)
2. Ossai, N.B.: How law students utilize information resources: a case study of the University of Benin, Benin City, Nigeria. Int. J. Libr. Inf. Sci. **3**(1), 1–14 (2011). http://www.academicjournals.org/article/article1379510973_Ossai.pdf
3. Doherty, O.: Legal Practice and Management in Nigeria. Cavendish, London (1998)

4. Barkan, S.M.: Should legal research be included on the bar exams? an exploration of the question. Law Libr. J. **99**(2), 403–412 (2007)
5. Milles, J.G.: Out of jungle: how to get beyond the digital v. print debate- and deal with the fact that digital won. AALL Spectrum **9**, 10–11 (2005)
6. Cuffe, N.: Law Students' experiences of information and information technology: implication for legal information literacy curriculum development. Australian Association for Research in Education (2002). http://www.aare.edu.au/02pap/cuff02169.htm
7. Tunkel, V.: Law Finding for Lawyers (1997). http://www.denison.edu/collaborations
8. Inskip, C., Butterworth, R., MacFarlane, A.: A study of the information needs of the users of a folk music library and the implications for the design of a digital library system. Inf. Process. Manage. **44**(2), 647–662 (2008)
9. Krubu, D.E., Osawaru, K.E.: The Impact of Information and Communication Technology (ICT) in Nigerian University Libraries. Library Philosophy and Practice (2011). http://unllib.unl.edu/LPP/krubu-osawaru.htm
10. Okello-Obura, C., Ikoja-Odongo, J.R.: Electronic Information Seeking Among LIS Postgraduate Students at Makerere University, Uganda. Library Philosophy and Practice (2010). http://www.webpages.uidaho.edu/~mbolin/okello-obura-ikojo-odongo.htm
11. Issa, A.O., Amusan, B., Daura, U.D.: Effects of Information Literacy Skill on the Use of E-library Resources Among Students of the University of Ilorin, Kwara State, Nigeria. Library Philosophy and Practice (2009). http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1249&context=libphilprac
12. Ololube, N.P., Eke, P., Uzorka, M.C., Ekpenyong, N.S., Nte, N.D.: Instructional technology in higher education: a case of selected Universities in the Niger Delta. Asia-Pacific Forum Sci. Learn. Teach. **10**(2), 1–17 (2009). article 7
13. Harkers, Y.S.: Information is cheap, but meaning is expensive: building analytical skill into legal research instruction. Law Libr. J. **105**(1), 79–95 (2013). http://www.aallnet.org/main-menu/Publications/llj/LLJ-Archives/Vol-105/no-1/2013-4.pdf
14. Indu, K., Roy, L.K.K., Prabha, R.S.: Know-how ICT among Student Teachers. In: International Conference on E-Governance and Cloud Computing Services (2012). http://research.ijcaonline.org/egov/number1/egov1005.pdf
15. Anderson, J.B.: Empirical Studies of Law Student Information Seeking Behavior and a Call for the Return of the Law Library as a "Laboratory" for Legal Education (2011). http://legalinformatics.wordpress.com/2012/07/25/anderson-on-empirical-studies-of-law-student-information-seeking-behavior/
16. Woxland, T.A.: Why can't Johnny Research? How It All Started with Christopher Columbus Langdell. Law Libr. J. **81**, 451–464 (1989)
17. Young, C.R., Blanco, B.A.: What students don't know will hurt them: a frank view from the field on how to better prepare our clinic and externship students. Clin. Law Rev. **14**(1), 105–141 (2006)
18. Mock, W.B.T.: Informing law curricula: modifying first-year courses to reflect the information revolution. J. Legal Educ. **51**, 554–567 (2001). http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1028615
19. Akpoghome, U.T., Idiegbeyan-Ose, J.O.: The role of digital library in law research. Int. J. Inf. Sci. **2**(6), 108–113 (2012)
20. Khan, G., Bhatti, R..: Information Needs and Seeking Behavior of Law Faculty Members: A Survey of the University of Peshawar and Its Affiliated Law Colleges. Library Philosophy and Practice (2012). http://digitalcommons.unl.edu/libphilprac/786

21. Ogba, C.O.: Information seeking behaviour of final year law students in South Western Nigerian Universities. Information and Knowledge Management, 3(5) (2013). http://www.iiste.org/Journals/index.php/IKM/article/viewFile/5600/5712
22. Oke-Samuel, O.: Clinical legal education in Nigeria: developments and challenges. Griffith Law Rev. **17**(1), 139–150 (2008)
23. Lawal, V.: Legal Research and Legal Education in Africa: The Challenge for Information Literacy (2007). http://scholarship.law.cornell.edu/cgi/viewcontent.cgi?article=1004&context=sws_papers
24. Lawal, V.L., Stilwell, C., Kuhn, R., Underwood, P.G.: A contextual study of the information literacy of Aspirant Barrister in Nigeria. S. Afr. J. Libr. Inf. Sci. **78**(2), 101–111 (2012)
25. Noor-Ul-Amin, S.: An Effective Use of ICT for Education and Learning by Drawing on Worldwide Knowledge, Research, and Experience: ICT as a Change Agent for Education (2013). http://www.nyu.edu/classes/keefer/waoe/amins.pdf
26. Goldman, P.: Legal education and technology II: bibliography. Law Libr. J. **100**(3), 414–528 (2008)
27. Adegbore, A.M.: Automation in Two Nigerian University Libraries. Library Philosophy and Practice (2010). htttp://www.webpages.uidaho.edu/~mbolin/adegbore.htm
28. Osunade, O., Ojo, O.M.: Library and internet usage: a case study of University of Ibadan. Inf. Technol. **3**(2), 20–24 (2010)
29. Akuru, U.B., Okoro, O.I.: Economic Implications of Constant Power Outages SMES. Abuja, FTC, Nigeria (2011). http://timetable.cput.ac.za/_other_web_files/_cue/DUE/2011/PPT/Ogbonnayapercent20Okoro.pdf
30. Adetimirin, A.E.: ICT literacy among undergraduates in Nigerian Universities. Educ. Inf. Technol. **17**(4), 381–397 (2012)

# The Teachers' Digital Literacy: Determining Digital Divide in Public Basic Schools in Ghana

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**Abstract.** This study explored the role of the teacher's digital literacy (TDL) among other schools' digital culture (SDC) components in determining Digital Divide (DD) among Ghana's basic schools. A paper-based survey was conducted with teachers and head-teachers from randomly sampled 17 basic schools in various locations in Ghana. The questionnaire was adopted from the Institute for Capacity Building – UNESCO and EU rubrics for measuring ICT in education; and explored nine Digital Culture components including TDL. Data were analysed using K-means Clustering, Correlation analysis, Discriminant analysis, and Independent-samples T-test. The schools were clustered based on SDC components into two DD groups; the principal influencing factors were Teachers' digital literacy and ICT related policy documents. The school groups particularly differed based on whether they not only had the digital literacy competences, but also applied these competences in their teaching and professional development in schools. We argue that in spite of training for TDL, many schools still lack other digital culture components, and this may hinder them in applying ICT in their schools.

**Keywords:** Digital divide · Digital literacy · School digital culture · Information literacy · Teacher digital literacy

## 1 Introduction

ICT (Information and Communication Technology) resources, namely, digital technologies and digital information are defining contemporary societies and, consequently, have transformed the teaching and learning approaches in schools. The benefits of ICT resources on teaching and learning cannot be denied, hence the awakening of governments and institutions to make digital literacy and information literacy the central pivot around which schools' business revolves [1]. According to [2], Digital Literacy (DL) should be seen as the very essential requisite skills for individuals to be economically and socially functional. DL has not developed a standard non-arguable definition [3, 4], probably owing to its relation with Information Literacy (IL) as observed by [5]. Notwithstanding, [6] described digital literacy as using digital tools skillfully for


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personal development and excellence and defines DL as *"the skill in using digital tools to undertake academic research; writing and critical thinking; as part of personal development planning; and a way of showcasing achievements"*. On the other hand, Information Literacy (IL) is defined by JISC as *"the ability to identify, assess, retrieve, evaluate, adapt, organise, and communicate information within an interactive context of review and reflection"* [7]. IL definitions target IL to specific professional contexts. In the light of the forgoing, we define Teacher Digital literacy (TDL) in this paper as teacher abilities (knowledge, attitude, skills, and application in the use of digital tools) to accomplish Information Literacy (IL) practices (define, search, evaluate, organise, adapt, and communicate information) in the context of teaching, professional learning, and development as well as for organisational learning and development.

In schools, teachers are expected to provide a learning environment promoting students' DL and IL skills. Teachers themselves should learn and develop professionally using DL and IL, as well as improving the school and the community. Consequently, the teacher would be required to be digitally literate enough to facilitate this process: teachers need to exhibit positive digital traits in the dimensions of knowledge, skills, attitude, and application [2] towards indentifying, assessing, retrieving, evaluating, adapting, organising, and communicating information [7]. In the school system, teachers nurture in students the culture, social systems, and political practices, skills for work, skills to solve problems; and values of the society' - as well as individual excellence and life's survival modes to thrive in the "*sea of knowledge and technology*" characterising day-to-day living in the information society. In contemporary twenty-first schools, these goals of education are obtained through the interplay of digital and information literacy on the part of the schools' actors. The emphasis tilts to the teacher, who is expected to be an agent of digital change in the school. Where these conditions are nonexistent then the subject of digital divide comes to the fore. Resultantly, this calls for redefining the roles of teachers, their professional competencies, and the related literacy underpinning their career and the working environments [3].

Schools are made up of systemic structures that define the way people in that system behave – constituting their culture [8]. An assertion is made by [1] that a school's culture is the product of teachers' and other school-related factors. It was reported by [8] that most ICT related research have relegated the subject of school cultures as an inhibitor to technology resistance or technology adoption to the background. [9] asserted the relevance of digital literacy in school's curriculum – it is in itself an intervention process to the challenge of digital disparities in schools. [10] determine the status of schools' DD highlighting the application of school-based human and material digital resources and other SDC factors.

Thus, to ensure the minimisation of DD in schools, Teachers need to reposition themselves digitally [11] to contribute meaningfully to the development of their unique school digital culture (SDC) and exhibit holistic digital literacy skills – that embraces DL and IL. Apparently, developing SDC has to do with relating the human and material factors associated with ICT resources (in other words, Digital tools and digital Information) in schools, as well as the digital information factors. Developing SDC requires not only training teachers on computer knowledge but also building their capacities in areas including the appropriation of ICT resources [5, 12] (both technologies and digital

information), coupled with provision of equipment and tools for use in schools, thus creating the supportive norms and policies for using ICT in teaching and professional development [7, 10]. Literature holds that holistic TDL skills needs to be modelled around related traits (knowledge, attitude, skills and application) that offer bases for digitally enhanced teaching and learning environments to be created through using Information literacy to identify, assess, retrieve, evaluate, adapt, and communicate information. This is the condition that causes digital culture to thrive and pervade all spheres of the school's teaching and learning practices [5, 7]. Thus, both DL and IL may define the schools' digital culture and prevailing DD status of schools.

Various empirical studies [13] described DD as lack of mental ability, material, skills, and usage access in the context of ICTs. [14, 15] examined the subject matter as a gap between "haves and have nots" in respect of access and use of ICT tools including the internet, but added that DD is a phenomenon that is not easily defined and the possible gap difficult to fill. In the works of [15], access is considered a key DD factor and seen as a multifaceted DD indicator involving motivational access, material access, skills access and usage access. In most of the developing countries, DD continues to be a contentious issue [16–18] requiring the attention of academia.

Empirically [10] identified that DD could prevail across schools' teacher factors and materials factors in digitally disadvantaged communities.

It is worth noting that records show [16, 23] that governments in Ghana had vigorously pursued an ICT in education policy agenda aimed at integrating ICTs in schools over the past eight years. Within this period, 2007 to 2015, incremental activities have resulted in massive deployment of ICT equipment in schools with a substantial percentage of practicing teachers participating in training for TDL organised across the country. The pre-service teachers are obliged to take a course in computer literacy in line with the national digital aspirations in teacher training colleges. African teachers' professional digital literacy capacity indicators are defined by [19]. This professional digital competency framework, launched in 2012, attempted to offer bases for standardising teacher professional digital practices in Africa. The framework evaluates TDL in six thematic areas of the teachers' professional digital literacy practices namely engagement in instructional design processes; the ability to facilitate and inspire student learning; innovation creativity; the ability to create and manage effective learning environments; the ability to engage in assessment and communication of student learning; engagement in professional learning and models of ethical responsibilities; and understanding of subject matter for use in teaching. It is anticipated that as teachers graduate from the emerging to the transformation levels of digital competence scale, they would be adequately equipped with the essential digital and information literacy skills to function as agents of change towards the development the positive digital culture of schools [14, 25].

It is, however, suggested by empirical studies and reports spanning across the period 2007 to 2015 [20, 24] that there is a gap between Teacher Digital literacy and ICT integration in the schools. We speculate that, despite the intensive Computer knowledge training programs and bringing technology to schools, the schools have disparities in SDC that causes some of them to be digitally disadvantaged [10]. Our article presents the results of a study that explored the role of the teacher's digital

literacy (TDL) in determining Digital Divide (DD) in the context of public schools' digital culture within selected basic schools in Ghana. We searched for answers to the following research questions:

1. Can the Digital Divide among Ghana's basic schools be detected based on Schools Digital Culture (SDC) components?
2. What is the role of Teacher's digital literacy (TDL) among other SDC components in determining the DD among Ghana's basic schools?
3. Which Teachers' Digital Literacy (TDL) component variables differentiate schools' Digital Divide (DD)?

## 2 Methodology

We carried out a survey with 17 schools in urban, semi-urban, and rural locations that we randomly sampled from a metropolitan region of Ghana. We constructed the survey instrument from rubrics adapted from the Institute for Capacity Building–UNESCO to measure TDL and EU rubrics for measuring ICT in schools. In our survey instrument we explored nine Schools' Digital Culture (SDC) components namely: Teachers' digital literacy (TDL), ICT training, ICT availability, ICT related policy documents, projections for school ICT use, ICT usages preferences for education purposes, perceived inhibitors for using ICT, perceived impact of ICT intervention and resources, and ICT usage in professional practice. We structured TDL variables to elicit responses on teacher professional perceptions and competence in ICT resources in relation to their professional practice, thereby catering for their digital information literacy capacities.

We created the composite variables from questionnaire items related with each SDC component for each school. Using these composite variables, we clustered schools with K-means analysis into two groups in respect to Digital Divide (DD). Next, we ran discriminant analysis to find the important digital literacy components that are determining the DD among those school groups. Prior to this activity, we carried out Pearson's Correlation analysis to establish the relationship between SDC components. Finally, we used independent-samples T-test to explore which TDL component's variables distinguished the schools to DD clusters.

## 3 Results

### 3.1 The Digital Divide Among the Ghana's Basic Schools Based on School's Digital Culture

We identified Two DD clusters with K-means clustering: Cluster 1 (9 schools) constituted 52.9 % and Cluster 2 (8 schools) 47.1 %. ANOVA test results in K-means analysis indicated that the variable, Teachers' digital literacy (f1), was significantly different between Cluster 1 ($N = 9$, $M = 2.537$, $SD = .246$) and Cluster 2 ($N = 8$, $M = 1.614$, $SD = .301$); $F = (1, 15) = 48.023$, $p = .0001$.

### 3.2 Teacher's Digital Literacy Determining the DD Among Ghana's Basic Schools

We carried out Correlation analysis in an attempt to obtain the general picture of how SDC components are relating with each other. SDC factors appeared not to be strongly interrelated: there was no significant correlation with TDL component (f1) and other components. We found a week positive between ICT related policy documents (f2) and ICT usage preferences for education purposes (f6) ($r = 0.612$, $p < 0.05$) and a weak negative correlation between ICT training for teacher's ICT use (f3) and Perceived inhibitors for using ICT in teaching and learning (f4) ($r = -0.484$, $p < 0.05$).

To further determine the components influencing the schools' digital culture, we ran a Canonical Discriminant analysis using the "enter all independents" method. We used school cluster membership as the group variable on the following variables: Teachers' digital literacy (f1); ICT training (f3); ICT availability (f9); ICT related policy documents (f2); Projections for school ICT use (f8); ICT usage preferences for education purposes (f6); Perceived inhibitors for using ICT (f4); perceived impact of ICT intervention and resources (f7); and ICT usage in professional practice (f5).

The test yielded one discriminant function defining differences between cluster 1 and cluster 2. The function described 100 % of the variance (eigenvalue = 6.848, r = .934).

$$\begin{aligned} \textit{Discriminant function } (Df) = {} & 1.173(\text{f1}) + 0\,.641(\text{f3}) + 0.608(\text{f8}) + 0.560(\text{f6}) \\ & + 0.262(\text{f7}) + 0\,.105(\text{f4}) - 0.186(\text{f9}) - 0.428(\text{f5}) - 1.176(\text{f2}) \end{aligned}$$

A Wilks's Lambda test had a significant result ($\lambda = .127$, $\chi^2 = 21.633$, df = 9, $p = 0.010$), an indication of the goodness of fit of the function. The group centroids for Cluster 1 are 2.318, while that of cluster 2 is −2.607. Principal factors influencing the variation in the clusters are Teachers' digital literacy (f1) and ICT related policy documents (f2). The final classification results showed that 100 % of the grouped case was correctly classified, while 94.1 % of the cross-validated grouped, were correctly classified.

### 3.3 Teachers' Digital Literacy Components Differentiating Schools to DD

We used the independent samples t-test to discover which aspects of Teachers Digital Literacy (TDL) differentiated schools to DD groups. The TDL component consisted of Digital literacy (knowledge) and Information literacy (application) practices. Table 1 gives an overview of the results.

We assumed that there were no significant differences in most of the competence items in the two school groups. The schools in two DD clusters differed significantly based on IL practices in their schools.

**Table 1.** Results of independent-sample test on Teachers' digital literacy (TDL) component variables differentiating the schools in DD culture.

| | School clusters | N | Mean | Std. deviation | t | df | Sig. | Eta squared |
|---|---|---|---|---|---|---|---|---|
| Teachers are competent in designing teaching methods using ICT tools and resources in their subject area | 1 | 9 | 2.22 | .667 | 1.251 | 15 | 0.230 | * |
| | 2 | 8 | 1.75 | .886 | | | | |
| Teachers are competent in inspiring pupils to learn using ICTs in their lessons | 1 | 9 | 2.67 | .707 | 2.407 | 15 | 0.029 | 0.279 |
| | 2 | 8 | 1.88 | .641 | | | | |
| Teachers are competent in using ICT resources to manage learning environments | 1 | 9 | 2.56 | .726 | 1.619 | 15 | 0.126 | * |
| | 2 | 8 | 1.75 | 1.282 | | | | |
| Teachers are competent in using ICTs to communicate about the learning of the pupils | 1 | 9 | 2.56 | .527 | 1.798 | 15 | 0.092 | * |
| | 2 | 8 | 1.88 | .991 | | | | |
| Teachers are competent in using ICT Resources that support their professional development | 1 | 9 | 2.44 | .527 | 1.505 | 15 | 0.153 | * |
| | 2 | 8 | 1.88 | .991 | | | | |
| Teachers are competent in using ICT Resources to enhance mastery in their subjects | 1 | 9 | 2.44 | .726 | 1.775 | 15 | 0.096 | 0.174 |
| | 2 | 8 | 1.75 | .886 | | | | |
| Teachers are applying ICT resources in designing teaching methods for their subjects | 1 | 9 | 2.56 | .527 | 3.004 | 15 | 0.009 | 0.376 |
| | 2 | 8 | 1.63 | .744 | | | | |
| Teachers are using ICT resources to inspire the pupils to learn in their lessons | 1 | 9 | 2.78 | .667 | 4.798 | 15 | 0.000 | 0.605 |
| | 2 | 8 | 1.38 | .518 | | | | |
| Teachers are using ICT in managing their learning environments | 1 | 9 | 2.33 | .500 | 4.615 | 15 | 0.000 | 0.587 |
| | 2 | 8 | 1.25 | .463 | | | | |
| Teachers are applying ICT resources in communicating about pupils' learning | 1 | 9 | 2.44 | .527 | 5.603 | 15 | 0.000 | 0.677 |
| | 2 | 8 | 1.00 | .535 | | | | |
| Teachers are using ICT resources to enhance their Professional development | 1 | 9 | 2.67 | .500 | 3.796 | 15 | 0.002 | 0.490 |
| | 2 | 8 | 1.50 | .756 | | | | |
| Teachers are applying ICT resources to enhance mastery in their subjects | 1 | 9 | 2.78 | .441 | 2.606 | 9.230 | 0.028 | 0.312 |
| | 2 | 8 | 1.75 | 1.035 | | | | |

*Negligible Eta Squared (Effect Size)*

## 4 Discussion and Conclusion

We found two school clusters indicating that schools were digitally divided based on the schools' digital culture components. The main culture components differentiating the schools were Teachers' digital literacy and Availability of ICT policy documents.

These results are in accordance with the literature assuming the role of the teacher as a principal factor in technology adoption and as an agent of change in schools [10, 19–21]. This reinforces the need for teacher digital literacy skills development in schools. In spite of the intensive ICT training programs and bringing technology to schools [16, 17, 22, 24], applying ICT in practice had not been achieved its expected level in half of the sampled schools. Even though technology and training for digital literacy were present and the teachers claimed that they had digital literacy competences, in digitally divided schools they seem not to be applying these competences in teaching and professional practice. Since the availability of school-specific regulations and documents of practising ICT was another distinguishing factor in digital divide, we may assume that in schools these documents were absent. This might have been one obstacle hindering positive ICT integration culture in the schools. Such documents should certainly be agendas developed in the participation of teachers themselves. The teacher needs to be empowered by appropriate schools' digital agenda to be an agent of digital change in the system.

In the light of these results, we hold the view that Teachers' digital literacy is a factor for propelling the successful implementation of ICT integration in teaching and learning and it cannot be taken for granted [26]. Training for DL and technology availability in schools are not sufficient for teachers to practice DL with students and in their professional practice. In order to address Digital Divide in schools in a way where ICT resources support teaching and learning, we share the stands of [10, 19, 21], that there is the need to deploy ICT Resources and equipment, plan the expected digital innovation, and monitor harmonisation in anticipation of how the innovation of services would address schools' digital needs. It is expedient that teachers should be oriented to understand how to harmonise ICT resources and learning outcomes. However, the schools are not the same and we cannot even make assumptions based on their locations, assuming that schools in suburb or periphery would necessarily be digitally divided to lower group of DD [10]. It is, however, important to acknowledge the role of the teacher as an essential one, especially in areas where there is pronounced and habitual digital disparities and where the conflict of traditional and innovative teaching and learning practices still rages on.

For successful integration of technology into teaching and learning with the intent of promoting digitally proactive culture, teachers need to be supported in innovative and proactive ways in the uptake of DL. For example, instead of teacher-focused individual short DL trainings, provide them with school-based digital turn trainings that involves simultaneously several teachers, he headteacher, and the ICT specialist in the school. Encourage this group to revise the situation in their school and proactively trying to change it. Other approaches could be training teachers for taking ownership of DL through longer cycles of training where they must try out learned competences with own students in their schools and report back to the peer teachers participating the training. In such trainings teachers will actively discover what is possible in their school and can make changes in their epistemic understandings as well as try to find solutions to the issues related to DL training in their schools.

Thirdly, since Africa and, especially, Ghana is a developing region. Citizens and schools will most likely lack the newest devices in everyday life and the teaching process. Thus, the DL training should focus on those long-term goals that make difference in the

region, such as embedding DL and IL competence training for entrepreneurship and innovation using available open software and social technologies.

In sum, we imply on the basis of these findings that there is the need for a framework to enhance holistic teachers' DL in the context of other Digital culture components in the schools. This will offset Digital Divide among schools and create opening for positive digital cultures. Our future study covers all the regions in Ghana to explore the DL and ICT culture components in schools for large-scale analysis.

## References


1. Fu, J.S.: ICT in education: a critical literature review and its implications. Int. J. Educ. Dev. Using Inf. Commun. Technol. **9**(1), 112–125 (2013)
2. Murray, M.C., Perez, J.: Unraveling the digital literacy paradox: how higher education fails at the fourth literacy. Issues Informing Sci. Inf. Technol. **11**, 85–100 (2014)
3. Markauskaite, L.: Towards an integrated analytical framework of information and communications technology. Inf. Res. **11**(3), 1–23 (2006)
4. Gallardo-Echenique, E.E., Marqués-Molias, L., de Oliveira, J.M.: Digital competence in the knowledge society. MERLOT J. Online Learn. Teach. **11**(1), 1–16 (2015)
5. Cordell, R.M.: Information literacy and digital literacy: competing or complementary? Commun. Inf. Lit. **7**(2), 177–183 (2013)
6. JISC: Developing Digital Literacies. Overview (2013). http://www.jisc.ac.uk/whatwedo/programmes/elearning/developingdigitalliteracies.aspx
7. CLIP: Definitions and Models Information Literacy (2013). http://www.informationliteracy.org.uk/information-literacy-definitions/definitions-of-il/
8. Tondeur, J., Devos, G., van Houtte, M., van Braak, J., Valcke, M.: Understanding structural and cultural school characteristics in relation to educational change: the case of ICT integration. Educ. Stud. **35**(2), 223–235 (2009)
9. Fyksen, S.: A digital literacy for the future: ICT as separate subject. Int. J. e-Learning Secur. **1**(3/4), 71–80 (2011)
10. Quaicoe, J.S., Pata, K.: Factors determining digital divide in Ghana's basic schools. In: IST-Africa 2015 Conference Proceedings, pp. 4–11 (2015)
11. Engen, B.K., Øgrim, L.: Integrating ICT without throwing the baby out with the bathwater. In: Proceedings of World Conference on E-Learning in Corporate Government, Healthcare, and Higher Education (E-Learn 2009) (2009)
12. Al-zaidiyeen, N.J., Mei, L.L.: Teachers' attitudes and levels of technology use in classrooms: the case of Jordan Schools. Int. Educ. Stud. **3**(2), 211–219 (2010)
13. Fuchs, C., Horak, E.: Africa and the digital divide. Telemat. Inf. **25**(2), 99–116 (2008)
14. van Dijk, J.: The digital divide in Europe (Draft). In: The Handbook of Internet Politics, pp. 288–304. Routledge, London and New York (2008)
15. van Dijk, J.: The evolution of the digital divide: the digital divide turns to inequality of skills and usage. In: Bus, J., et al. (eds.) Digital Enlightenment, pp. 57–75. IOS Press, Amsterdam (2012)
16. Mndzebele, N.: Teachers readiness in using ICT in the classroom: the case of a developing country. Int. J. Inf. Educ. Technol. **3**(4), 409–412 (2013)
17. ITU: Measuring the Information Society. ITU, Geneva (2014)
18. Gudmundsdottir, G.B.: From digital divide to digital equity: learners' ICT competence in four primary schools in Cape Town South Africa. Int. J. Educ. Dev. Using Inf. Commun. Technol. **6**(2) 84–105 (2010)

19. UNESCO-IICBA: ICT-enhanced Teacher Standards for Africa (ICTeTSA). UNESCO-IICBA, Addis Ababa (2012)
20. Amenyedzi, W.K., Lartey, M.N., Dzomeku, B.M.: The use of computers and internet as supplementary source of educational material: a case study of the senior high schools in the tema metropolis in Ghana. Contemp. Educ. Technol. **2**(2), 151–162 (2011)
21. Acquah, B.Y.S.: Status of implementation of the ICT curriculum in Ghanaian basic schools. J. Arts Humanit. **1**(3), 27–37 (2012)
22. Boadu, G., Awuah, M., Eduaquah, S.: An examination of the use of technology in the teaching of history: a study of selected senior high schools in the cape coast metropolis. Ghana. Int. J. Learn. Teach. Educ. Res. **8**(1), 187–214 (2014)
23. Boakye, K.B., Banini, D.A.: Teacher ICT readiness in Ghana. In: Toure, K., Tchombe, T.M.S., Karsenti, T. (eds) ICT and Changing Mindsets in Education, pp. 1–8. ERNWACA/ROCARE, Mali (2008)
24. GNA: Strengthen Capacity of Teachers in ICT. GhanaWeb Regional News, Accra, January 2015
25. McKenney, S.: Designing and researching technology-enhanced learning for the zone of proximal implementation. Res. Learn. Technol. **21**(Suppl. 1), 1–9 (2013)
26. European Union: Survey of Schools: ICT in Education, Benchmarking Access and Attitudes to Technology in Europe's Schools. EU, Belgium (2013)

# Doctoral Research on Teachers as Technology Users: Summary of a Work in Progress

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**Abstract.** This is a summary of a doctoral research study in progress which deals with secondary school teachers, and their use of different forms of information and communication technology (ICT). The particular focus of the study is on the relationships between various teacher-level, societal and contextual factors, and the ways in which these factors either support or constrain technology integration in education. This mixed-method small-scale study was conducted in Latvia and Estonia. Both countries have tried to make digital competences an integral part of every school subject, but there are no formal requirements on how subject teachers should integrate technology into their teaching. As a result, very diverse attitudes towards ICT and technology usage practices emerge. Part of this study was conducted as an action research project, and thus the findings have been utilized in providing recommendations to a group of teachers willing to make technology a more integral part of their teaching.

**Keywords:** Secondary school teachers · Teachers' beliefs · Pedagogic use of ICT

## 1 Introduction

This doctoral study is about secondary school subject teachers as users of information and communication technology (ICT). For decades, instructional use of ICT has been one of the major research streams in teacher studies, and thousands of articles have been published. However, there are still gaps in our understanding of why some teachers, in terms of technology use, act like "innovators", while others are described as "laggards" [1]. Drawing on the theory of social domains by Layder [2, 3], this study focuses on some less investigated teacher-level, social and contextual factors which are related the pedagogic use of ICT. The aim of the study is to analyze how various aspects of different social domains are related to the ways in which teachers integrate technology into their practices.

Data for this study were partly collected in Estonia, and partly in Latvia in the course of an action research project. This project started in 2013 with a group of teachers from a regional secondary school. The author's role in the project has been to help the action research group understand the "status quo" of teachers' skills, beliefs, attitudes toward technology, and training needs at different stages of the project in order to develop recommendations for in-service training. This explains the seemingly wide scope of aspects that have been examined in this study and reported in five individual papers,


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which are summarized in the empirical section of this paper. The empirical work largely reflects the issues which were raised by the action research group. Each publication is aimed at answering more specific questions, but the overarching questions of the doctoral research are:

- How are various factors stemming from individual, societal and contextual domains related to teachers' usage of ICT?
- What is the role of teachers in promoting and mediating the technology use of their students?

The rest of the paper is structured in the following way: first, the theoretical framework is outlined, then the national context is provided, and finally an overview is given of the methodology of the research and empirical work carried out so far.

## 2 Theoretical Background

The theory of social domains of Layder [2, 3] was chosen as the overarching theoretical framework for this study. Layder [3] has proposed that the social world can be understood by looking at four broad domains, which range from micro-level to macro-level: the psycho-biography of the individual (the self), the situated activity (everyday interaction, and face-to-face encounters), the social setting (proximate relations) and contextual resources (institutional and cultural resources). All domains are strongly interconnected and they interact with each other through power, social relations and practices.

In formulating his theory, Layder drew on a number of other theories, and in many ways he has views similar to several social theorists, including Habermas, Giddens and Bourdieu [3, p. 6–13]. However, Layder's multi-layered perspective on the agent-structure relationship serves as the most useful theoretical basis for doing an in-depth analysis of the ways in which teachers integrate ICT in their teaching, because the focus of this study is on teachers as individuals, and the study does not try to make any claims on the macro level. The theory of social domains, more than any other theoretical framework, seeks a balance between systems (structures) and actors (individuals) [4], arguing that structures influence people's actions, but individuals can change the social structures they relate to. In addition, placing this doctoral research in the framework of social domain theory avoids dealing with technological determinism or assumptions about taken-for-granted benefits of technology. This theoretical framework helps to show that ICTs do not define teachers' instructional practices; rather, the application of technology always depends on the individual teacher's interaction with technology.

## 3 The National Context

There are several reasons why Latvia and Estonia serve as interesting cases for studying teachers and their use of ICT. Firstly, Estonia is recognized internationally as a success story for its rapid change from a post-socialist country to a modern democracy, and its considerable investments in educational infrastructure and teacher training. Latvia in

many ways has made similar progress, especially after becoming a member state of the European Union in 2004 and gaining access to European structural funds. Secondly, both countries have striven to make digital skills an integral part of every subject curriculum [5, 6]. However, there are no formal guidelines on how subject teachers should deal with the promotion of ICTs and digital skills in their teaching [7]. This means that teachers can decide whether and how to use digital teaching materials and educational ICTs in their subjects. As a result, teachers develop very diverse practices of ICT use, based on a range of individual, societal and contextual factors.

## 4 The Empirical Part of the Study

### 4.1 Methods

This doctoral study is largely based on qualitative data collected through semi-structured interviews with 26 in-service secondary school teachers (16 teachers in Latvia and 10 teachers Estonia) and classroom observations (in Estonia only). In addition, an approach to data collection was tested to overcome the problem of social desirability in self-reported measures assessing people's ICT skills. A small scale study was conducted with a group of Latvian teachers ($n = 10$), who were asked to perform a number of information retrieval tasks online with the search process being recorded by a search logger and a screen-capturing program. By triangulating various methods of data collection, a data set was aggregated which offered opportunities for deep and holistic insights in the complex interplay between various teacher-level, societal and contextual factors (see Table 1).

In terms of the limitations of this research, although data sets came from two countries and there is a lack of comparative research in the field, this doctoral research did not aim to examine cross-national differences in the pedagogic use of ICT. This was due to the small sizes of the samples, which did not allow for any generalization of the findings.

### 4.2 Overview of the Individual Papers Comprising the Doctoral Thesis

All together, five individual papers will comprise the final doctoral thesis. The first paper [8] explores the ways in which teachers have integrated ICTs in teaching humanities and science classes. Data were collected through classroom observations and two consecutive interviews with 16 Estonian teachers. The findings indicate that technology use was strongly related to the teacher's dominant instructional style [9] and the specific subject culture [10].

The second paper [11] aims to reveal how various pedagogical beliefs and subject cultures shape the ways in which primary and secondary school teachers mediate students' use of digital technology. Empirical data were provided by 26 semi-structured interviews with teachers in Latvia and Estonia. The results indicate that teachers mostly applied mixed approaches to mediate students' use of technology, and the mediation approaches were based on teachers' dominant pedagogical beliefs and subject domains.

**Table 1.** Overview of the aspects of social domains covered in the individual papers

| Publication | Psycho-biography | Situated activity | Social setting | Contextual resources |
|---|---|---|---|---|
| I | | Instructional style; teacher-student-technology interaction | Subject cultures | |
| II | Teacher beliefs about the nature of technology and the nature of learning; teachers' self-efficacy | Mediation of students' use of digital technology | Subject cultures | |
| III | Expertise in technology use | Student-centered vs. Teacher-centered learning | Subject cultures | |
| IV | Achievement goal orientation; teachers as learners about ICT | | | Curricular requirements; high-stakes exam factor |
| V | Computer self-efficacy | Information retrieval online; teacher-technology interaction | | |

In the third paper [12], two cases from the Latvian sample were analyzed from the perspective of the pedagogy of connection [13, 14] to examine how a teacher of science and a teacher of humanities promoted students' digital competences during the course of teaching the subject. The findings indicate that each teacher promoted different sets of skills, and they had different motivations for teaching ICT to their students. This paper indicates that teachers were able to help students to develop various aspects of digital literacy; however, the teachers were not the main providers of digital competences for students.

The fourth paper [15] explores relationships between in-service teacher achievement motivation [16, 17], the practices of technology integration in teaching, and the ways in which teachers learn about ICT. This paper is based on 26 semi-structured interviews with teachers in Latvia and Estonia. This study indicates that teachers with mastery goal orientations had rich repertoires of ICT use and intrinsic motivations to improve their ICT skills. Teachers with ability-approaches and work-avoidance motivations were

active users of ICT; however, the former teachers acquired new skills to gain professional recognition and demonstrated superior ability in ICT use, while the latter teachers mainly sought opportunities to learn about available digital teaching resources to avoid putting effort into preparation for lessons and teaching. Teachers who strove for close and caring relationships with their students limited their ICT use and showed little interest in developing their ICT skills, arguing that technologies might make the learning process "cold" and distant.

The fifth paper [18] deals with a specific aspect of digital literacy – skills of information retrieval – and its relationship to teachers' perceived Internet self-efficacy. This narrow focus was chosen based on the argument of Bandura [19] that self-efficacy can be researched best on the micro-level. Data were collected, first, through 16 semi-structured interviews with the action group participants in Latvia. Later a purposive sampling method was applied based on teachers' self-efficacy levels, and ten teachers were invited to do a number of pre-defined online search tasks. The results indicate that the teachers' perceived Internet self-efficacy did not correlate with their actual search performance. In addition, teachers with low and high self-efficacy used similar online search strategies. Teachers over-estimated the difficulty of search tasks before conducting searches.

A summary is provided of the various factors from different social domains [3] that were analyzed in the five individual papers (Table 1).

As can be seen from Table 1, most of the attention in this doctoral study was on the individual and situated activity domains, which is related to the aim of addressing teachers and their uses of technology from the perspective of the individual. In terms of the research questions that inform the study, answers to the first research question were provided by the results of all individual papers, while the second research question was addressed in the second and third papers. However, the particular factors that were included in the analysis are not exhaustive; rather, each individual article contributes to providing a broad picture of the complex interplay of micro-, meso- and macro-level forces that shape the ways in which teachers integrate technology into their teaching.

## 5 Conclusions

This paper provides a summary of a doctoral research study in progress on secondary school teachers and their use of technology. The findings of the study have been utilized in providing practical recommendations to a group of Latvian teachers willing to make technology a more integral part of their teaching. This research also provides a useful basis for future studies, with more representative samples and including a cross-national dimension, knowing how limited the number of comparative studies is on factors that influence teachers' use of ICT.

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## References


1. Rogers, E.M., Shoemaker, F.F.: Communication of Innovation. The Free Press, New York (1971)
2. Layder, D.: New Strategies in Social Research: An Introduction and Guide. Polity Press, Cambridge (1993)
3. Layder, D.: Modern Social Theory: Key Debates and New Directions. UCL Press, London and Bristol (1997)
4. Pruulmann-Vengerfeldt, P.: Information Technology Users and Uses within the Different Layers of the Information Environment in Estonia. Ph.D. thesis. Tartu University Press, Tartu (2006)
5. Mägi, E.: Issues in Estonia: The Challenge of Having Fewer Children! Thematic Dossiers for Observatory for the New Technologies and Education (2006)
6. Kangro, A., Kangro, I.: Integration of ICT in teacher education and different school subjects in latvia. Educ. Media Int. **41**(1), 31–37 (2004)
7. Grivins, M.: Implementation of per capita education funding in the Baltic states. Baltic J. European Stud. **2**(2), 87–108 (2012)
8. Karaseva, A., Pruulmann-Vengerfeldt, P., Siibak, A.: Comparison of different subject cultures and pedagogical use of ICTs in Estonian schools. Nord. J. Digit. Lit. **3**, 157–171 (2013)
9. Zhao, Y.: Social Studies Teachers' Perspectives on Technology Integration. Ph.D. thesis, University of Georgia, USA
10. Goodson, I.F., Mangan, J.M.: Subject cultures and the introduction of classroom computers. Br. Educ. Res. J. **21**(5), 613–629 (1995)
11. Karaseva, A., Siibak, A., Pruulmann-Vengerfeldt, P.: Relationships Between Teachers' Pedagogical Beliefs, Subject Cultures, and Mediation Practices of Students' Use of Digital Technology. Cyberpsychol. J. Psychol. Res. Cyberspace, **9**(1) (2015)
12. Karaseva, A.: Pedagogy of connection: teachers' experiences of promoting students' digital literacy. In: Erstad, O., Kumpulainen, K., Mäkitalo, Å., Schrøder, K., Pruulmann-Vengerfeld, P., Jóhansdóttir, T. (eds.) Learning Across Contexts in the Knowledge Society. Sense Publishers, Rotterdam (in press)
13. Dillon, P.: Creativity, Integrativism and Pedagogy of Connection. Int. J. Thinking Skills Creativity **1**(2), 69–83 (2006)
14. Dillon, P.: Pedagogy of connection and boundary crossing: methodological and epistemological transactions in working across and between disciplines. Innovations Educ. Teach. Int. **45**(3), 255–262 (2008)
15. Karaseva, A., Pruulmann-Vengerfeldt, P.: An Exploratory Study of Relationships between in-Service Teacher Achievement Motivation and their Technology Integration Practices (work in progress)
16. Butler, R.: Teachers' achievement goal orientation and associations with teachers help seeking: examining a novel approach to teacher motivation. J. Educ. Psychol. **99**(2), 241–252 (2007)
17. Butler, R.: Striving to connect: extending an achievement goal approach to teacher motivation to include relational goal for teaching. J. Educ. Psychol. **104**(3), 726–742 (2012)
18. Karaseva, A.: Teachers as Internet Users: An Exploratory Study on the Relationships between Teachers' Computer Self-efficacy and Search Performance (work in progress)
19. Bandura, A.: Self-efficacy mechanism in human agency. Am. Psychol. **37**(2), 122–147 (1982)

# IT in Small Czech Schools and the Development of Teachers' Competences

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**Abstract.** The paper presents a description of IT use by teachers in small primary and secondary schools in the Czech Republic based on data from 34 schools participating in the INTERES project. Twenty-nine different areas of IT use were analysed by the Profile School21 self-evaluation tool in fall 2014. Findings are not representative but they offer a unique insight into schools with tens of pupils. Limited resources (human, financial, material, time) in these schools can influence their use of IT and contribute to the rural digital divide. The data allow comparisons of small schools with hundreds of schools that had used the same tool previously. IT training sessions held at each school and individual mentoring for teachers were carried out according to the educational needs analysis obtained by the evaluation tool. Field reports and evaluation questionnaires provided data about teachers' competences in small schools and ideas for further training.

**Keywords:** Digital divide · Education · Information technology · Primary and secondary schools · Research · Teachers · Touch devices

## 1 The Digital Divide and Small Schools

There is no longer any need to discuss that information technologies (hereinafter IT) enhance opportunities in different spheres of life – e-commerce, healthcare, leisure, networking, business and of course education [1]. However, the use of IT may be limited by various factors, which can be divided into unavailability of IT (primary digital divide) and inability to use IT (secondary digital divide) [2]. The digital divide manifests itself between continents, countries, territories as well as individuals. This paper is concerned with the territorial aspect as it is focused on the Czech Republic (CR) and the differences between small and large schools. There are usually smaller primary (and in some cases also secondary) schools within smaller municipalities, which corresponds to the number of pupils living in the catchment area [3].

The development of the digital divide can be significantly influenced by the extent to which IT is introduced into the work of small rural schools. The digital divide is influenced by the size of a municipality and the correlating characteristics of the inhabitants, including the level of education of adults and their socio-economic status [1, 4–6]. Townsend [1] identifies as crucial for the development of the rural digital


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divide the influence of the state on the cost and speed of broadband, and interest in IT adoption by educational institutions.

Individuals who have an impact on their surroundings, in particular teachers, play a pivotal role in local situation. "Without teachers effectively applying technological innovation in this way, there is a real potential for the marginalization of students who are not prepared to be active participants in the 21st century workforce." [5] Two problems may surface: slow adoption of IT by teachers and insufficient school infrastructure, the use of time, and defective technology [5]. To eliminate them, continued technology support (ideally by IT coordinator in the school), instruction to motivate teachers and classes focusing not on general use of the technology, but rather providing age and subject specific training are needed. The focus of IT lessons for teachers is nevertheless often general [6]. According to Sims [4], education must be provided locally, since those technologically less competent (or motivated to use IT) cannot be satisfied by distance learning using IT. Therefore, e-learning cannot overcome such barriers as distance from education centre.

## 2 Related Studies

As hypothesis of this paper, Rubagiza [7] draws attention to the shortcomings in state policy of IT use in schools, in particular disadvantaging of certain communities, including the rural. Differences in the use of IT can be identified not so much among individual teachers as among schools, which may be influenced by sharing experiences within an institution, but not beyond [8]. In addition to sharing, a defined IT policy plan mapping the situation at the school, but serving also as a guide to further development is relevant [9]. Tezci [10] found that Turkish primary school teachers did not have a positive view of either the motivational or technical aspects of the use of IT in instruction. Deficiencies in knowledge were also found in Serbian teachers, but their motivation to work with IT was high [11]. The use of IT to assist in teaching can lead to developing various teacher competences. Involvement in a virtual school platform enhances: "pedagogical management, knowledge management, deepening of knowledge; and social, ethic and legal dimensions, by applying the knowledge and talent management models." [12] A mentor can be of significant assistance. Even if accessible only through e-mail, it is necessary to select a suitable mentor in terms of technical, pedagogical as well as personal characteristics [13].

In the Czech Republic the number of computers for educational purposes and school websites at grade 4 and grade 8 are slightly above the EU average (in 2012, the CR ranked 6-8th among EU28 countries in these indicators) as well as individuals (ages 16-24) who have obtained IT skills through schools (in 2011, the CR ranked 4th among EU28 countries) [14]. In the EU, school staff still indicate insufficient IT equipment as the main obstacle. Therefore, both school infrastructure and teacher development continue to be recommended [15]. Teachers still tend to use IT for preparation, but not for instruction as such or even "to communicate with parents or to adjust the balance of students' work between school and home in new ways" [15]. In the Czech Republic, [16] broadband is almost ubiquitous in schools; there is zero percent of schools without

broadband at grade 4 and two percent at grade 8 (cf. Sect. 4). The frequency of IT use by teachers in lessons roughly corresponds with the EU average. On the contrary, Czech teachers' self-confidence in their operational and social media skills is lower than the EU average at all grades, in particular in social media skills. Czech teachers engaged in professional development during the past two years more often than the EU average. However, as far as IT training is concerned, with the exception of training provided by school staff at grade 4, they are below the EU average in all types monitored. School support in IT is above average in the CR, 90 percent of pupils attend a school with an IT coordinator at grade 4 and 8 and more than 60 percent a school with reward for teachers using IT in teaching and learning. Given the selection of schools and recounting based on the number of pupils, the results have been affected by large schools to the detriment of small schools. The IT standard of Czech schools is thus high according to the survey, but the question is whether this holds for all schools, including the small ones.

OECD's (Organisation for Economic Co-operation and Development) TALIS (Teaching and Learning International Study) survey [17] mapped teacher work and satisfaction at ISCED (International Standard Classification of Education) 2 level, which means that teachers in small schools only with ISCED 1 level were completely excluded. In comparison with the EU survey, lesser participation of teachers in continuing professional development was found. Mentoring and sharing within a school is more common than engagement in professional groups. Most teachers were interested in IT skills for instruction, coping with pupil behaviour and new technologies at the workplace. According to the ICILS (International Computer and Information Literacy Study) 2013 survey [18], despite the fact that Czech schools are relatively well equipped with IT in general, availability of tablets is less prevalent. Twenty seven percent of teachers use a computer in their teaching every day; 60 percent of them at least once a week. About half of the teachers are convinced that the use of IT in teaching is not considered a priority at the school and therefore there is not enough time to prepare lessons using IT. "From all the participating countries, teachers in the Czech Republic least agreed that IT used in teaching helps students learn to cooperate with their peers (62 percent, ICILS countries average 78 percent), learn to plan and organize their work (41 percent, average 65 percent) and that it improves students' academic performance (53 percent, average 68 percent)." [18] Czech children have learned at school mainly skills falling under the category of information literacy (e.g. 76 percent searching for information using a computer and 74 percent assessing usability of information for school work) in comparison with computer literacy issues (e.g. 16 percent working in a computer network and 13 percent changing computer settings).

Shortcomings of the studies are that they only research at the entire country level, while small schools are not differentiated and are even excluded from some surveys (OECD). Even though each such school concerns only a small number of pupils, with regard to the number of these schools, the results in terms of IT use may differ. This assumption needs to be verified by research.

## 3 Evaluation of IT in Small Czech Schools by Profile School21

The use of IT in schools is viewed as crucial for the development of the entire society in the Czech Republic. This is evidenced by the current ministerial effort to formalize the IT strategy in children and adult education. With infrastructure development and use of IT, evaluation is also in the centre of attention [19]. The Profile School21 tool that was inspired by similar tools by the Irish National Centre for Technology in Education (IT Planning Matrix) and BECTA (Self-review framework). It has been tailored to Czech needs may be used for this purpose in primary and secondary schools. [20] Evaluation is only the first step; the tool serves also as a guide to increase IT use according to the school strategy, to enhance cooperation of teachers and to break down the barriers between the school and its surroundings.

This self-evaluation tool was designed in 2010 and it underwent a standardization process in the following two years [20]. It makes possible an analysis of the use of IT in different areas of schools' activities: management and planning, IT in the school curriculum, professional education of teachers, integration of IT in the life of the school and IT infrastructure. The tool uses a four level scale (from beginner to sharing experience outside the school) for 29 indicators (listed in Fig. 2). Already in the testing phase, small schools showed different results in comparison with other schools, e.g. perceiving the highest level as unattainable.

### 3.1 Data Collection and Processing

The INTERES project aimed to give teachers in primary and secondary schools touch devices and to learn them to use the device in teaching and its organization. The Profile School21 evaluation tool was used to describe the use of IT in all schools in the INTERES project in October and November 2014. The standardized framework was updated and, for simplicity reasons, adapted formally (not in terms of content). Schools were referred to the interpretation of the original tool, when in doubt. The questionnaire was accessible online and data were analysed using SPSS.

Given the size of the sample, the statistical testing was limited. The results thus provide a basic description with discussion of the findings based on a larger sample from 2011 [21], even though INTERES participants differ from the cohort from 2011 (predominantly larger schools from kindergarten to higher vocational schools). The originally planned comparison with current corresponding data was not possible since the relevant data have not been provided by the National Institute for Education yet, although their handover was planned for March 2015.

### 3.2 Research Sample

There were 4,095 primary schools attended by the average of 202.1 pupils registered in the Czech Republic in school year 2013/2014 [22]. 1,237 schools reported up to 50 pupils and 546 schools 51–100 pupils. The statistics of pupils in comparison with the INTERES project is shown in Fig. 1. A similar division of public secondary schools has not been published. Small schools operate with considerably fewer resources (both financial and

human) and the use of IT is therefore presumably at a lower level. No survey focusing on a comparison according to school size is available. Thus, it is one of the main objectives of this article to provide it.

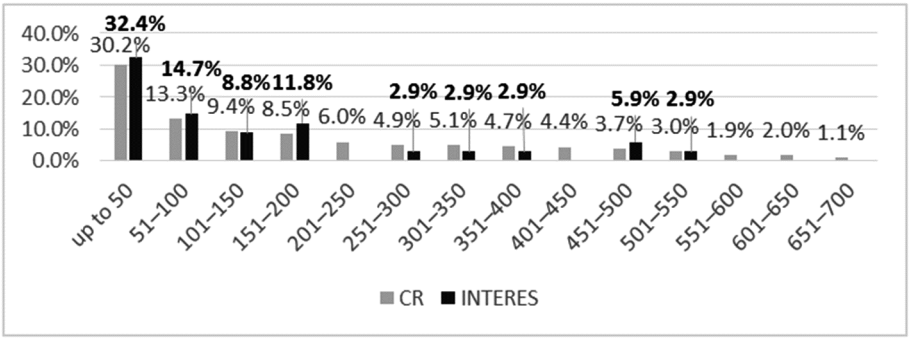


**Fig. 1.** Number of pupils in Czech primary schools [22] and all schools in the INTERES project (categories 700 to more than 1000 pupils are not displayed - number less than 1 percent).

The evaluation focused on all 34 schools participating in the INTERES project. The selection was thus influenced by the conditions of the grant that contained the requirement to support schools with up to 200 pupils, in particular primary schools (there are five secondary schools in the project, thereof three with 163–170 pupils). The reason was limited possibilities of further education of school staff and lower access to resources [23]. There are 79.4 percent of schools of this size in the INTERES project (compared to 61.5 percent in the population of Czech schools), thereof 47.1 percent of schools have less than 100 pupils. The largest school participating in the project has 505 pupils. Another factor for selection of the schools was their interest and not being involved in a project call with another partner. The schools are in different locations, with 4 regions out of 14 represented in the sample. The survey was in most cases filled in by the head teacher (27 out of 34 schools).

Even though the results are not representative given the size and selection of the sample, the aim of this paper is to draw attention to the need to evaluate the use of IT in schools with regard to school size. These findings offer a unique insight into the situation in small schools (with less than 200 pupils). The obtained data allow comparing small schools with hundreds of (usually larger) schools that decided to use the same tool a few years ago. They were also used for the analysis of the needs of educational institutions (Sect. 4). The same tool will be used to evaluate the influence of the INTERES project in June 2015.

### 3.3 Results

The schools in the project are very diverse in terms of integration of IT into their scope of activity. Summary results are illustrated in Fig. 2. At the same time, it is not possible to say that some schools are good or bad in all criteria – even a school with the best results designated itself as a beginner in some indicators. There was only one school

that designated itself as a beginner in almost all criteria; other schools used the values from the lowest to the two top ones.

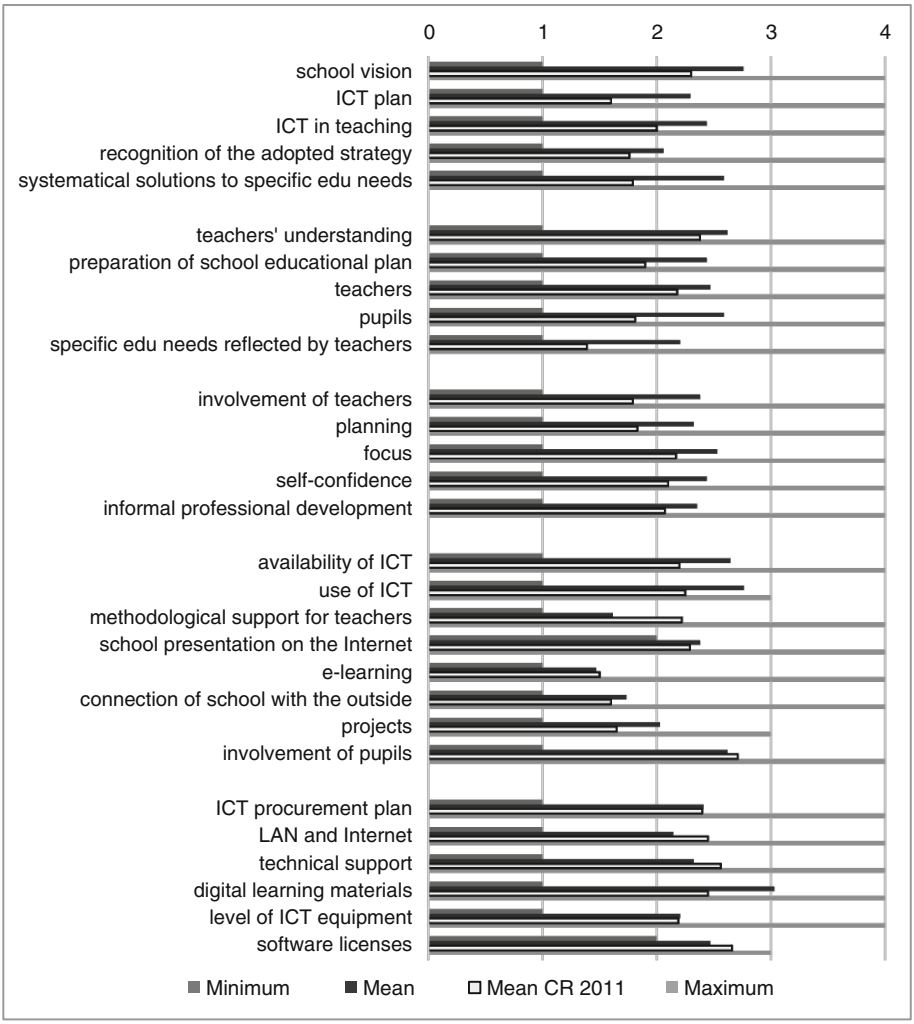


**Fig. 2.** Aspects of IT use in schools in the INTERES project. The scale points mean: 1 beginner, 2 first experience, 3 acquiring of confidence, 4 sharing experience outside the school

All criteria reported at least one school at beginner level. The exception with at least first experience are Internet school presentation, where all schools have already started updating websites on a regular basis with clear rules, and work with software licenses, which means that all schools are confident about the legality of all software. The highest level for most criteria was the maximum level, licenses being an exception again (no school has an elaborate license policy for both teachers and pupils outside the school), which shows that they still need assistance in different IT use. The other two criteria

with level 3 as the highest level indicated were the use of IT in teaching (good practice is not shared beyond school community) and in project teaching (no projects with the use of the most appropriate IT and results publishing).

The results show that schools do not feel very advanced in connecting their activities with IT. It is an area that requires proaction and sufficient skills of the IT methodologist at the school supporting other pedagogical staff and implementing or sustaining e-learning and communication of the school with the surroundings. In contrast, as far as creation of visions and the ability of teachers to use IT in their teaching are concerned, the schools reported the highest competence, even significantly outperforming in all indicators of these categories the schools from the previous survey [23]. This indicates awareness and self-confidence of school management which is contrasted with the results on the level of real application into other categories. Under the influence of these results, differences in average results in the monitored categories according to school size did not manifest (Fig. 3).

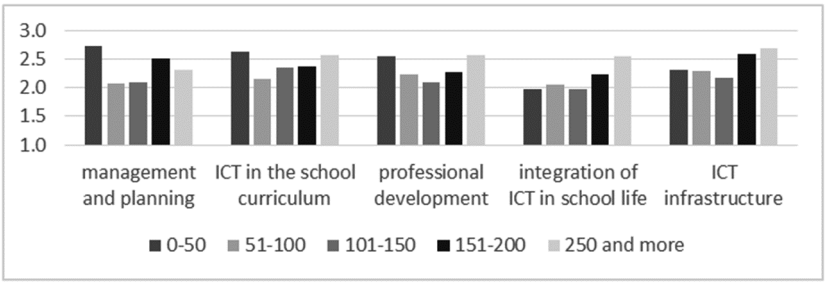


**Fig. 3.** Categories of using IT in schools participating in the INTERES project

Schools indicated different levels for the criteria, mostly showing relatively homogeneous results corresponding to median values. The schools differ most in terms of equipment. This is the area that the INTERES project should significantly change. If we compare the results with the previous survey [23], even despite the difference of three years, schools appear as less advanced in the integration of IT into school life and IT infrastructure, which is confirmed by the request for intervention by the state (Sect. 1) This is also an area where the effect of school size is evident (Fig. 3).

## 4 Development of Teachers' Competences

Touch devices for 350 teachers in schools participating in the INTERES project were purchased. A series of five IT training sessions in each school (supplemented with e-learning and webinars) and individual mentoring consultation were carried out according to the needs identified in the Profile School21. Field reports and evaluation questionnaires from each offline and online educational activity provided data about competences of teachers in small Czech schools and motivation for further training. Upon evaluation of IT in schools and identifying differences, it became evident that despite numerous similarities it is necessary to adapt education to the needs of individual schools, which is

in line with previous evidence-based experience from Czech schools [24]. Teachers at individual schools are interested in training together and they are often at a similar level, therefore exclusively individual education is not necessary, but rather the last step for subject related specifics (see Sect. 2). A detailed description of education in schools will be prepared and published; with regard to the objective of this paper, only three schools showing the differences here.

The first group of schools is represented by the Primary School in Nesovice and the Primary School Ořechov, which have only 5 grades. The school does not have its own IT technician – he is available upon calling, but teachers avoid communication with him. Therefore, computers are swamped with malware. Nobody notices that there has been no WiFi signal for a prolonged period. Nobody, not even the head master knows who the Internet Service Provider (ISP) is or the speed of the Internet connection, which is not available to the children. Other small schools are not connected to the Internet, and there is no WiFi or mobile Internet in the municipality. Teachers perceive IT as something alien, they are afraid they may break something. They are unaware of basic IT routines, for example they are surprised that an unused device is flat after two weeks without charging. They would welcome a technician's visit every three weeks to fix what has been broken. Some schools have no idea that they might participate in projects that would advance their equipment or are afraid to participate. The mood and motivation is determined by the head teacher, but motivation for IT is weak since it challenges some of the deeply rooted stereotypes of teachers who have little time to change them even if they decide to do so, which is occasionally the case with individuals. Almost all teachers feel language barriers and any interest is destroyed when a mobile application is not available in Czech (even when there are only basic words in English). On the other hand, they show interest when they are given exact instructions as to how to use something in their subject. It is hard for the teachers to imagine how they might use a transdisciplinary application in their teaching. An instructor with many years of experience in teaching their subject inspires trust in them, while an IT expert must try hard to show that he/she has something to offer to the teacher. They prefer traditional software distribution channels. Teacher's age does not play any role at these schools.

A similar approach has been found at Brno Dance Conservatory. The teachers kept their distance from IT and there was minimum infrastructure available (just one computer room for pupils and one computer for teachers in the staffroom), but their motivation was high. This school with 133 pupils is facing the negative consequences of formally falling within an unusual category, which does not allow it to participate in certain projects. Given the school's orientation, IT is not considered as the most important area for funding. About two-thirds of the pupils leave the school and continue in a non-dancing environment, but they are unprepared in IT competences.

The last type of school is represented by Deblín Primary School. The municipality with 966 residents has a school with 194 pupils (most pupils commute from nearby municipalities). The school is famous in pedagogical circles in the Czech Republic and serves as an example for a number of other schools. This school has a progressive head teacher who strives to make sure that all teachers keep up with current IT practices in teaching and learning. Teachers view this approach as demanding and there is a relatively high staff turnover rate. Formal pedagogical education of the trainers and their broader

teaching experience from school is not so important for the teachers; what is much more important is that the trainers are experts in the topic explained (using a certain device, for instance) and that they are able to explain it in a way understandable to the teachers (especially with respect to the level of complicatedness and the use of terms with which the teachers are familiar).

Despite a number of differences, identical features were also identified among the schools. The most common was a lack of interest in online education. Even though e-learning courses and webinars with the same instructors and topics as in the offline mode were offered, teachers showed little interest (a few individuals from about 350 teachers). In contrast, demand for offline lessons was higher than was feasible within the project. A more positive feature shared by the schools was interest in using IT in instruction in a manner that was clearly described by instructors with disillusionment in case of a limited offer of subject specific applications.

## 5 Conclusion

The aim of this paper was to provide a description of the IT use in small primary and secondary schools in the Czech Republic. The findings are not representative research results, but they offer a unique insight into small schools (usually with tens of pupils). A more thorough analysis of teacher education with school clustering is planned. Section 4 brought a preliminary insight into this area. The survey of different aspects of the use of IT indicates the influence of school size and the need for intervention in particular on the level of infrastructure and practical use of IT in instruction. On the other hand, the managers of small schools show increased self-confidence. The results need to be verified on a representative sample of schools. Nevertheless, it is probable that small schools use IT in a different way, but tend to be excluded from standard surveys. It is therefore desirable to focus on their specifics and, depending on the results, adopt measures that will control the growth of the rural digital divide.

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## References

1. Townsend, L., Sathiaseelan, A., Fairhurst, G., Wallace, C.: Enhanced broadband access as a solution to the social and economic problems of the rural digital divide. Local Econ. **28**, 580–595 (2013)
2. Attewell, P.: Comment: the first and second digital divides. Sociol. Educ. **74**, 252–259 (2001)
3. Kučerová, S.: Zanikání Škol na Českém Venkově [Disappearance of Schools in the Czech Countryside]. http://www.dvs.cz/clanek.asp?id=6438748
4. Sims, J., Vidgen, R., Powell, P.: E-learning and the digital divide: perpetuating cultural and socio-economic elitism in higher education. Commun. Assoc. Inf. Syst. **22**, 429–442 (2008)
5. Reinhart, J.M., Thomas, E., Torskie, J.M.: K-12 teachers: technology use and the second level digital divide. J. Instr. Psychol. **38**, 181–193 (2011)

6. Valcke, M., Rots, I., Verbeke, M., van Braak, J.: IT teacher training: evaluation of the curriculum and training approach in flanders. Teach. Teach. Educ. **23**, 795–808 (2007)
7. Rubagiza, J., Were, E., Sutherland, R.: Introducing IT into schools in Rwanda: educational challenges and opportunities. Int. J. Educ. Dev. **31**, 37–43 (2011)
8. Vanderlinde, R., Aesaert, K., van Braak, J.: Institutionalised IT use in primary education: a multilevel analysis. Computers **72**, 1–10 (2014)
9. Vanderlinde, R., Dexter, S., van Braak, J.: School-based IT policy plans in primary education: elements, typologies and underlying processes. Br. J. Educ. Technol. **43**, 505–519 (2012)
10. Tezci, E.: Factors that Influence pre-service teachers' IT usage in education. Eur. J. Teach. Educ. **34**, 483–499 (2011)
11. Soleša, D., Soleša-Grijak, Đ.: IT competences of teachers and educators. Croatian J. Educ./ Hrvatski Casopis za Odgoj I Obrazovanje **13**, 8–24 (2011)
12. Butter, M.C., Pérez, L.J., Quintana, M.G.B.: School networks to promote IT competences among teachers. case study in intercultural schools. Comput. Hum. Behav. **30**, 442–451 (2014)
13. Quintana, M.G.B., Zambrano, E.P.: E-mentoring: the effects on pedagogical training of rural teachers with complex geographical accesses. Comput. Hum. Behav. **30**, 629–636 (2014)
14. Digital Agenda Data. http://digital-agenda-data.eu/
15. Survey of Schools IT in Education: Benchmarking Access, Use and Attitudes to Technology in Europe's Schools. Publications Office, Luxembourg (2013)
16. Survey of Schools IT in Education: Country Profile: Czech Republic. Publications Office, Luxembourg (2012)
17. Kašparová, V., Holečková, A., Hučín, J., Janík, T., Najvar, P., Píšová, M., Potužníková, E., Soukup, P., Ševců, M.: Analytická Zpráva z Šetření TALIS 2013 [Analytical Report of Survey TALIS 2013]. Česká Školní Inspekce, Praha (2015)
18. Basl, J., Boudová, S., Řezáčová, L.: Národní Zpráva Šetření ICILS 2013: Počítačová a Informační Gramotnost Českých Žáků [National Surveys Report ICILS 2013: Computer and Information Literacy of Czech Pupils]. Česká Školní Inspekce, Praha (2014)
19. Strategie Digitálního Vzdělávání do Roku 2020 [Digital Education Strategy until 2020]. Ministerstvo Školství, Mládeže a Tělovýchovy (2014)
20. Brdička, B., Neumajer, O., Růžičková, D.: IT v Životě Školy - Profil Školy21: Metodický Průvodce [IT in School Life – Profile of School21: Methodological Guide]. Národní Ústav pro Vzdělávání, Praha (2012)
21. Brdička, B., Neumajer, O., Růžičková, D.: Profil Škola21 v Roce 2011: Zpráva pro MŠMT o Využívání IT v Činnostech Škol [Profile Škola21 in 2011: Report to the Ministry of Education on IT Usage in Schools Activities]. RVP.cz (2012)
22. Základní Školy: Výkonová Data o Školách a Školských Zařízeních – 2003/04–2013/14 [Elementary Schools: Performance Data for Schools and Educational Institutions – 2003/04–2013/14]. http://www.msmt.cz/file/33002/download/
23. Metodický Výklad Výzvy č. 51 [Methodological Interpretation of Challenge No. 51]. Operační Program Vzdělávání pro Konkurenceschopnost (2014)
24. Havlik, J., Kubu, P.: Implementation of IT to Czech schools. In: IEEE 11th International Conference on Emerging eLearning Technologies and Applications (ICETA), pp. 239–242. IEEE, Košice (2013)

# From Information Literacy Toward Information Illiteracy

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**Abstract.** The objective of this paper is to explore the concept of information literacy in relation to the constant changes in technology, communication channels and habits. The findings show that new releases of computer programs (software) and devices (hardware), as well as new models of communication tools and channels, services, professional measurement devices, and techniques have a significant role in creating information illiteracy already information literate people. The findings of this work help to better understand the nature of the information literacy phenomenon in modern society. On the one hand, the causes for the accelerating obsolete of skills are linked to technology development in general. On the other hand, the causes are directly linked with the industrial concept of planned obsolescence. This latter concept has a direct impact on the ever faster obsolescence of skills and information literacy.

**Keywords:** Information literacy · Information illiteracy · Technology · Planned obsolescence

## 1 Introduction

Today's modern society is characterized by a strong technological progress. This affects the processes of personal knowledge acquisition and sharing of information between members of modern societies. This has also arisen as an important issue within the concept of information literacy using technological skills and knowledge allows individuals to fully participate in today's developed society.

A number of technological, economic, political and sociological changes that shape the world at the beginning of the 21st century give great importance to the concept of information literacy in general. Thus, information literacy became a necessary mean for the inclusion of individuals in their social environment at different levels. Moreover, various segments and levels of involvement in modern society lead to differentiation and different forms of literacy that enable the approach to these segments of social activities and that need to be mastered so that the individual is fully included in society. The literature discusses information technology (IT) literacy, digital literacy, information fluency, multiliteracies, transliteracy, media and information literacy (MIL), cultural literacy, functional literacy, information literacy, voter literacy, work-related literacy and many others. However, to be information literate, a person must be able to


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recognize when information is needed and have the ability to locate, evaluate and use effectively the needed information [1]. Thus, information literacy is considered as knowledge, skills and efficient information practices in human information behavior [2] including recognition of information need, development of information strategies, use of information sources, and building of pathways for gaining knowledge, all of which are deeply connected with IT.

## 2 Statement of Problem and Objective

It can be said that skill obsolescence is an integral part of technological progress and that it is natural that some previously necessary skills are no longer needed as people progress in their careers. Also, it seems that information literacy skill obsolescence has become more important as jobs have become more demanding and complex. As technology progresses, this trend is expected to speed up in the coming years. The question of information literacy skill obsolescence is still rarely explored but some data exist. For example, Cedefop [3] launched a pilot survey in four European countries that looked at how many people age 30 and 55 felt their skills were, or were becoming, obsolete. One of the survey findings was that an average of 16 % of workers across the four countries believed their skills had become outdated in the past two years due to technological developments or structural reorganization. The two skills identified as most affected were speaking other languages and computer/ICT use. Also, around 19 % of workers age 50 to 55 believed that technological developments had made their skills outdated in the past two years.

Planned obsolescence in the industry presents policy planning or designing a product with a limited shelf-life so that they become outdated, old-fashioned or non-functional after a certain time [4]. Changing technology and innovation, which are withal one of the bases of planned obsolescence, have become a common economic category that has a significant impact on business. From the perspective of information literacy there is a clear problem concerning this concept. After the launch of each new generation of devices or programs, users must adapt to new options and solutions that enable access to and exchange of information. It is about permanent changes of existing programs and new versions of existing devices that users have to get used to again. Therefore, our paper focuses on the concept of planned obsolescence and its impact on information literacy. Our objective is to explore the dependency of the concept of information literacy on the constant changes in technology. We examine the causes of the constant need to teach information literacy to already information literate people due to planned obsolescence along with the implications of the current situation.

## 3 Methodology

We applied a qualitative analysis approach to examine the publicly available data and literature on information literacy and planned obsolescence. In our synthesis we used a descriptive method to define the nature of relation between the concept of information literacy and the constant changes in technology, communication channels, and habits.

## 4 Research Findings

In this paper we connect research on current use of ICTs with information literacy. It can be argued that the fast-paced development of digital technologies and their applications has had an unprecedented influence on global societies and the world economy. Furthermore, it is believed that human history has not witnessed another development in which new technology has so thoroughly penetrated the everyday lives of international community members [5]. We conclude that almost all contemporary concepts of literacies, including visual, electronic, and digital forms of communication and expressions are closely related to technologies. That is why almost all types of literacies emerged with the introduction of new technologies in the last 15 years [6]. In the literature there is a more detailed distinction of interrelated concepts of information literacy, digital literacy and computer literacy. According to this, information literacy could be related to selection, evaluation and organization of the found information. Digital literacy is concerned with understanding and using information in multiple formats from a range of sources via computers while **c**omputer literacy refers to ability to manipulate documents and data via software [6]. The technological basis for the development of the information society and information literacy has changed significantly in recent decades in an unprecedented manner. Considering only the period from 2000 until now, according to data published by International Telecommunication Union [7], technological progress, infrastructure deployment, and falling prices have brought unexpected growth in ICT access and connectivity to billions of people around the world. Between 2000 and 2015, global Internet penetration grew 7 fold from 6.5 % to 43 %. Globally, 3.2 billion people are using the Internet. However, of 3.2 billion Internet users, 2 billion are from developing countries. This means that of 7.1 billion people in the world, 4 billion people from developing countries remain offline, representing two-thirds of the population residing in developing countries. Of the 940 million people living in the least developed countries (LDCs), only 89 million use the Internet, corresponding to a 9.5 % penetration rate. Also, 200 million people in developed countries remain offline.

Globally, the proportion of households with Internet access at home increased to 46 % in 2015. By end of 2015, 34 % of households in developing countries will have Internet access, compared with more than 80 % in developed countries. In LDCs, only 7 % of households have Internet access, compared with the world average of 46 %. Internet penetration in developing countries stands at 35 %; LDCs lag behind by only 10 %. By the end of 2015, there will be more than 7 billion mobile cellular subscriptions, corresponding to a penetration rate of 97 %. Mobile broadband is the most dynamic market segment: globally, mobile broadband penetration reaches 47 % in 2015, a value that increased twelve times since 2007. Mobile-broadband penetration levels are highest in Europe and the Americas, at around 78 active subscriptions per 100 inhabitants. Africa is the only region where mobile broadband penetration remains below 20 %. Fixed-broadband penetration remains at less than 1 % in LDCs. Africa and the Arab States stand out as the regions with the fewest fixed-broadband subscriptions per 100 inhabitants, at less than 1 and less than 4, respectively.

Such great development in ICT enables the expansion of computer literacy. If the use of Internet as a basic platform for search and exchange of information could be taken as the indicator of IT literacy, then the above data show that more and more people are information literate. However, there is still a significant number of those who do not participate in this way in the digital information age. In the European Union, while more than a fifth of the population (22 %) have never used the Internet [8], "regular" (at least once a week) use of the internet in the EU 27 countries increased to 70 % in 2012. Frequent (daily) use of the internet in the EU27 grew to 59 %, showing that not only is the proportion of the population going regularly online increasing but that it is increasingly becoming a daily activity. While the rate of non-users continued to fall in 2012 (by 2 % since 2011), 22 % of the EU population has still never used the internet. This means that around 120 million European citizens have never used the internet. [8]. The EU target of 20 % of citizens shopping online cross-border by 2015 has been missed. Similarly, the share of SME selling online likely will remain far below the target of 33 % by 2015. On the other hand, the proportion of citizens using the internet to interact with public authorities has resumed growth, reaching 44 % in 2012 after 41 % during the two preceding years [8].

At the same time, the issue of information literacy is gaining importance in everyday life activities and has been associated with the development of commercial markets of ICT technologies and applications. There are many different figures on the mobile applications market, such as smartphones and tablets, the value of which have reached 11 billion euros in 2012. This represented more than 50 billion downloads and 41 applications per user on average, a 32 % increase over 2011 when the average was 32 applications [9]. Evidence on barriers shows that as internet use increases, an increasing proportion of those who remain as non-users say that they don't need it (47 % in 2012), and/or do not have the necessary skills (35 % in 2012). Access (24 %) and equipment (26 %) costs are the next most important factors and their importance has changed little over time. Access has been declining in importance and other factors such as privacy and security concerns and no broadband availability are mentioned less. Physical disability remains a less mentioned barrier in the overall population; however, the share of the disabled in the population is also low. A declared lack of interest in the internet by non-users could relate to a number of things: lack of knowledge and skills, a genuine lack of interest, lack of an appropriate offer, not wanting to report financial reasons or lacking skills [8].

Digital skills are fundamental to an effective use of ICT. In the EU, 67 % of individuals had some level of computer skills. Thirty-three percent had none of the defined skills. As such, almost 50 % of the EU population still has little or no computer skills, defined here as low skills plus none of the defined skills [8]. Looking at what people do online provides useful insights into the development of online life. Looking at the types of activities undertaken, *email* remains the most popular activity on the internet with 66 % of individuals reporting using it in the last three months. This is closely followed by "looking for information about goods and services" (62 %) and then by reading online news or newspapers (45 %). The next most popular activities are *internet banking* (40 %), *posting messages to social media sites or instant messaging* (40 %), using *travel and accommodation services* (36 %) buying/ordering goods or services (35 %), *playing /downloading games, images, films or music* (35 %), and

*listening to web radio and/or watching web TV* (33 %). Less popular activities include *uploading self-created content* (26 %), *telephoning or video calls* (26 %), *selling goods or services* (16 %), *playing networked games with other persons* (10 %), *making a doctor's appointment* (8 %), and *creating websites or blogs* (6 %). Nevertheless, many of these activities, too, have seen strong growth over the last couple of years, indicating that activity online is becoming more diverse [8].

## 5 The Impact of Obsolescence to Information Literacy

Detailed breakdown of the different types of modern literacy, such as offered by Kovářová and Zadrazil [6], is not necessary for the purposes of this study since the information technology is a dominant factor influencing all of the above levels of these types of literacy. Technological solutions partly follow theoretical conceptual solutions and, in turn, practical technological capabilities and technical solutions define conditions for development of theoretical and conceptual set up of models of processing of data and information. In this way, the technologies, through their development, steer us toward the selection of the available information sources, methods of data collection/aggregation of information, search methods, ways to store data, how to use information and ways of presenting data. Furthermore, it is especially important that technology determines to a large extent the choice of information sources as many search engines systematically exclude certain sites and give preference to others [10]. Technology also affects the way of selection and technical transfer of information because transition to a new level can lead to the loss of information and contents that remain on the old media storage. This results in a reduced possibility of seeking and using data and information. Due to its heavy dependence on ICT, it can be concluded that the current Information Society cannot be "Information" without IT [6].

Therefore, this paper focuses on the concept of planned obsolescence and its impact on information literacy. Obsolescence can be defined as "a decline in the value of materials or equipment before the natural occurrence of deterioration"; they do not expire for reasons of physical wear but for reasons associated with the advancement of technology, changes in behavior, fashion, and so forth. [11]. As mentioned before, planned obsolescence or built-in-obsolescence in the industry presents policy planning or designing a product with a limited shelf-life so that they become outdated, old-fashioned, or non-functional after a certain time [4]. Planned obsolescence is usually divided into two main types: technical obsolescence and psychological obsolescence. In the first case, it is about objective material reasons for the replacement product prior to consumer expectations and in the second case it is about suggested intangible reasons for an earlier replacement of functional products. Planned obsolescence, as a proven concept of increasing sales, today permeates contemporary production, culture and civilization in general to the extent it became a generally accepted principle. Changing technology and innovation, which are withal one of the bases of planned obsolescence, have become a common economic category that have a significant impact on business. In a recent study by PricewaterhouseCoopers on business trends that included 1,344 top managers of the world's largest companies, the issue of changing technologies or the technological advances were rated by 81 % of managers

as the most important trend that will most affect their business in the next five years [12]. The concept of planned obsolescence associated with rapid changes in technology and the product has very complex consequences that affect the general economic development and have a significant impact on social conditions. While the positive sides of this concept are associated with providing jobs, developing innovation and technology, facilitating access to a wider range of customers to the many products and services, there are also negative aspects of planned obsolescence. They are reflected in the rising costs for customers regarding product acquisition and maintenance, significant credit indebtedness of the majority of population, the loss of jobs in certain service segments, deterioration of certain industry segments in some regions due to uncompetitiveness, rising unemployment, rapid depletion of natural resources, rapid increase of environmental pollution, and the emergence of geopolitical crises due to struggle for resources [13].

From the perspective of information literacy there is a clear problem concerning planned obsolescence that leads to information illiteracy. The concept of information illiteracy can be defined as lack or significant reduction of information skills of individual related to fulfilment of his/her information needs. The market of computing and communication products and applications is particularly dynamic. After the launch of each new generation of devices or programs, users must adapt to new options and solutions that enable access to and exchange of information. It is about permanent changes of existing programs and new versions of existing devices to which the users have to get used again to work. It was noted that, globally, most widespread operating systems (OS) change on average every 5 years [14] along with continuously added patches while specialized applications are much more frequently submitted to change, almost every few months. Planned obsolescence leads to the replacement of equipment or product before it reaches its real functional obsolescence. For example, in April 2014 Microsoft ended its support services for its popular operating system (OS) Windows XP. One can increasingly read the claim that Microsoft's move is yet another example of a company adopting a business strategy of planned obsolescence. This debate is fueled by the fact that, at present, Windows XP users still account for a market share of almost 30 % [15]. In order to achieve higher earnings, the producers encourage buyers to purchase new products faster using planned innovation and changing models. Thus, the existing versions of devices such as laptops and smartphones as well as their software and applications are changing every few months. Web-enabled services saw a 3 to 5 year time-to-obsolescence 15 years ago compared to perhaps 14 to 18 months today. Time-to-obsolescence for a mobile-first web services innovation today is probably only 12 months. Time-to-obsolescence seems to be occurring faster as time itself progresses [16].

New software is often carefully calculated to reduce the value to consumers of the previous version. This is achieved by making programs upwardly compatible only; in other words, the new versions can read all the files of the old versions but not the other way round. Someone holding the old version can communicate only with others using the old version. It is as if every generation of children came into the world speaking a completely different language from their parents. While they could understand their parents' language, their parents could not understand theirs. The production processes required for such a strategy are illustrated by Intel. This American semiconductor firm

is working on the production of the next generation of PC chips before it has begun to market the last one [17]. Due to accelerating purchasing of new devices, customers after a year or two have to renew their existing knowledge or adopt completely new practical knowledge on the use of new devices and programs to continue to participate in the exchange of information. Otherwise they would not be able to access information easily or participate in their exchange. Namely, in relatively short time, in the early years of the 21st century, the Internet shifted from Web 1.0 to the Web 2.0. The Web 2.0 application has changed how people deal with the media and handle information, with user-generated content entering the mainstream media. Media users become "prosumers" with Web 2.0 acting as a "read-write Web" from which a wealth of "we media" such as YouTube, Twitter, Facebook, Wikimedia and other social networking sites has emerged [18].

Many portals today use social networks for informing their users and for sharing information with them. This facilitates the exchange of information among users and enables the performance of business or other transactions through social networks and similar platforms [19]. In the science community, there also arises new channels of official distribution of scientific information, new ways of publishing journals, and new ways of informal communication between researchers and to the general public [20]. Therefore, those users who do not keep pace with new products and services are in danger of falling behind and not being able to access the changed information sources as well as changed channels of communication. If one does not follow the dynamic development of equipment, software, and services, his/her ability to independently seek and collect and disseminate information in the digital age will be significantly reduced in two to three years. In other words, frequent change of equipment and programs, largely because of the actual planned obsolescence, is part of the reason why already IT literate people become semi-information literate and then, with further development and increasing setback, they become information illiterate.

With the increasing reliance of social development on computer technology as well as with new programs and changed information solutions, the value of the former or current way of organizing information knowledge will be gradually lost as it is going to change in the near future. For the individual, knowledge of some information sources loses its value as they will physically and virtually disappear or otherwise become unavailable or will change in a different way and lose importance. It can be argued that digital skills are increasingly needed throughout the workforce as a complement to existing jobs and for the new jobs that are being created. It has been suggested that soon 90 % of jobs will require digital skills [21]. That is why the problem of rapid obsolescence of information literacy due to planned obsolescence is even more significant. It makes inclusion of different user groups such as the elderly or socially marginalized groups in their private and professional life even more difficult.

There often is a special technical problem of planned obsolescence as well as obsolescence of technology in general that disables access to data stored on old media [14]. In this way, the development of technology also reduces the information literacy of individuals and the access and the possibility of using the information. Further development and application of new technology will not solve the problem but will probably deepen it. For example, scholars have warned of the negative consequences of "Googlization," a state in which it is so convenient to go online and search the Web that

people no longer feel the need to memorize things. Heavy search engine users will suffer from memory loss and may also ultimately find themselves unable to read long, in-depth articles [18]. All these changes lead to challenges originating from frequent ICT changes that cannot be considered just a generational issue. These technologies possess cognitive characteristics that make learning them a non-trivial effort. Frequent changes currently witnessed add another layer of difficulty with almost constant knowledge obsolescence and knowledge update requirements [22]. ICTs will play an even more significant role in the post 2015 development agenda and in achieving future sustainable development goals as the world moves faster and faster towards a digital society.

## 6 The Expected Growth of Information Illiteracy Risk

As Lee [18] suggests, it is predicted that by 2016 the world will enter the Web 3.0 era which will feature a semantic Web. Super computers will help us analyze all kinds of online information while providing personal services. In the near future, the search engines within the Web will comprehend not only the keywords but also the specific meanings of our requests. The computer will use artificial intelligence (AI) to draw useful suggestions and solutions for us from databases, at which point going online will be very convenient through mobile devices. People will be closely linked to the Web. Thus, the Internet will play an increasingly dominant role in our work and lives [18]. The first challenge will be to master the ICT skills needed to take advantage of the new technologies [18]. In the Web 3.0 age, a person will need to acquire new competencies and skills to maintain critical autonomy and avoid succumbing to the manipulations of new technologies. Moreover, people must discover how to overcome digital divides to ensure that they will not be deprived of opportunities to fully participate in the digital world [18]. Citizens in urban or rural areas in developed or developing countries will be connected by a global village. Marginalized groups such as persons with disabilities, migrants, ethnic groups, poor families, and the less educated are also global citizens, all of whom deserve equal opportunities to join and contribute to the future knowledge societies. It is important that every global citizen receive training in the 21st century competencies, especially media information literacy, in which ICT skill training is a key component [18].

So one can say that the development of the application of information technology will speed up and draw wider and deeper into all segments of society and personal life. In relation to this, it will be increasingly more important to be information literate to be able to participate in life in a developed society. Since the adoption of different digital and IT skills will be all the more needed, it is reasonable to assume risk that a large number of people will have difficulties to follow up with the development and application of new technologies. Planned obsolescence of software and ICT equipment will only further complicate their situation. These problems will be even more pronounced for people in countries that are lagging behind today. On the one hand, industrial products may become more accessible because of the concept of planned obsolescence, which enables lower prices of new devices. On the other hand, frequent changes in technology and the rapid obsolescence of necessary information knowledge and skills

that make information literacy will prevent their full inclusion in the digital world. From that perspective, it can be said that the concept of planned obsolescence becomes an agent of achieving competitive advantage in a globalized world and allows the setting-up of digital barriers between developed and developing countries.

In the area of uneven development and technology distribution, significant risk for the development of future digital society is hidden. The uneven development of society will sooner or later cause the instability of the social system. It is difficult today to consider all future consequences of social instability but for political decision-makers it is one more risk. It is therefore necessary to pay greater attention to the ever faster obsolescence of skills and information literacy, in other words the creation of information illiteracy. It is starting to happen not only in developing but also in developed countries. Long-term information illiteracy, which disables individuals or groups for active exploitation of digital society benefits, can probably bring social, cultural, and political instability and cause the internal collapse of the political system, both in developing and developed countries as well.

## 7 Conclusion

All forecasts indicate that the developed world will rely even more on wider use of computer technology. Thus, it will significantly affect the personal and professional lives of individuals and the various social groups as well. Even now it is required that people constantly adapt and acquire new skills if they want to stay information literate. Those who fail for any reason become less and less information literate or soon even illiterate. The reason for this is the increasing reliance of developed societies on information technology. The nature and the concept of planned obsolescence introduced significant changes in the way how to physically and virtually maintain the information, how to access the information, and how information is exchanged as well as the changes of the reasons why someone will do those things. Only the information literate people will be able to actively and fully professionally and personally participate in social life. Those with low literacy skills, who become information semi-literate or entirely illiterate, will probably be more or less excluded from most social processes. Lifelong learning programs are unlikely to be able to allow anyone to be permanently up-to-date with accelerating technological changes. Nor will all individuals be able to effectively use such programs due to other personal reasons including aging or illness.

There is a risk of unequal development of information technology that will increase the digital gap between the information-literate and illiterate population. Due to the rapid development of technology and its planned obsolescence, the problem of accelerate reducing of information literacy occurs even within the population in developed countries. Such a phenomenon that reduces the possibility of active participation of individuals in social processes, sooner or later can lead to a social system instability.

## References


1. American Library Association: Presidential Committee on Information Literacy: Final report. (1989). http://www.ala.org/acrl/publications/whitepapers/presidential
2. Steinerová, J.: Ecological dimensions of information literacy. Inf. Res. **15**(4), 27 (2010). paper colis719 http://InformationR.net/ir/15-4/colis719.html
3. Cedefop: Pilot survey on skill obsolescence among ageing workers: results and findings from the main phase. Technical report. (2011). http://www.cedefop.europa.eu/en/publications-and-resources/publications/9070
4. Bulow, J.: An economic theory of planned obsolescence. Quart. J. Econ. **101**(4), 729–749 (1986)
5. UNESCO: Conceptual Relationship of Information Literacy and Media Literacy in Knowledge Societies. UNESCO (2015)
6. Kovářová, P., Zadražilová, I.: The influence of technological changes on the definition of information literacy. In: Kurbanoğlu, S., Grassian, E., Mizrachi, D., Catts, R., Špiranec, S. (eds.) ECIL 2013. CCIS, vol. 397, pp. 118–125. Springer, Heidelberg (2013)
7. International Telecommunication Union: ICT Facts and Figures (2015)
8. Digital Agenda Scoreboard (2012). https://ec.europa.eu/digital-agenda/sites/digital-agenda/files/scoreboard_life_online.pdf
9. Compuware: Survey Report: Mobile Apps - What Consumers Really Need and Want, quoting data from Nielsen (2013). http://www.compuware.com/about/release/747433/mobile-apps-vs-mobile-websites–and-the-winner-is
10. Carroll, J.: From encyclopaedias to search engines: technological change and its impact on literacy learning. Literacy Learn. Middle Years **19**(2), 27–34 (2011)
11. Le Petit Larousse: French Dictionary (2014). http://www.larousse.com/en/dictionaries
12. PricewaterhouseCoopers.: 17th Annual Global CEO Survey (2014). http://pwc.com/hu/global_ceo_survey
13. Tokić, I.: Planned obsolescence and quality management. In: 14th Croatian conference on quality and 5th Scientific congress of Croatian Quality Association, Baška, 15–17 May 2014, pp. 307–322. Croatian Quality Association, Zagreb (2014)
14. Hills, C.A.: Overcoming Obsolescence of Software Development tools, The Phaedrus Systems Library (2013). http://www.safetycritical.info/library/presentations/SWobsolescence.pdf
15. Scholz, E.-M.: Planned Obsolescence in the Digital Age (2014). http://www.ipdigit.eu/2014/03/planned-obsolescence-in-the-digital-age/
16. Gersh, L.: The Velocity of Obsolescence (2013). http://www.forbes.com/sites/lewisgersh/2013/07/29/the-velocity-of-obsolescence/
17. Planned Obsolescence. The Economist (2009). http://www.economist.com/node/13354332
18. Lee, A.Y.L.: Literacy and competencies required to participate in knowledge societies. In: Conceptual Relationship of Information Literacy and Media Literacy in Knowledge Societies, pp. 13–36. World Summit on the Information Society (WSIS). UNESCO (2015)
19. Alizadeh, A., Mat Isa, R.: The use of social media in destination marketing. Tourism **63**(2), 175–192 (2015)
20. National Academy of Sciences: Sustainable Infrastructure for Life Science Communications. National Academy of Sciences, Washington (2014)
21. EU Digital Agenda (2015). http://ec.europa.eu/digital-agenda/en/news/launch-study-digital-skills-workplace
22. Schneider, H.: Rapid ICT Change and Workplace Knowledge Obsolescence. Berkman Center Research Publication, No. 2005-04 (2005). http://cyber.law.harvard.edu/wg_home/uploads/509/2005_Schneider_RapidICTChange.pdf

# Copyright Literacy

# Copyright Literacy in the UK: Results from a Survey of Library and Information Professionals

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**Abstract.** Reports on a survey of 'copyright literacy' amongst over 600 UK librarians and related professionals. The study followed reform of UK copyright legislation in 2014. It aimed to provide comparative data to other countries participating in the survey. Bulgaria, Croatia, France and Turkey have to date presented data. Ten countries participated in the second data collection phase. Findings suggest that levels of copyright literacy amongst UK librarians is relatively high, however respondents wanted more education and training. Approximately two thirds of institutions had a copyright policy and a named individual dealing with copyright queries. Almost all respondents believed copyright should be included in the professional training and education of librarians. The findings suggest copyright literacy levels in the UK compare favourably to other countries. However there is a need to increase confidence and knowledge of copyright issues in the sector. Further qualitative research is recommended.

**Keywords:** Copyright · Digital literacy · UK · Continuing professional development · Copyright literacy

## 1 Introduction and Background

The Copyright Literacy Survey was developed in Bulgaria[1] and findings from four countries (Bulgaria, Croatia, France and Turkey) were presented at the European Conference of Information Literacy in 2014 [1]. The project was extended in 2014 and the UK was one of ten countries that took part in phase two of the study. The survey was distributed in the UK in December 2014 to gather data from librarians and those

[1] The Survey results from the project "Copyright Policies of libraries and other cultural institutions", financed by National Scientific Fund of the Bulgarian Ministry of Education, Youth and Science, Contract № DFNI-K01/0002-21.11.2012 and led by Tania Todorova from State University of Library Studies and Information Technologies, Sofia, Bulgaria.


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working in related cultural heritage organisations, such as galleries, archives and museums. In 2014 there had been several significant changes to UK copyright law, including several new exceptions of relevance to librarians and those working in related sectors. It was therefore timely to conduct the survey but also to allow further cross-country comparisons. This paper provides a summary of the key findings and compares levels of UK copyright literacy with other countries.

In the UK there is an active copyright community in the library and archives sector. The Chartered Institute of Library and Information Professionals[2] (CILIP) convene LACA[3] (Libraries and Archives Copyright Alliance) which lobbies the UK government and European Parliament on copyright matters. CILIP organises an annual copyright briefing for the sector and training is offered by library organisations and private consultants. In higher education there is a lively online community supported by an email discussion list (LIS-Copyseek). Universities are also represented by the Universities UK Copyright Working Group, which negotiates sector-wide licensing with bodies such as the Copyright Licensing Agency (CLA[4]) and the Educational Recording Agency (ERA[5]). The authors are involved in several groups and wanted to investigate how copyright literacy levels in the UK compared to other countries.

There is little previous research examining copyright knowledge in the library and information profession. A study of the copyright knowledge of academic librarians was undertaken in Kenya [2]. This study recognised the growing role for librarians to educate others about copyright issues. A study of archivists' knowledge of copyright was carried out in Canada [3]. In the UK, a survey by Oppenheim and Woodward [4] is of greatest relevance, investigating copyright advice and guidance services offered by UK libraries. 47 respondents completed the survey, mainly from the academic library sector. The study investigated levels of confidence amongst librarians when answering copyright queries. It found they were generally fairly confident in handling queries, and they often had back up in the form of colleagues, lawyers or external staff. Many librarians were giving advice to people within their organisation and more than half of the respondents ran training internally. It was clear that copyright was an addition to many librarians' substantive roles, and understanding and managing licensing schemes contributed significantly to their workload.

## 2 Methodology

In order to facilitate cross-country comparisons the survey instrument devised by the Bulgarian researchers was used in the UK with only minor amendments. It was distrib-

[2] http://www.cilip.org.uk/.
[3] http://www.cilip.org.uk/cilip/advocacy-awards-and-projects/advocacy-and-campaigns/copyright/laca-libraries-and-archives.
[4] http://www.cla.co.uk.
[5] http://www.era.org.uk/.

uted online using the open source survey tool: LimeSurvey. The survey included closed, half-open (through applying 5-degree scale of Likert) and open questions.

The survey investigated the knowledge and awareness of the respondents on copyright issues. It explored attitudes towards the development and application of copyright policies in library and cultural institutions. It examined attitudes towards formal copyright education and CPD, for example in library or archival professional qualifications. Finally the survey gathered demographic information including the educational and professional experience of the respondents.

The survey was open throughout December 2014 and promoted via email discussion lists and social media. The authors targeted copyright specific discussion lists, those related to information literacy, as well as discussion lists for school, public and government librarians. The survey was promoted on the UK museums, archives and galleries copyright list. The aim was for broad coverage, to collect data from the profession as a whole, and not just from those with specific responsibility for copyright. In total there were 613 respondents to the survey, of whom 417 completed all questions. Because no questions were mandatory each question had a different number of respondents. Therefore figures are given as percentages of total responses for each question with the total number of responses stated in each figure.

## 3 Survey Findings: Demographics

The survey collected demographic data on respondents including gender, age, highest qualification and sector of work. Of those who completed this question 76 % were female and 24 % were male. The age of the respondents was clustered in the 30–60 age range with 25 % between 30–39, 28 % between 40–49 and 32 % between 50–60 years of age. Eight percent of respondents were younger than 30 and just 7 % were over 60.

The majority of respondents (63 %) recorded their highest educational qualification as a master's degree which is fairly unsurprising. 52 % of respondents had a qualification in library or information studies. The majority of the respondents who completed the survey were librarians and many worked (57 % of the total responses) in the academic library sector as per Fig. 1.

The survey also examined the experience of the respondents, asking how long they had worked at their current institution. More than half of the survey respondents had less than 10 years' experience at their institution, although the survey didn't ask how many years total experience they had in their profession. There was a high level of interest in the survey with over 100 respondents providing their email addresses to be kept informed about the results.

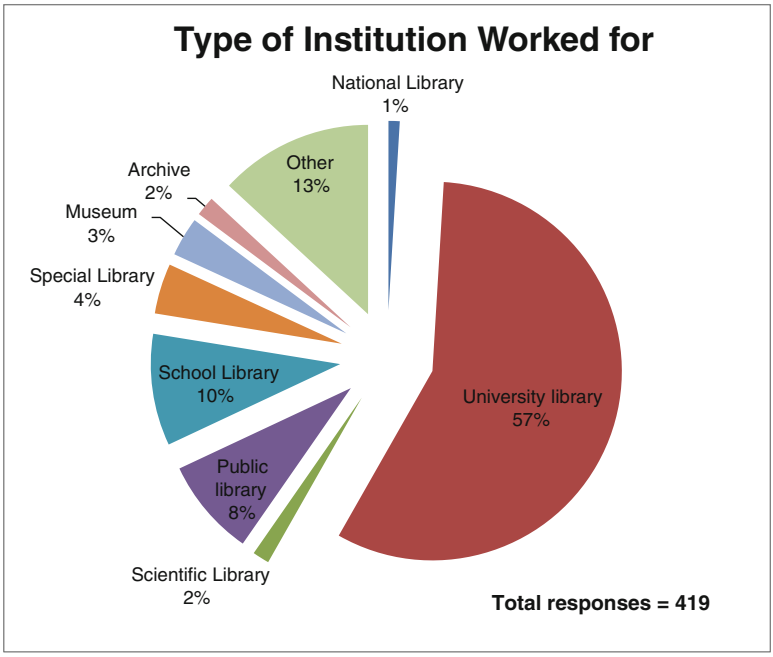


**Fig. 1.** Type of institution worked for

## 4 General Knowledge and Awareness of Copyright

The survey included 10 questions to ascertain the general level of knowledge and awareness of a variety of copyright issues. Respondents were asked about their familiarity with copyright and intellectual property rights (IPR) issues (see Fig. 2). The survey used a five point Likert scale for these questions, from extremely aware, through to not aware at all. Most people (40 %) described themselves as 'moderately aware' of copyright issues. 27 % were 'somewhat aware' while 17 % said they were 'extremely aware'. Just 3 % of people were 'not aware at all' of copyright and IPR issues.

Using the same scale, respondents were asked about their knowledge and awareness of the following issues: Copyright law at a national and international level; Copyright related institutions at a national and international level; Collective rights organisations; Experience of clearing rights.

The findings (see Fig. 3) showed that respondents were most familiar with UK copyright law, with 58 % either extremely or moderately familiar. Meanwhile 46 % were extremely or moderately familiar with UK copyright institutions. International copyright law and international copyright organisations were clearly the two areas where respondents had least knowledge. More than half of all respondents were not at all, or only slightly familiar with clearing rights. Finally, knowledge of collective rights management and organisations such as the CLA and the ERA was fairly evenly spread. Slightly

more than half of all respondents felt they were not at all or only slightly aware of this, whilst 28 % were extremely or moderately aware.

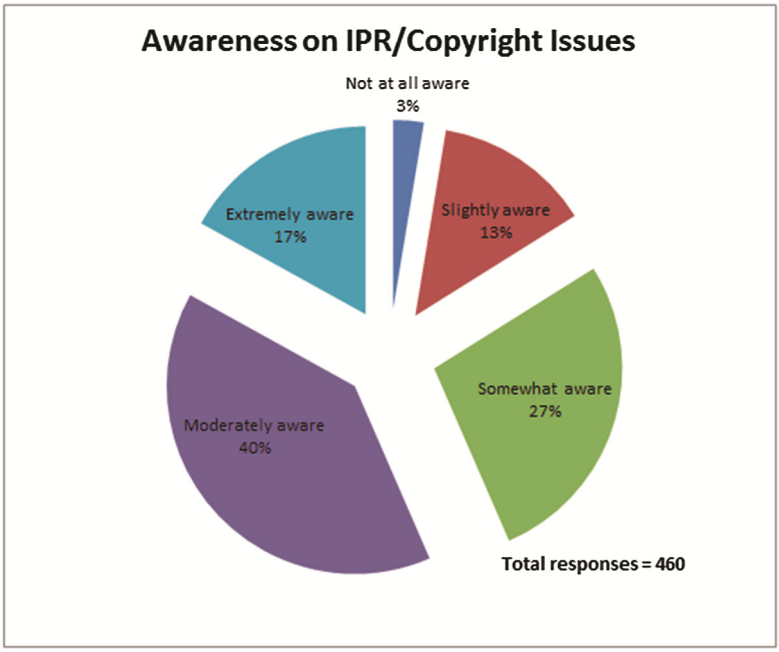


**Fig. 2.** Awareness on IPR/copyright issues

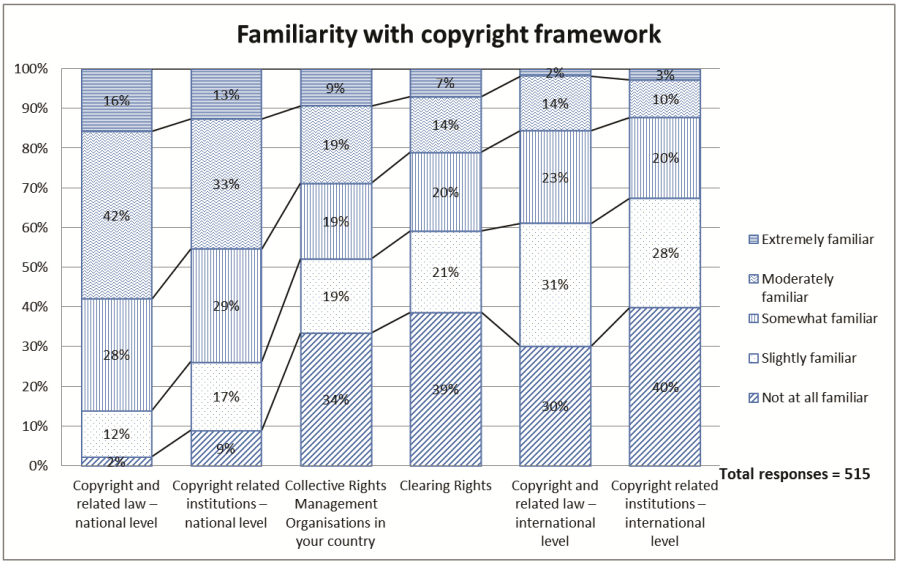


**Fig. 3.** Familiarity with copyright framework

The second question asked about familiarity with topics such as Creative Commons licences, fair dealing, open access, licences for electronic resources and issues related to e-learning (see Fig. 4). Knowledge of licensing in their own institution, licensing of digital resources, fair dealing and Creative Commons were all areas where many respondents were extremely or moderately knowledgeable of the issues. Open access was another issue that almost half (44 %) of respondents said they were extremely or moderately aware. Copyright and e-learning was an area where there were mixed levels of knowledge. For example, 34 % of people were moderately or extremely familiar with the issues, but 46 % were either not at all or only slightly aware. 'Copyleft' was also a term that many (60 %) were not familiar with.

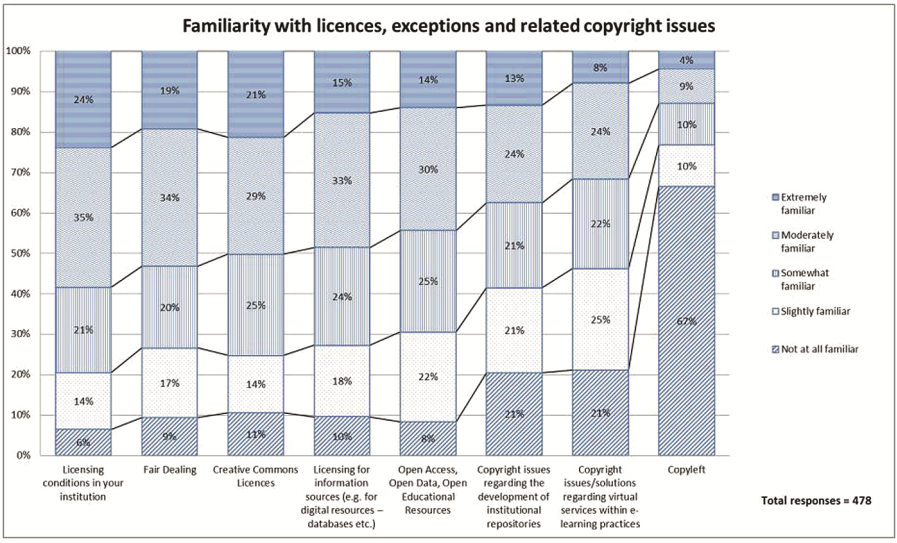


**Fig. 4.** Familiarity with licences, exceptions and related copyright issues

The survey asked about familiarity with digitisation issues, out of print works, public domain and orphan works. Digitisation was an issue that almost half (49 %) of respondents were extremely or moderately aware of. Levels of awareness of out of print works, dealing with public domain materials and orphan works split the respondents almost equally.

The survey also asked respondents where they went to get information about copyright issues. Websites and colleagues were by far the most frequently cited sources of copyright information. Books were also an important source as were professional bodies and email discussion lists such as 'LIS-Copyseek'.

The survey investigated levels of interest in copyright initiatives from national libraries or professional associations such as CILIP or LACA. The survey suggested that most people (56 %) were moderately or somewhat interested in these. Quite a high proportion of respondents did not answer this question and only 19 % said they were extremely interested.

The survey asked if there was a national strategy for copyright in the UK and there was uncertainty in this area – 49 % of people did not know if this existed. It also tested people's understanding of UK copyright law at a deeper level asking them if the national legislation included: Duration of copyright protection; Exceptions for private use, educational, scientific and research purposes; Exceptions for libraries, educational institutions, museums and archives; Rights for librarians to provide modified copies of works to serve the needs of visual impaired patrons; Orphan works (e.g. compulsory licence or limitation of liability). Figure 5 shows that people had the greatest knowledge about the provision for duration of copyright, but that new provisions such as the UK's orphan works licensing scheme were less well known as only 62 % knew these existed.

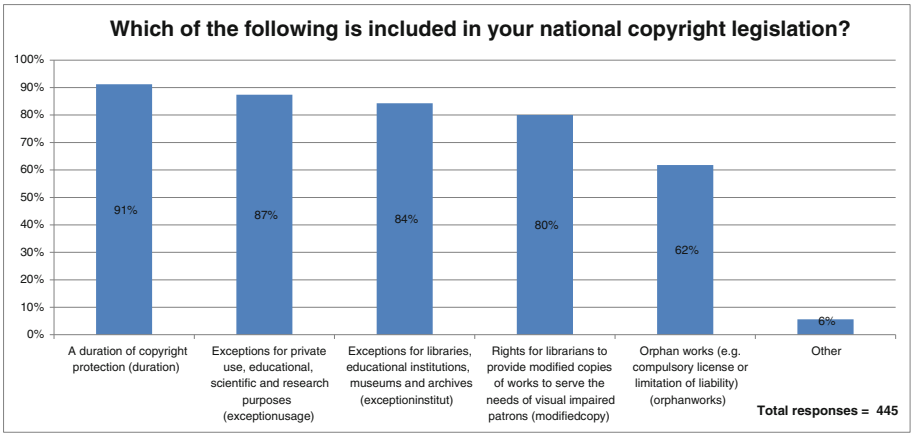


**Fig. 5.** What is included in national copyright legislation

Awareness of international copyright initiatives, such as the work of IFLA, are clearly less widely known in the UK with only 25 % of people being aware of these.

The final question in this section asked people whether they agreed with four statements about global copyright policy: 91 % of people agreed with the first statement that library and cultural heritage services should comply with copyright legislation. 87 % of people agreed with the second statement that the World Intellectual Property Organization (WIPO) Treaty to Facilitate Access to Published Works for Persons who are Blind, Visually Impaired, or otherwise Print Disabled was an important achievement. 75 % agreed with the third statement that WIPO should define better exceptions and limitations to copyright in the digital environment. 61 % agreed with the statement that worldwide harmonisation of exceptions and limitations to copyright for libraries and archives is necessary.

## 5 Copyright Policy at an Institutional Level

The survey explored copyright issues and policies at an institutional level and responses to these are summarised in Fig. 6. Almost all institutions owned resources protected by

copyright and related rights and the majority of respondents (76 %) thought institutional copyright policies are necessary for libraries and cultural institutions. However a number of people were uncertain about this and when asked if they had an institutional copyright policy or internal regulations, only 63 % said they did. Interestingly nearly a quarter of people (24 %) who answered the question were not sure if their institution had a copyright policy.

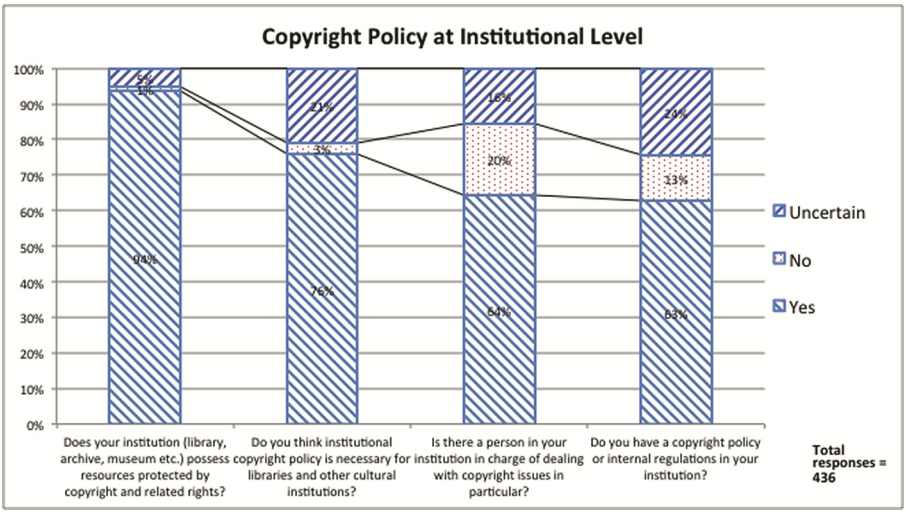


**Fig. 6.** Copyright policy at institutional level

64 % of respondents said there was a specific person in their institution responsible for dealing with copyright issues; 20 % said there was not, and 16 % did not know.

## 6 Copyright and Education

The survey asked about the need for copyright and IPR in formal education and continuing professional development (CPD). In both the cases almost all respondents (over 90 %) felt copyright and IPR issues should be included in the curriculum.

The survey asked which topics should be included in education and training. These two questions were free text boxes and the comments were analysed and categorised into discrete topics to indicate areas of commonality in the wide range of responses. Over 60 discrete topics were identified from the data. Table 1 shows the 15 most frequently cited topics for formal LIS education (Q1) and CPD (Q2).

**Table 1.** Copyright and IPR topics required in the education of LIS and related professionals and continuing professional development

| Topic /Issue | **Q1 Frequency** | **Q2 Frequency** | **Sum** |
|---|---|---|---|
| Overview of UK copyright legislation | 68 | 48 | 116 |
| Recent updates to the law | 6 | 67 | 73 |
| Copyright exceptions/relation to licences | 43 | 23 | 66 |
| Practical application of copyright law | 34 | 30 | 64 |
| Digital copyright/copyright and the internet | 33 | 20 | 53 |
| Creative Commons/copyleft | 31 | 15 | 46 |
| Fair dealing | 27 | 16 | 43 |
| Specific Licensing schemes e.g. CLA, ERA | 27 | 15 | 42 |
| As per previous answer | – | 41 | 41 |
| Exceptions for libraries | 24 | 15 | 39 |
| Open access and institutional repositories | 23 | 15 | 38 |
| International copyright law | 20 | 14 | 34 |
| Licensing of digital resources | 20 | 13 | 33 |
| How to protect IP | 16 | 17 | 33 |
| Copyright of specific types of works e.g. images, music, unpublished works | 21 | 9 | 30 |

Fewer people answered the second question and 41 people said that all the same topics should be included in CPD. In both cases people wanted an overview of UK copyright legislation and practical aspects of copyright that might relate to their job However there are key differences. An understanding of recent updates to the law was the most frequently cited topic for CPD.

The survey asked about preferences for delivery of CPD. and training courses were the most popular (cited by 85 % of respondents), with online resources the next popular (cited by 82 % of people). Distance learning or e-learning was another popular choice (80 %).

## 7 Comparisons with Other Countries and Discussion

There are some interesting comparisons between the UK and other countries. Levels of copyright literacy appear to be higher in the UK with 57 % of respondents being either extremely or moderately aware of copyright and IPR issues compared to 32 % across Bulgaria, Croatia, France and Turkey.

In relation to copyright policies within institutions, the earlier study found that 76 % of institutions believed they had resources protected by copyright, compared to 96 % in the UK. Meanwhile 84 % of non-UK respondents thought institutions should have a copyright policy, yet only 34 % reported having one. In the UK 63 % of institutions have a copyright policy, and yet only 76 % think they should have one. The greater likelihood that UK libraries have a copyright policy seems to have led to a greater level of ambivalence about their necessity. Perhaps the most interesting cross country comparison is that only 15 % of institutions surveyed in Bulgaria, Croatia, France and Turkey had a person responsible for copyright whereas in the UK this figure was 64 %.

With regard to copyright education 71 % of respondents in Bulgaria, Croatia, France and Turkey thought it should be included in undergraduate curricula for LIS professionals. In the UK this figure was over 90 %. Unfortunately no comparative data on the topics that respondents thought should be included were available at the time of this study.

The survey asked mainly closed questions and the highest number of respondents came from university librarians who are more likely to have an individual with responsibility for copyright. The findings suggest those in other sectors, for example, school librarians are less confident. However, copyright expertise is recognised as valuable and librarians want more copyright content in professional qualifications and CPD. This paper focuses on the quantitative data, but the qualitative data about copyright education suggests many professionals are anxious about dealing with copyright queries. There were also several questions where people chose not to answer or were uncertain, suggesting that terminology could be confusing. The survey suggests international copyright issues and changes to UK law have made professionals anxious to keep up-to-date, but further research is required.

## 8 Conclusion

This paper provides a summary of one of the most wide ranging surveys of copyright knowledge amongst librarians and related professionals. To date, of all the countries participating in the survey, the UK provided the largest response rate and the researchers intend to undertake further research to gather more qualitative data. The survey found that levels of copyright literacy are generally good, but that there is a need for additional training and support. The limited qualitative data suggests that support should focus on developing confidence amongst librarians who feel they are grappling with an increasingly complex international copyright regime.

## References

1. Todorova, T., Trencheva, T., Kurbanoğlu, S., Doğan, G., Horvat, A., Boustany, J.: A Multinational study on copyright literacy competencies of lis professionals. In: Kurbanoğlu, S., Špiranec, S., Grassian, E., Mizrachi, D., Catts, R. (eds.) ECIL 2014. CCIS, vol. 492, pp. 138–148. Springer, Heidelberg (2014)
2. Olaka, M.W., Adkins, D.: Exploring copyright knowledge in relation to experience and education level among academic librarians in Kenya. Int. Inf. Libr. Rev. **44**(1), 40–51 (2012)
3. Dryden, J.: What Canadian archivists know about copyright and where they get their knowledge. Archivaria **69**, 77–116 (2010)
4. Oppenheim, C., Woodward, I.: A survey of copyright advice and guidance in UK higher education libraries. Libr. Inf. Res. **28**(89), 50–56 (2004). http://www.lirgjournal.org.uk/lir/ojs/index.php/lir/article/view/167/214

# Copyright Literacy in Finnish Libraries, Archives and Museums

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**Abstract.** Copyright literacy in Finnish libraries, archives, and museums was studied by a web survey as part of a multinational research. The study focused on the awareness concerning national and international copyright legislation and institutions, regulations concerning different aspects of copyright, and sources of copyright information that the respondents would use. 156 completed questionnaires were returned, representing different kinds of memory institutions. The informants were mostly experienced information professionals who were moderately well aware of national legislation and copyright institutions, whereas they were less familiar with respective international regulations. Copyright issues are already and will be in the future even more relevant part of information professional's expertise and this is emphasized by the need to educate students in this respect.

**Keywords:** Copyright related literacy · Libraries · Copyright regulations

## 1 Introduction

Digital technology, involving changes in information formats, enables new ways to download, copy, and reuse creative content [1–3]. While web attention may delight the original creator, the utilization of the work in other contexts may not be the purpose of web publishing, at least not without permission. One objective of libraries, archives, and museums is to enable access to publications but this should be done without violating the copyright of the creators. In cultural institutions copyright literacy is a relevant part of professional expertise as information professionals face complicated intellectual property and copyright issues [1]. Literacy is defined as competence or knowledge in a specific area [2].

Finland is known for its comprehensive library network with 198 scientific and 790 public library units that, in 2014, received 61 million personal and over 50 million web visits in a country with 5.4 million inhabitants. Public libraries provided over 90 million loans and scientific libraries provided 2.9 million. Use of technology and information networks is effective. FinELib is a consortium of Finnish libraries and other relevant institutions that acquires international electronic resources, such as scientific journals, centrally on behalf of its member organisations. There are more than 1000 museums in the country, of which 300 are professionally managed and open all year round, and receive more than 50 million visits in the museums. Besides the


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national archive, there are nine provincial and numerous private archives in Finland. The National Digital Library brings libraries, archives, and museums together to build a system that provides easily available materials and services and secures the long-term preservation of digital materials for future generations. [4–8].

The purpose of our paper is to study the copyright literacy in Finnish libraries, museums, and archives. This study is part of a multi-national research, the survey instrument of which has been prepared by Dr. Tania Todorova, State University of Library Studies and Information Technologies, Bulgaria. In this study we posed the following research questions:

1. What copyright issues are familiar for the respondents representing Finnish libraries, archives, and museums?
2. To what degree are there differences with regard to the familiarity with copyright issues between the representatives of libraries, archives, and museums?
3. What information sources do informants use to seek copyright related information?

## 2 Background

Copyright gives an artist or other creator the legal right to decide how the created work can be used after being published [3, 9]. The purpose of copyright laws is to provide a balance between the rights of creators to earn living from their work and the "public interest" of accessing their work [10–12]. Copyright concerns almost everything that has been published on the Internet. Exceptions to this are, for example, public domain materials and fair use that allows teachers to use creative works for educational purposes. It is also a good practice for educators to credit the sources they have used and provide a web link to them [10, 11].

Copyright literacy can be defined as the ability to identify copyright-protected materials, navigate fair use and fair dealing, obtain permissions and licenses where necessary, and recognize infringement of copyright law [13] but also to recognize respective information needs. The Information Literacy Competency Standards for Higher Education [14] include the understanding the economic, legal, and social issues surrounding the use of information and its ethical use.

Copyright literacy of LIS professionals has been previously studied by Todorova et al. in a multinational survey [1]. Their main findings were that the level of knowledge and the awareness of respondents about copyright topics were not satisfactory but a majority was in favor of including copyright related issues in LIS education and continuing education programs. In different countries (Bulgaria, Croatia, France and Turkey) there were differences between the self-rated awareness levels of respondents but they were interested in the initiatives of the international and national professional associations on copyright issues.

## 3 Research Materials and Methods

We conduced this research as a web survey using a LimeSurvey instrument, basing the questionnaire on that of Todorva et al. [1]. The questionnaire was sent in Finland to 71 scientific and special libraries, to nine national and regional archives, 66 museums, to

relevant departments of the ministry of education and culture, and to 20 regional libraries that were asked to forward it to the 291 municipal libraries. We asked the informants questions about their familiarity with copyright law and institutions, open access, copyright regarding digitization, and copyright policies.

Respondents answered the questionnaire between November the 25 and December 15, 2014. We received 274 responses, about two thirds of which were completely filled. Therefore, in the results the number of answers varies from 156 upwards. Nevertheless, the results illuminate varying awareness and interests concerning copyright regulations. We conducted the statistical data analysis with IBM SPSS Statistics Data Editor. We studied free comments following a qualitative approach.

## 4 Results

Of the respondents, 123 were women and 33 were men. Half (49 %) of the respondents were younger than 50 years and 25 % younger than 40 years old. 69 % (108) of informants held a master's degree, 13 had a bachelor (8 %), 12 doctoral (8 %), and 23 (15 %) some other degree. Sixty-two percent of informants had more than 10 years of work experience.

Ninety nine of the informants represented different kinds of libraries (68 %), 33 museums (21 %), 10 archives (6 %) and 14 other institutions (5 %) such as the national broadcasting company or public administration. In the analysis, the group "other" also includes institutions where there was only one representative involved with research material, such as the national library. In other groups, there are several representatives from all other organization types.

We asked informants to estimate their familiarity with copyright issues with a 5-point Likert scale where the ideal zone was determined as moderately (4) or extremely familiar (5) following Todorova et al. [1]. In Fig. 1 the level of familiarity is pictured as means of the 5-point Likert scale. The only area of that reached the ideal zone above the level 3.5 was familiarity in copyright related national law. In this respect these results differ from those of Todorova et al. [1] where the ideal zone was not reached in any country. Familiarity in national copyright institutions and licensing conditions in the respondents' own institution reach almost the same level.

In Fig. 1, archives and "other institutions" are most familiar with many copyright topics. One explanation is that the former group includes the national archive and the "other institutions" group includes the national library where there obviously is expertise in this field. Eighty three (54 %) informants were at least moderately familiar with copyright law at the national level, while seventy nine (50 %) were at least moderately familiar with licensing conditions in own institution, and sixty eight (41 %) were at least moderately familiar with national copyright related institutions as shown in Table 1. Domestic collective rights management organizations were familiar to 52 (33 %) and licensing for information sources to 79 (50 %) of respondents.

Of the informants, 134 (85 %) answered that their organization possesses copyright protected resources, 14 (9 %) were not sure, and 9 (6 %) said they do not have such resources. Seventy eight (50 %) of respondents had in their organization a copyright policy or respective internal regulations, 44 (28 %) said they do not have one, and 35

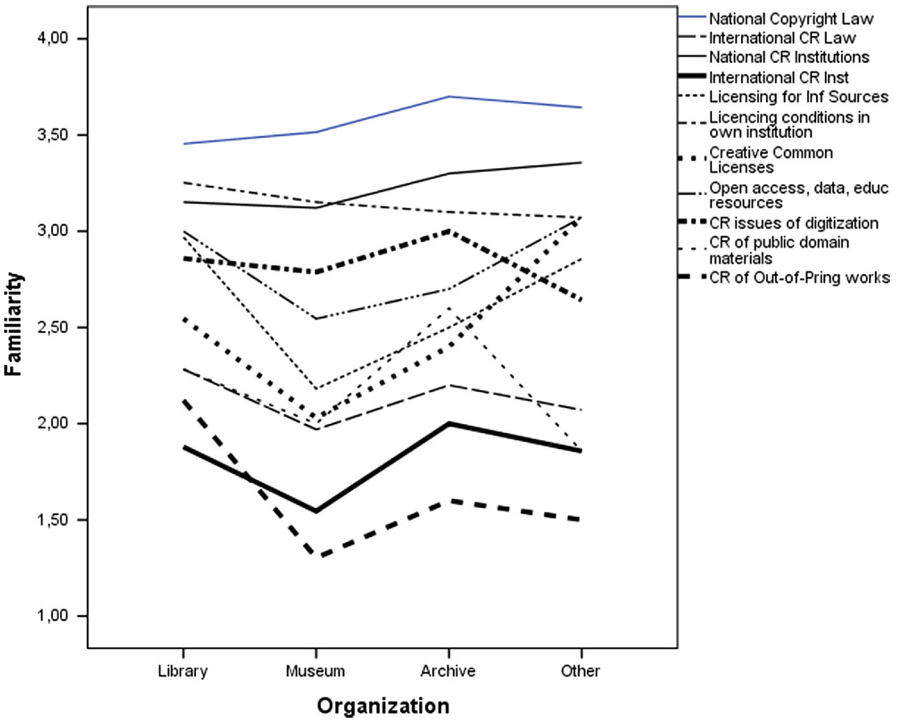


**Fig. 1.** Familiarity with copyright issues: 5 = extremely, 4 = moderately, 3 = somewhat, 2 = slightly, 1 = not at all familiar.

(22 %) were uncertain, but only 38 (24 %) had a person in charge of dealing with copyright issues in particular. Ninety six (61 %) respondents indicated that their organizations did not have such person and 23 informants (15 %) were unsure. Thirty three (21 %) responded that there is a national strategy of copyright in our country, 121 (76 %) were unsure and in 5 (3 %) responses such strategy did not exist.

Seventy our informants (47 %) responded that they were "somewhat" aware of issues related to intellectual property or copyright and in 40 responses (25 %) awareness was at least moderate. Only 4 % were not at all aware, as shown in Table 2. A clear majority, 134 of responses (8 %) support the application of copyright legislation. One hundred and three respondents (65 %) supported the definition and worldwide harmonization of exceptions to it in libraries and other cultural heritage institutions. According to the free comments, there is a real need for knowledge in museums and archives about the application of copyright regulations to their materials, for example photos, and how their customers are allowed to use them. Also use of materials for educational purposes was mentioned, copyright concerning pictures, referring to them, use in digital environments, and limitations to copyright regulations.

If informants need more information concerning copyright topics, websites are the

**Table 1.** Familiarity of Copyright (CR) Topics in Finnish Libraries, Archives and Museums

| How familiar are you with the. | | Arch. | Muse. | Library | | | | Total | % |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Public | Scie or Special | Univ. | Other | | |
| National CR and related law | F | 6 | 18 | 20 | 13 | 17 | 9 | 83 | 54.2 |
| | SWF | 4 | 15 | 24 | 10 | 6 | 9 | 68 | 44.5 |
| | NF | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 1.3 |
| International CR and related law | F | 2 | 3 | 1 | 2 | 5 | 2 | 15 | 9.6 |
| | SWF | 6 | 18 | 30 | 21 | 17 | 13 | 105 | 67.3 |
| | NF | 2 | 12 | 15 | 3 | 1 | 3 | 36 | 23.1 |
| CR related national instititutions | F | 4 | 12 | 13 | 7 | 23 | 9 | 68 | 41.7 |
| | SWF | 6 | 21 | 30 | 17 | 7 | 9 | 90 | 55.2 |
| | NF | 0 | 0 | 3 | 2 | 0 | 0 | 5 | 3.1 |
| CR related international instit | F | 0 | 0 | 0 | 1 | 3 | 2 | 6 | 3.8 |
| | SWF | 7 | 14 | 22 | 15 | 16 | 11 | 85 | 54.5 |
| | NF | 3 | 19 | 24 | 10 | 4 | 5 | 65 | 41.7 |
| Ntnl inst. related to collective rights manag | F | 6 | 10 | 13 | 6 | 10 | 7 | 52 | 33.3 |
| | SWF | 4 | 19 | 25 | 13 | 0 | 2 | 63 | 40.4 |
| | NF | 0 | 4 | 8 | 7 | 13 | 9 | 41 | 23.4 |
| Licencing conditions in own instit | F | 5 | 18 | 20 | 12 | 17 | 7 | 79 | 50.6 |
| | SWF | 3 | 9 | 17 | 10 | 6 | 9 | 54 | 34.6 |
| | NF | 2 | 6 | 9 | 4 | 0 | 2 | 23 | 14.7 |
| Open access, data and educ. resources | F | 3 | 4 | 13 | 7 | 16 | 6 | 49 | 31.4 |
| | SWF | 6 | 25 | 24 | 17 | 7 | 11 | 90 | 57.7 |
| | NF | 1 | 4 | 9 | 2 | 0 | 1 | 17 | 10.9 |

**F** = familiar = extremely or moderately familiar; **SWF** = somewhat = slightly or somewhat familiar; **NF** = not familiar = not at all familiar. The group "Other libraries" includes school libraries, national library and other institutions.

most favoured source mentioned by 130 respondents (82 %), followed by colleagues mentioned by 124 informants (78 %) as shown in Fig. 2. This result is different from previous research [1] where books and articles were the most preferred information sources. Archives and other institutions would also use lawyers as sources of information, whereas only a few informants from libraries and museums would do this. Librarians would use also books, articles and professional associations not equally favoured by informants from museums and archives. Blogs, wikis, and international organizations are used only by a few informants while in Todorova's study [1] they were used more frequently.

The informants were asked to give free comments on topics that they felt should be covered in LIS continuing education. They included topics such as the state of copyright regulations; international and national coverage; "basic things and practical situations"; policymaking concerning immaterial rights; application of legislation in their own institution, for example, a library; and common copyright ideas such as when can

**Table 2.** Self ratings of the awareness on issues related to intellectual property or copyright

| Aware | Library | Museum | Archive | Other | Total | % |
|---|---|---|---|---|---|---|
| Extremely | 1 | 1 | 1 | 0 | 3 | 1.9 |
| Moderately | 22 | 7 | 4 | 4 | 37 | 23.7 |
| Somewhat | 49 | 12 | 4 | 9 | 74 | 47.4 |
| Slightly | 24 | 10 | 1 | 1 | 36 | 23.1 |
| Not at all | 3 | 3 | 0 | 0 | 6 | 3.9 |
| Total | 99 | 33 | 10 | 14 | 156 | 100 |

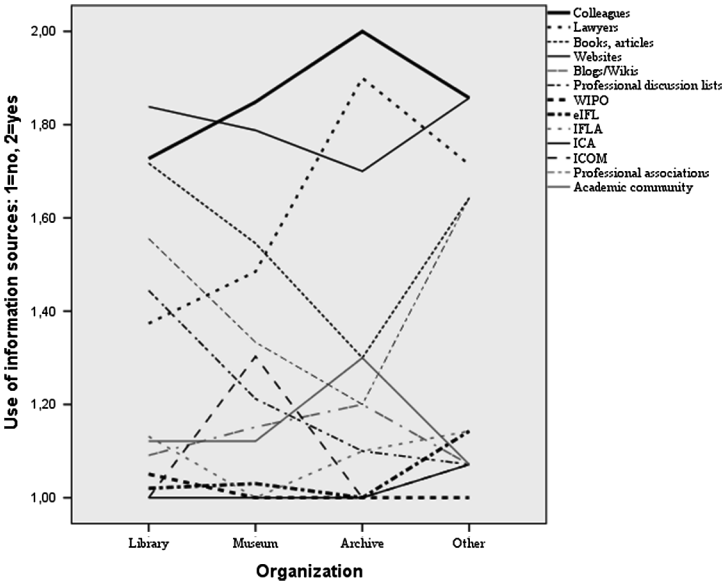


**Fig. 2.** Sources of copyright information

you use a photo of a certain person. They also mentioned digitization of art as well as educational use and copying, licensing and copyright of electronic resources, and exceptions and limitations of copyright in the digital environment.

One hundred and thirty (83 %) of the respondents support the inclusion of intellectual property issues in education at undergraduate level, 97 (61 %) at the master's level, and 38 (24 %) at the doctoral level. In continuing education, distance learning and online courses were favoured in 100 answers (63 %), and also websites, blogs and wikis (100 answers). Eighty four (54 %) informants were interested in thematic workshops, 73 (47 %) in training courses, 61 (39 %) in panels or conferences and 60 (38 %) in consultations on request. The informants could choose several options, when needed.

## 5 Discussion

The purpose of this study was to find out what copyright related issues are familiar to respondents representing Finnish libraries, archives, and museums and what sources they would favour. The questionnaire was completed by 156 informants of whom 99 represented libraries, 33 museums, 10 archives and 14 other institutions. The distribution of the organizations in the research material to some degree reflects that of the organizations in real world.

The FinELib Consortium operating at the National Library of Finland is responsible for acquiring digital material from international publishers, thus decreasing in this respect the work in different scientific and public libraries and, consequently, also the need for expertise in international copyright regulations. However, providing web services and supporting customers' information seeking inevitably emphasises the relevance of copyright knowledge. Moreover, there is need for information about how customers are allowed to use the materials, for example photos, stored in archives, museums, as well as in libraries.

Awareness and knowledge concerning national copyright law is moderately familiar and almost at the ideal zone as defined by Todorova et al. [1] and, compared to previous research in this respect [1], at a little higher level. One explanation may be the long work experience of the respondents: almost two thirds (62 %) had worked more than 10 years and 69 % held at least a master degree. Other topics about which respondents were more than somewhat aware are national copyright related institutions and licensing conditions in the own institution. They were somewhat or slightly familiar with copyright issues of digitization. In libraries there is familiarity with open access, open data and open educational resources, and licensing for information resources and Creative Common licenses, but these topics were not equally familiar in museums and archives. Least familiar topics were copyright of out-of-print works, international copyright law, and institutions. These results were in accordance with previous research [1].

In the category of how respondents locate more information about copyright issues the favourite sources are web sites and colleagues. Respondents working in libraries also consulted books and articles but much less lawyers that would be used especially by archives. International organizations were not favoured in this respect by many respondents. Intellectual property education at the undergraduate level was most favoured, although more than half of respondents also supported education at the master's level as well as continuing education.

## 6 Conclusions

In the Finnish libraries, archives, and museums participating this study, national copyright law and institutions are moderately well known whereas awareness of respective international organizations is recognized at much lower level. Half of the respondents were aware of copyright regulations in their own institutions but only in every fourth institution is there a person responsible for intellectual property issues. A majority of respondents support copyright legislation and harmonization of its exceptions in libraries

and other cultural heritage institutions. Todorova et al. predict that, in the future, LIS professionals will need copyright competencies and the ability to implement institutional copyright policies [1]. Respondents' free comments in this study indicated their information needs especially in the practical application of copyright regulations. The respondents were interested in continuing education concerning intellectual property issues and their inclusion in undergraduate and graduate level education. The need to include intellectual property topics also in library education for students [5, 7, 9] furthermore emphasizes the importance of copyright literacy in libraries.

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## References

1. Todorova, T., Trencheva, T., Kurbanoğlu, S., Doğan, G., Horvat, A., Boustany, J.: A multinational study on copyright literacy competencies of LIS professionals. In: Kurbanoğlu, S., Špiranec, S., Grassian, E., Mizrachi, D., Catts, R. (eds.) ECIL 2014. CCIS, vol. 492, pp. 138–148. Springer, Heidelberg (2014)
2. Harris, L.E.: Understanding copyright – a life skill. WIPO Mag. **2**, 1 (2012). http://www.wipo.int/wipo_magazine/en/2012/02/article_0002.html
3. Lyon-Jones, S.: Copyright, plagiarism, and digital literacy. Teach. Village, April 2015. http://www.teachingvillage.org/2012/04/10/copyright-plagiarism-and-digital-literacy-by-sue-lyon-jones/
4. Libraries in Finland. Ministry of education and culture. http://www.minedu.fi/OPM/Kirjastot/?lang=en
5. Finnish Public Library Statistics. http://tilastot.kirjastot.fi/en-GB/
6. Research Library Statistics Database. https://yhteistilasto.lib.helsinki.fi/
7. The FineLib Consortium. http://www.nationallibrary.fi/libraries/finelib.html
8. National Digital Library – Centralised Services for Libraries, Archives and Museums. Fınnish Libraries Now! http://now.libraries.fi/digitallibrary.html#.VcHnUmM5FEI
9. Seadle, M.: Copyright in the networked world: orphaned copyrights. Libr. Hi Tech **23**(3), 453–459 (2005)
10. McKinnon, L.F., Helge, K.S.: Copyright, open access and library instruction. Libr. Hi Tech News **22**(10), 13–16 (2014)
11. Sheat, K.: Libraries, copyright and the global digital environment. Electron. Libr. **22**(6), 487–491 (2004)
12. Cheng, S., Winter, C.: Copyright skills in academic libraries. Feliciter **60**(2), 8–12 (2014)
13. Harris, L.E.: Copyright literacy and translating copyright to a life skill. About copyrightlaws.com (2015). http://www.copyrightlaws.com/libraries/copyright-literacy-copyright-life-skill/
14. Association of College and Research Libraries: Information literacy competency standards for higher education (2015). http://www.ala.org/acrl/standards/informationliteracycompetency#ildef

# Copyright Literacy of Doctoral Students in France

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**Abstract.** This paper aims to produce comprehensive knowledge of the copyright literacy of doctoral students in France and to know how familiar they are with copyright issues. In order to achieve this objective, a web-based survey has been conducted. Results show a significant lack of awareness of copyright and intellectual property issues. Furthermore, there is a gap between the general copyright and intellectual property competencies they assess and the level of awareness about more specific items. It also reveals the existence of a relationship between levels of awareness and disciplines, as well as gender and year of study. Students lack training and show preferences for certain types of training and topics.

**Keywords:** Copyright literacy · France · Doctoral students · Higher education

## 1 Introduction

Doctoral students today are facing permanent and unprecedented challenges dealing with copyright issues. The Internet and Digital technology have created a new territory for copyright laws and changed the way we conduct research, including easier ways to access and use information, and reproduce documents. Even the publishing process has been affected by the open access movement and Creative Commons licenses. Doctoral students in most disciplines must complete a thesis as a requirement for their diploma and, as copyright issues are getting more and more complex, unwitting infringement of copyright laws can happen. To avoid this problem, copyright literacy awareness is important.

This state of affairs led us to study the copyright literacy of doctoral students in France. How familiar are they with copyright issues such as intellectual property, publishing rights, and the open rights movement? Are they sufficiently well prepared to face the complexity of copyright rules in their everyday academic lives? Is their background, including training and formal education, well adapted to their needs? Is there a significant disparity between the copyright literacy of doctoral students and the subject disciplines to which they belong? Is there any difference in awareness of the doctoral students, depending on gender or year of study?


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## 2 Literature Review

In recent years, the development of the Internet, of communication and information technology, and of digital media, has dramatically increased opportunities to access, use, reproduce and reuse all kinds of documents. The general public, and researchers within the academic realm all the more, became active consumers and producers of information. Therefore, intellectual property and copyright issues are now more important. This importance is coupled with a growing complexity as national and international copyright legislation evolves and tries to adapt to the rapidly evolving digital reality. These issues are being addressed consistently, stressing the need for copyright awareness and education for all actors in the specific context of higher education, research and universities [1–3], and the prominent role academic librarians can and should play towards students and faculty [4–6].

A number of publications describe initiatives related to these issues developed within universities, mostly by librarians. Other studies have also analyzed the librarians' competencies and stressed the need for librarians themselves to become more knowledgeable on these issues [6–8] in order to assume this education, such as the proposal of specialized services [9], guidelines [10] or online tools, and different kinds of ethics and copyright-related curricula [11–13].

Such analyses of the intellectual property-related competencies within the academic community in general are lacking. A great majority of studies are focused on the problematic behaviors of undergraduate or college students concerning plagiarism, mainly due to a widespread lack of copyright knowledge, a reduced physical presence in the library as online access increases, and also a lack of legislative framework in developing countries [14–17]. Two studies devoted to faculty, one comparing the results of two campuses in health science [18] and another one concerning the use of online teaching materials by Spanish professors [2] reach the same conclusion, that is, an insufficient knowledge of copyright law and fair use.

The analysis of doctoral students' competencies on these issues has not received much attention either. In its wide-ranging study on the information-seeking and research behavior of doctoral students, the Researchers of Tomorrow report indicates "an overall lack of understanding about the networked information and scholarly communications environment in which the students work" in general, and about copyright and intellectual property rights in particular. The report also highlights the fact that half of them have never used research support services on these issues, and that another 15 % are unaware of their availability [19]. Two other and more localized studies, one on research assistants in a Turkish university and another on doctoral students on an Indian campus, reveal that the respondents might be prone to plagiarize for several reasons, among which, again, is a lack of knowledge of these issues [20–21]. In her research, Torras [22] calls for the investigation of Ph.D. students' information searching behaviour and information needs in order to enhance evidence-based library practice.

## 3 Research Methodology

In order to answer these questions, we conducted a web-based survey during one month (from 17th March to 17th April 2015). The questionnaire included four groups of questions: the first group of questions was intended to measure the level of doctoral students' awareness of copyright issues based on a five-point Likert scale, from *not at all aware* to *extremely aware*. The second group dealt with the students' practices related to intellectual property and copyright. The third group concerned training, and the fourth focused on demographic information. The questionnaire was mailed to the directors of 284 doctoral schools in France[1] asking them to spread the survey among their students. This approach enabled us to collect 1,110 completed answers. This sample represented around 2 % (n = 61 707) of doctoral students in France[2]. Quantitative data were entered, coded, and analyzed using the SPSS statistical package. Descriptive statistics were used to analyze the findings and Chi-square tests of independence to compare different factors.

Females represented 57.4 % of our sample and 42.6 % were male. Ages ranged from 19 to 72 years old. This fact created a distortion in the age distribution (scored to the left at the low values). The mean became insignificant, which led us to consider the median age of 28 years old: Md = 28 (IQR: 26, 32), calculated for 1,102 respondents, eight respondents having given a wrong or incomplete date of birth. Students in the first year of their doctoral research represented 37.1 % (n = 412) of the sample; 25.4 % (n = 282) were in the second year, and 20.9 % (n = 232) in the third. Doctoral students in the fourth year were less represented with only 9.5 % (n = 106). Those in the fifth year or more represented less than 5 % (n = 78) of the respondents, which is why we chose to merge all the responses equal to the fifth year or more into one category "Over five".

## 4 Findings

### 4.1 Levels of Awareness

The first two questions in the survey dealt with doctoral students' awareness of copyright and intellectual property. These two questions aimed to evaluate the level of self-assessment by the students of their general knowledge of intellectual property and copyright issues before addressing more specific questions. Eight percent (n = 89) of the respondents considered that they were extremely aware, and 27.4 % (n = 304) that they were moderately aware concerning *copyright in general*. Contrariwise, 9.5 % (n = 105) considered that they were not at all aware and 29.1 % (n = 323) that they were slightly aware.

[1] Ministère de l'éducation nationale de l'enseignement supérieur et de la recherche. Écoles doctorales en open data. http://goo.gl/8xR2LZ23/04/2014.

[2] Ministère de l'éducation nationale de l'enseignement supérieur et de la recherche. Repères & références statistiques : enseignements, formation, recherche. Paris: MENESR, 2014.

The results were more or less the same concerning *intellectual property in general* with 6.9 % (n = 77) who were extremely aware and 28.4 % (n = 315) who were moderately aware. Contrariwise, 10.5 % (n = 117) were not at all aware and 27.8 % (n = 309) were slightly aware (Fig. 1).

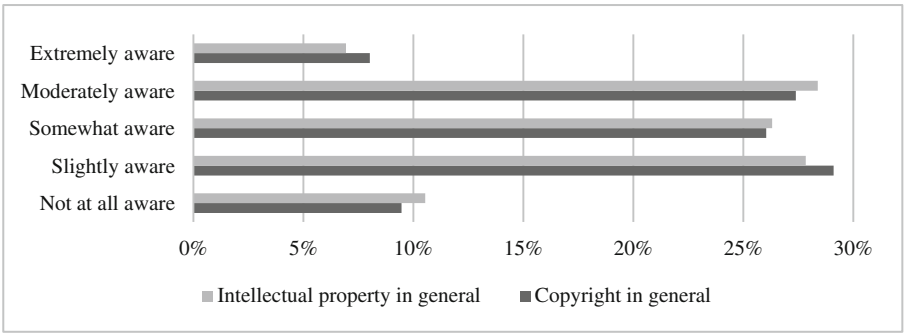


**Fig. 1.** Copyright and intellectual property awareness in general

The same statement applies for other more specific questions of copyright and intellectual property (Fig. 2):

- For *image rights*, 7.3 % (n = 81) of students declare being extremely aware and 23.7 % (n = 263) moderately aware, whereas 13.7 % (n = 152) were not at all aware and 30.3 % (n = 336) slightly aware.
- For *rights to copy*, 6.3 % (n = 70) were extremely aware, and 22.1 % (n = 245) moderately aware, whereas 15.1 % (n = 168) not at all aware, and 30.2 % (n = 335) were slightly aware.

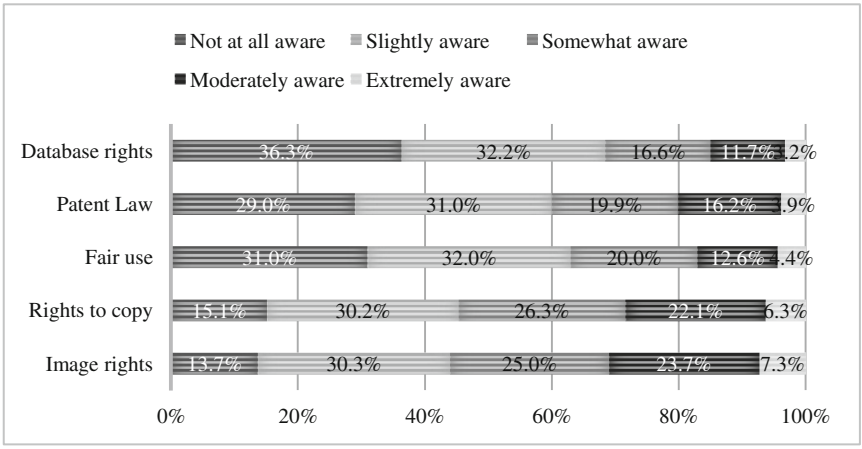


**Fig. 2.** Intellectual property awareness of respondents

However, the pattern was different concerning *patent law*, *fair use* and *database rights*, where the proportion of respondents who were not at all aware was much higher, respectively 29 % (n = 322), 31 % (n = 344), and 36.3 % (n = 403); whereas the proportion of slightly aware remained quite identical to the previous items, respectively 31 % (n = 344), 32 % (n = 355) and 32.2 % (n = 357).

The same scenario was again reproduced with the publishing and sharing rights issues (Fig. 3). Except for *public domain works* where only 24.4 % (n = 271) of respondents declared being not at all aware, the level of awareness failed tremendously. The rate of not at all aware respondents actually exceeded 60 %, especially with questions regarding *embargo* (65.8 %, n = 730) and *orphan works* (62.3 %, n = 691). The level of unawareness was also high concerning *out of print works* (52.8 %, n = 586), *digitized corpus* (49.9 %, n = 554), *online content licenses* (45.9 %, n = 510) and *online file sharing* (39.3 %, n = 436). Concerning *publishing license and contract*, only 2.5 % (n = 28) of students were extremely aware and 11.4 % (n = 127) moderately aware, whereas 37.7 % (n = 419) were slightly aware and 32.6 % (n = 362) were not at all aware.

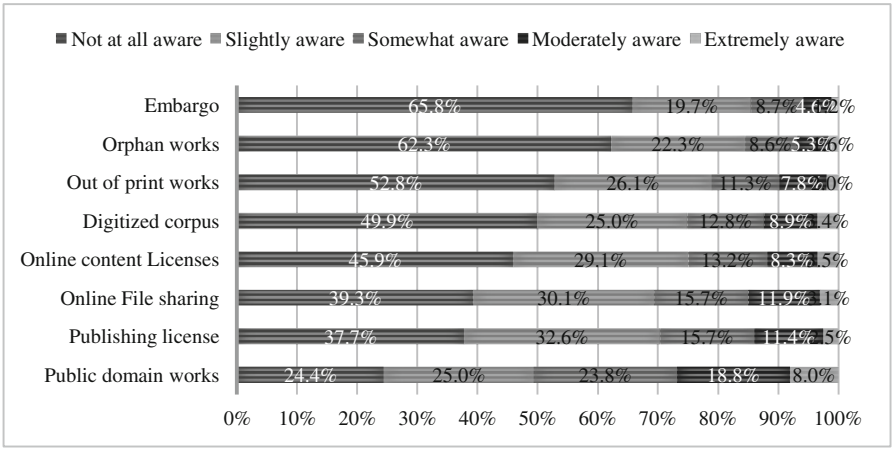


**Fig. 3.** Publishing and sharing rights awareness of respondents

The results concerning open rights were no better than the other topics (Fig. 4). The obvious gap was for *copyleft* where 68.8 % (n = 764) of respondents were not at all aware and for *Creative Commons licenses* with 50.1 % (n = 556). Concerning *open access*, they were only 6.7 % (n = 74) to be extremely aware and 19.5 % (n = 217) moderately aware, whereas 21.4 % (n = 238) declared being not at all aware, and 26.5 % (n = 294) slightly aware.

### 4.2 Relationship Between Level of Awareness and Discipline

In the research hypothesis, we postulated that there is a relationship between the doctoral students' awareness of copyright and the discipline to which they belong. In order to verify this, the data was analyzed using a *chi* square goodness of fit test. In the questionnaire, 24

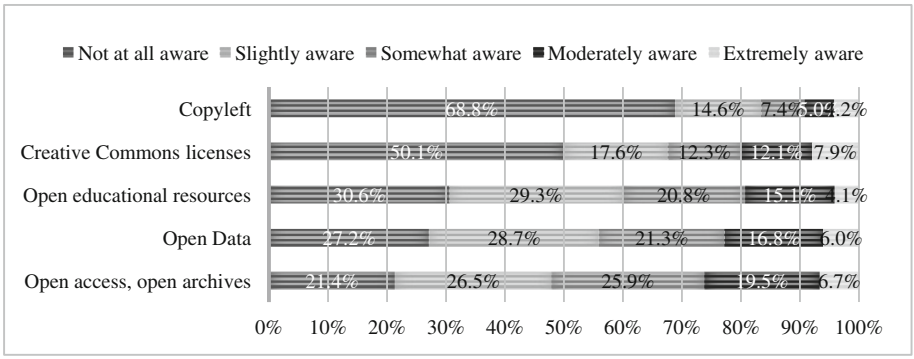


**Fig. 4.** Open rights movement awareness of respondents

disciplines were suggested. As three of the disciplines received fewer than five answers (Social Work and Social Policy, Political Science and Public Administration, Public Health and Health Care Science), we classified them within the "Other" category, resulting in a figure of 19 disciplines remaining (Fig. 5). Three respondents did not fill the discipline field which reduced the number of respondents to 1,107.

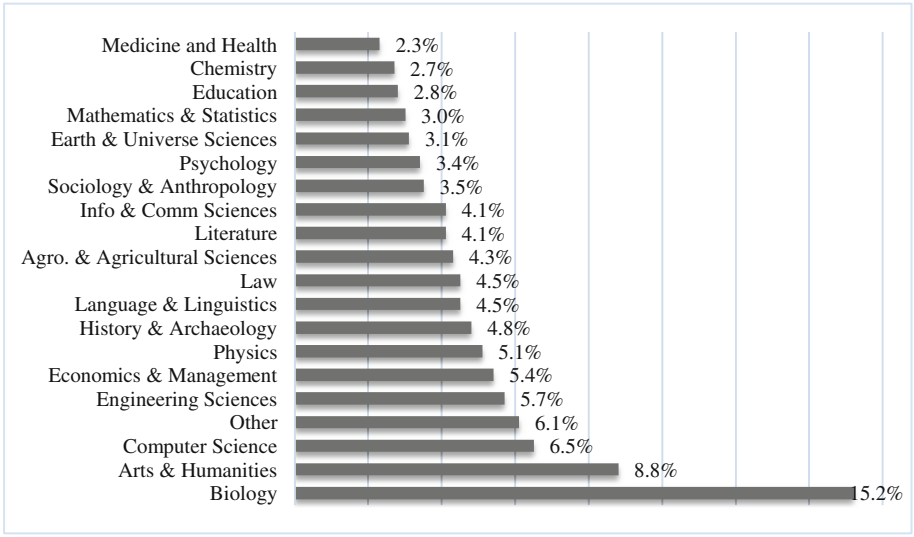


**Fig. 5.** Repartition of respondents by discipline

As one of the assumptions for the chi square test was violated - minimum expectation of five occurrences in each category - we combined the items *not at all aware* with *slightly aware,* and *moderately aware* with *extremely aware*. In spite of this, some disciplines could not satisfy the assumptions of the chi square test.

For many points, the null hypothesis was rejected, which meant there was a strong relationship between the competencies of doctoral students and the discipline to which they

belong. This was the case for *copyright* $\left(\chi^2\,(38) = 68.902, p \leq .05\right)$ and *intellectual property in general* $\left(\chi^2\,(38) = 56.265, p \leq .05\right)$, *image rights* $\left(\chi^2\,(38) = 66.619, p \leq .05\right)$, *rights to copy,* $\left(\chi^2\,(38) = 93.334, p \leq .05\right)$, *patent law* $\left(\chi^2\,(38) = 120.539, p \leq .05\right)$, *public domain works* $\left(\chi^2\,(38) = 115.652, p \leq .05\right)$ as well as *open access*, *open archives* $\left(\chi^2\,(38) = 53.353, p \leq .05\right)$, *open data* $\left(\chi^2\,(38) = 65.783, p \leq .05\right)$, and *open educational resources* $\left(\chi^2\,(38) = 56.687, p \leq .05\right)$. Concerning the other competencies - *fair use*, *database rights*, *publishing license and contract*, *embargo*, *out of print works*, *orphan works*, *copyleft*, *Creative Commons licenses*, *online file sharing*, *online content licenses, digitized corpus* – the chi square assumptions were violated and it was impossible to measure. It was then necessary to gather the different disciplines into two general groups: Science, Technology, Engineering, Mathematics, and Medicine (STEMM), and Arts, Humanities and Social sciences (AHSS).

Except for patent law, respondents in AHSS seemed to be more aware than respondents in STEMM regarding copyright in general, image rights, rights to copy, database rights, fair use, embargo or moving wall publishing license and contract, open educational resources, digitized corpus, public domain, out of print, and orphan works. Contrariwise, the null hypothesis of the chi square test has been verified concerning, publishing licenses, online content licenses, online file sharing, open access, Creative Commons licenses, and copyleft, which meant that there was no relationship between discipline and level of awareness. It is important to notice that when the disciplines were regrouped, the relationship between intellectual property and open data could not be verified as it was the case previously.

### 4.3 Relationships Among Awareness, Year of Study and Gender

In order to see whether the year of study had an incidence on the doctoral students' awareness, data was analyzed using a chi square goodness of fit test. The null hypothesis had been rejected for some issues where students in the fourth year and more were more aware. This was the case for *rights to copy, fair use*, *embargo* or *moving wall, digitized corpus, public domain* and *out of print works.* The *Creative Commons licenses* topic was more relevant to students in the fourth year, *publishing license* for students in the third and fourth years, and *open access* for the third year.

Performing a comparison to see whether there was a gender difference in the respondents' awareness, the null hypothesis had been rejected, except for issues such as *image rights*, *rights to copy*, *database rights*, *fair use*, d*igitized corpus* and *public domain* where there was no independence, meaning no relationship with the gender issue.

### 4.4 Difficulties

It is important to note that 44.1 % (n = 489) of doctoral students in France agreed that it is difficult to know whether the use of a source, in certain circumstances, constitutes plagiarism or not. In addition, 58.9 % (n = 654) admitted that they had difficulties being aware of the law on intellectual property and copyright, and 77 % (n = 802) answered that it was hard to know which legislation to refer to for a production published abroad. None of the respondents disagreed with the last assertion.

As part of their research, 49.3 % (n = 547) of the respondents had already published: a paper in a scientific journal for 38.6 % (n = 428), and a chapter in a book for 21.5 % (n = 239). Among those having already published, 14.9 % (n = 165) had signed a contract and 34.4 % (n = 382) had not. Interestingly, 50.9 % (n = 84) of those who had signed a contract found it not complicated and 24.8 % (n = 41) found it complicated.

### 4.5 Training

Only 23.1 % (n = 256) of doctoral students declared that they had been trained in intellectual property and copyright. Concerning the type of training they preferred, 40.2 % (n = 446) said they were in favor of *consultations on request*, followed by *training courses* (38.6 %, n = 429) and *thematic workshop*s (36.8 %, n = 409). The least preferred options were *self-training* (77.7 %, n = 862) and *round table discussion*s (76.7 %, n = 851).

Concerning the training topics they wished for, the most requested concerned *reusing data or content* (83.8 %, n = 930), *publishing license and contract* (77.8 %, n = 864), followed by *open access* (61.2 %, n = 679). The least requested topics related to *patent law* (50.2 %, n = 557), *Creative Commons licenses* (47 %, n = 522) and *copyleft* (44.8 %, n = 497).

## 5 Discussion

It is interesting to note that the gap between the general copyright and intellectual property competencies and the level of unawareness declared about more specific items is quite significant: more than 25 % concerning online publishing, for example. Even *open access* was not mastered, which is a considerable lack in the copyright knowledge of doctoral students when we know the importance of the open access movement for the strategic science outreach. Furthermore, with the "publish or perish" motto that applies also to French doctoral students, we could have expected a high level of awareness concerning publishing licenses and contracts. But only 2.5 % of respondents declared being extremely aware and 37.7 % not at all aware. However, we also noted that among those who had signed a publishing contract, a majority found it not complicated. One explanation could be that knowing comes by doing and that skills and understanding can be reached through experience.

Such a high level of unawareness on so many topics dealing with copyright is not surprising when we know that only 23.1 % (n = 256) of doctoral students had been trained on these topics. The comparison between the weak levels of awareness about *Creative Commons licenses* and *copyleft* and the low levels of request for training on these topics was also noteworthy: is it because they are not interested in these topics or because they do not know what they imply by lack of training? Our study also revealed the existence of a relationship between levels of awareness, disciplines and gender but the size of our sample, although quite large, did not allow for a sufficiently thorough analysis of these particularities. This implies a need for detailed analysis of doctoral students' practices and needs as suggested by Torras [22]. This would help the design

of appropriate training, services and communication by the institutions in order to improve the intellectual property and copyright literacy within the academic community, and would also help the systematic integration of copyright literacy as another form of information literacy [23, 24]. In fact, 43.3 % (n = 481) of doctoral students assessed that there was nobody in their institutional environment dealing with copyright issues and 22.3 % (n = 248) did not know if there was such a person.

## 6 Conclusion

The results of this study filled a gap by shedding light on the copyright literacy of doctoral students, although our sample represented two percent of the total surveyed population. We hope this will help doctoral schools to adjust their curricula for training or counseling students.

This research produced comprehensive knowledge regarding the copyright literacy of French doctoral students, especially considering that this kind of study has never been done before in France.

We were able to measure the levels of their awareness as well as the levels of their ability to master the subtleties of the publishers' different license agreements. We also addressed questions concerning the relationship between discipline, gender and the level of awareness.

As this was a web-based questionnaire, the results are declarative and may not reflect the participants' true abilities. It will also be necessary to complete this study by investigating further the disciplinary particularities with a larger sample.

## References

1. Wagner, K.I.: Intellectual property. Copyright implications for higher education. J. Acad. Libr. **24**(1), 11–19 (1998)
2. Fernández-Molina, J.C., Muriel, E., Vives-Gràcia, J., et al. (eds.): Copyright and E-learning: Professors' Level of Knowledge About the New Spanish Law, vol. 63. Emerald Group Publishing Limited, Bingley (2011)
3. Gilliland, A.T., Bradigan, P.S.: Copyright information queries in the health sciences. J. Med. Libr. Assoc. **102**(2), 114–117 (2014). doi:10.3163/1536-5050.102.2.011
4. Nollan, R.: Campus intellectual property policy development. Ref. Ser. Rev. **32**(1), 31–34 (2004). doi:10.1108/0090732041051935
5. Horava, T.: Copyright communication in Canadian academic libraries. A national survey. Can. J. Inf. Libr. Sci. **34**(1), 1–38 (2010). doi:10.1353/ils.0.0002
6. Charbonneau, D.H., Priehs, M.: Copyright awareness, partnerships, and training issues in academic libraries. J. Acad. Libr. **40**(3–4), 228–233 (2014). doi:10.1016/j.acalib.2014.03.009
7. Gadd, E., Gaston, R.: Copyright questions asked by libraries. Libr. Manag. **22**(8/9), 387–394 (2001)
8. Boustany, J.: Copyright literacy of librarians in France. In: Kurbanoğlu, S., Špiranec, S., Grassian, E., Mizrachi, D., Catts, R. (eds.) ECIL 2014. CCIS, vol. 492, pp. 91–100. Springer, Heidelberg (2014)

9. Duncan, J., Clement, S., Rozum, B.: Teaching our faculty. Developing copyright and scholarly communication outreach programs. In: Davis-Kahl, S., Hensley, M.K. (eds.) Common Ground at the Nexus of Information Literacy and Scholarly Communication, pp. 269–285. Association of College and Research Library, Chicago (2013)
10. Ferullo, D.L.: Copyright services for students. Managing Copyright in Higher Education: a Guidebook, pp. 131–138. Rowman & Littlefield, Lanham (2014)
11. Quartey, S.: Developing a campus copyright education program. Conquering the challenge. J. Interlibr. Loan **18**(1), 93–100 (2007). doi:10.1300/J474v18n01_10
12. Datig, I., Russell, B.: Instructing college students on the ethics of information use at the reference desk. A guide and literature review. Ref. Libr. **55**(3), 234–246 (2014). doi: 10.1080/02763877.2014.912458
13. Rodriguez, J.E., Greer, K., Shipman, B.: Copyright and you. copyright instruction for college students in the digital age. J. Acad. Libr. **40**(5), 486–491 (2014). doi:10.1016/j.acalib. 2014.06.001
14. Mahesh, G., Mittal, R.: Digital content creation and copyright issues. Electron. Libr. **27**(4), 676–683 (2009). doi:10.1108/02640470910979615
15. Wu, H.-C., Chou, C., Ke, H.-R., Wang, M.-H.: College students' misunderstandings about copyright laws for digital library resources. Electron. Libr. **28**(2), 197–209 (2010)
16. Ali, W.Z.W., Ismail, H., Cheat, T.T.: Plagiarism. to what extent it is understood? Procedia – Soc. Behav. Sci. **59**, 604–611 (2012). doi:10.1016/j.sbspro.2012.09.320
17. Isiakpona, C.: Undergraduate students' perception of undergraduate students' perception of copyright infringement. A case study of the University of Ibadan, library philosophy and practice (e-journal). Oyo State (2012)
18. Smith, K.H., Tobia, R.C., Plutchak, T.S., Howell, L.M., Pfeiffer, S.J., Fitts, M.S.: Copyright knowledge of faculty at two academic health science campuses. Results Surv. Ser. Rev. **32**(2), 59–67 (2006). doi:10.1016/j.serrev.2006.03.001
19. Carpenter, J., Wetheridge, L., Tanner, S., Smith, N.: Others: researchers of tomorrow. The research behaviour of generation Y doctoral students. J. Inf. Serv. Use **32**(1–2), 3–17 (2012)
20. Eret, E., Gokmenoglu, T.: Plagiarism in higher education. A case study with prospective academicians. Procedia-Soc. Behav. Sci. **2**(2), 3303–3307 (2010)
21. Vasudevan, T.M., Suchithra, K.M.: Copyright awareness of doctoral students in Calicut University campus. Int. J. Digit. Libr. Serv. **3**(4), 94–110 (2013)
22. Torras, M.-C.: Comment Soutenir la Recherche Doctorale. Les Doctorants, la Littératie Informationnelle et la Formation à l'Utilisation des Bibliothèques. In: Denecker, C., Durand-Barthez, M. (eds.) La Formation des Doctorants à l'Information Scientifique et Technique. 10e rencontres FORMIST, Villeurbanne, 3 et 4 juin 2010, pp. 39–52. Presses de l'Enssib, Villeurbanne (2011)
23. Association of College and Research Libraries: Intersections of Scholarly Communication and Information Literacy. Creating Strategic Collaborations for a Changing Academic Environment. Association of College and Research Libraries, Chicago (2013)
24. Ogburn, J.L.: Foreword. closing the gap between information literacy and scholarly communication. In: Davis-Kahl, S., Hensley, M.K. (eds.) Common Ground at the Nexus of Information Literacy and Scholarly communication, pp. v–viii. Association of College & Research Libraries, Chicago (2013)

# Other Literacies

# Everyday Health Information Literacy in Counselling on Healthy Eating. The Case of PrevMetSyn

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**Abstract.** The use of a screening tool for assessing everyday health information literacy (EHIL) is examined in counselling on healthy eating and lifestyle in the intervention study *Improved Methods of Lifestyle Modification for Patients at High Risk for Metabolic Syndrome (PrevMetSyn)* ongoing in Finland from 2013 to 2016. A case study with quantitative methods is used. The participants in a controlled intervention trial (based on a population-based sample of 560 subjects) were randomized into three groups: (1) intensive face-to-face counselling, (2) low-intensive face-to-face counselling, and (3) a control group, and further into users or non-users of a web-based ICT-programme. All participants' EHIL was screened at the beginning. The analyses indicated the distributions of the EHIL scores. Accordingly, one visit was targeted on the perceived ability to assess the quality of health information in intensive face-to-face counselling. Applying the EHIL tool together with cognitive behavioral therapy is a novel counselling approach.

**Keywords:** Health information literacy · Screening · Medical intervention study · Nutrition · Lifestyle · Counselling

## 1 Introduction and Aim of the Study

Health information abounds in our everyday-life contexts and relates to our lifestyle too. Coping with the complexity of this information environment, which is fast becoming more and more digitized, refers to critical competences of people in finding, evaluating and understanding information related to health. These competences, referred to by the term health information literacy, are suggested to be associated with individuals' ability to make informed decisions concerning health [1]. The critical role of health information literacy is highlighted by recent research which indicates that it is positively associated with people's health behaviours (see for example, [2]) and self-reported health [3].

Health information literacy combines the concepts of health literacy and information literacy. It has been defined as the abilities to 'recognize a health information need;


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identify likely information sources and use them to retrieve relevant information; assess the quality of the information and its applicability to a specific situation; and analyze, understand, and use the information to make good health decisions' [4]. There are two basic approaches to address the differing health information literacy levels of individuals: information may be provided in a more accessible form, for instance by tailoring (see for example [5]), or individuals may be educated to help them better cope with the demands of the complex health information environment (see [6, 7]). In this study we focus on the latter approach.

In this article our aim is to examine how the concept of everyday health information literacy (EHIL) was introduced, and a screening tool for assessing it was applied in a counselling practice on healthy eating and lifestyle. The focus is placed on a detailed examination of a visit to an intensive face-to-face counselling in the context of a medical intervention study related to preventive health care. The multidisciplinary intervention study "Improved Methods of Lifestyle Modification for Patients at High Risk for Metabolic Syndrome (PrevMetSyn)" is ongoing in Finland from 2013 to 2016. In this study metabolic syndrome was defined as a high body mass index (27–35 kg/m2) and at least two of the following criteria: high fasting glucose (impaired fasting glucose > 5.6 or diagnosed with diabetes), high triglycerides (> 1.7 mmol/l or medication), low HDL cholesterol (men < 1.0, women < 1.3 mmHg or medication) or high blood pressure (≥ 130/≥ 85 or medication) [8]. Healthy eating and lifestyle are behavioural means to manage these health risks and prevent associated chronic diseases, such as type 2 diabetes, and cardiovascular and heart diseases.

The everyday health information literacy (EHIL) screening tool applied in the intervention study was introduced by Niemelä, Ek, Eriksson-Backa and Huotari in 2012. It was piloted among high school students in Finland. One of the major results of the pilot study was that it can be used for indicating an individual's health information literacy on three dimensions: (1) motivation, (2) self-confidence to access information, and (3) perception of the ability to assess the quality of health information. Furthermore, an item on the ability to understand terminology in health contexts was considered as fundamental for assessing a person's health information literacy level [1]. The purpose of this article is, firstly, to identify those dimensions of EHIL that are the most challenging for the participants of the intervention from the perspective of preventive counselling. Secondly, a detailed description will be provided on how these challenges were treated in the design of counselling on healthy eating in this intervention study. The theoretical background, on which the counselling was based, is cognitive behavioural therapy.

Cognitive behavioural therapy regards obesity to be an outcome of dysfunctional thoughts or misconceived beliefs and pursues cognitive change [9, 10]. The premise is that cognitive change is a prerequisite of long-term behaviour change [9] and can be affected by cognitive behavioural therapy. When applied to this context, it is assumed that disordered eating behaviour, for example, emotional eating or binge eating, is caused by one's own cognitions and emotions.

## 2 Methodology

The examination is based on a case study approach and quantitative research methods. Moreover, documents of the design of counselling and conducting it in practice are used. The case in this study is the intervention study PrevMetSyn in general and one of the eight counselling sessions which focused on health information literacy in particular. In PrevMetSyn a population-based sample of 560 participants, whose age varied from 20 to 60 years, was collected by using the address and information system of the Finnish Population Register Centre. In total, an invitation letter was sent to 12,500 people and of them 1,065 responded with a letter of interest (the screening failure was 423 people). A randomised controlled intervention trial consisted of two-phases. First, the participants were randomised into three groups: (1) intensive face-to-face counselling, (2) low-intensive face-to-face counselling, and (3) a control group. After that they were randomised into users or non-users of a web-based ICT-programme. Each of the six randomised groups included approximately 100 participants (Fig. 1). The EHIL screening of all study subjects was conducted at the beginning of the intervention study. In total 560 participants of the intervention study filled in the questionnaire. The response rate was very high, close to 100%. The analyses of these data focused on distributions of the EHIL scores.

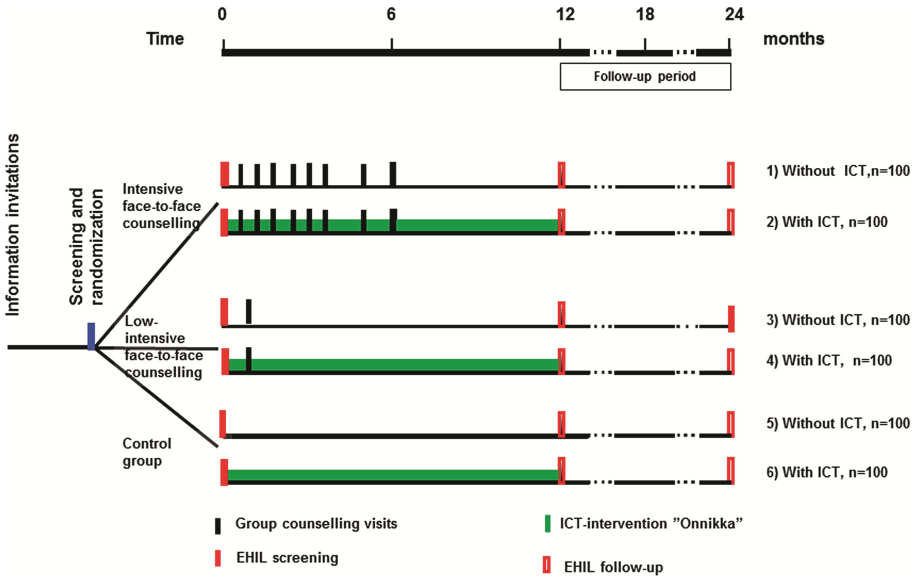


**Fig. 1.** Randomisation and data collection in the PrevMetSyn study

To help design the EHIL counselling, a sample of all intervention participants was selected focusing on the intensive, face-to-face group members' EHIL scores. Of these 57 participants, 45 had filled in the EHIL questionnaire. The intensive, face-to-face counselling was provided for twenty groups in total, and each of them consisted of from

eight to eleven participants. The documents used in our examination are the guidelines outlined for counselling in the practice of the PrevMetSyn intervention study. These guidelines were provided for the group counsellors, who were authorized clinical nutritionists and conducted the actual counselling. The counselling aimed at supporting the development of the participants' metacognitive competencies and increasing their self-regulation of thoughts and emotions in particular. The counselling focused on: (1) specifying factors related to the participants' own health, such as lifestyle, eating behaviour, eating habits, exercise, and situation in life; (2) recognizing interaction between thoughts, emotions, and actions; and (3) recognizing and reformulating potential dysfunctional thoughts related to eating and weight control.

Each counselling session was conducted according to the following structure: (1) introduction, for example, with a mindfulness or related exercise; (2) going through homework through peer-to-peer discussion; (3) psychoeducation of each session's new theme through discussions, working in pairs, and exercises; and (4) giving new homework along with related guidelines. Counselling consisted of eight visits to the clinic at the University Hospital. Health information literacy was the theme of the seventh visit. It was followed by a concluding session which included going through homework related to health information literacy.

## 3 Results

The intervention study participants' EHIL varied in its three dimensions: (1) motivation on finding health information (statements 1, 2, 3 and 9), (2) confidence in one's ability to find, understand and use health information (statements 4, 5 and 10), and (3) evaluation of health information (statements 6 and 7) (see also [1]). Furthermore, the ability to understand terminology in health contexts (statement 8) was analyzed. The distributions of the individual EHIL statements in this study's total population (n = 560) are presented according to these three dimensions and the statement of understanding the terminology in Table 1.

The participants were highly motivated to receive health information with, for example, almost all of them (96.1%) agreeing that it is important to be informed about health issues. They were also rather confident in their abilities to find information on printed sources (68.2%) and especially on the Internet (82.0%). However, almost half of the participants (45.2%) found it difficult to know who to believe in terms of health issues. Furthermore, half of the participants (50.2%) found it hard to assess the reliability of health information on the Internet and 43.6% in printed sources. Of the participants, 41.8% found health related terminology often difficult to understand. This analysis shows that the weakest dimension of EHIL among all participants, who were people with high risk for metabolic syndrome, was the perceived ability to assess the quality of health information (See Table 1).

**Table 1.** Responses to individual statements concerning everyday health information literacy among people with high risk for metabolic syndrome (n = 560).

| EHIL statement | Disagree[1] N (%) | Neutral N (%) | Agree[2] N (%) |
|---|---|---|---|
| *Motivation* | | | |
| 1. It is important to be informed about health issues. | 14 (2.5) | 8 (1.4) | 538 (96.1) |
| 2. I know where to seek health information. | 30 (5.4) | 30 (5.4) | 500 (89.3) |
| 3. I like to get health information from a variety of sources. [3] | 22 (3.9) | 52 (9.3) | 485 (86.8) |
| 9. I apply health related information to my own life and/or that of people close to me. [3] | 74 (13.2) | 89 (15.9) | 396 (70.8) |
| *Confidence* | | | |
| 4. It is difficult to find health information from printed sources (magazines and books). [3] | 381 (68.2) | 75 (13.4) | 103 (18.4) |
| 5. It is difficult to find health information from the Internet. | 459 (82.0) | 22 (3.9) | 79 (14.1) |
| 10. It is difficult to know who to believe in health issues. | 201 (35.9) | 106 (18.9) | 253 (45.2) |
| *Evaluation* | | | |
| 6. It is easy to assess the reliability of health information in printed sources (magazines and books). | 244 (43.6) | 121 (21.6) | 195 (34.8) |
| 7. It is easy to assess the reliability of health information on the Internet. | 281 (50.2) | 107 (19.1) | 172 (30.7) |
| *Terminology* | | | |
| 8. Health related terminology and statements are often difficult to understand. | 234 (41.8) | 101 (18.0) | 225 (40.2) |

[1]Strongly disagree and disagree; [2]Strongly agree and agree, [3]n = 559

The results of the 560 participants were not available until the end of the participant recruitment. The analysis of the forty-five intensive, face-to-face counselling group members' EHIL scores was in line with this result. On the basis of this result, the counselling session targeting the informational aspects of health behaviour during one 90 minute visit was outlined as follows:

1. getting familiar with the concept of EHIL including the screening tool,
2. learning about health information sources and assessment of their quality,
3. discussing the Internet as a source of health information, and
4. concluding the visit along with some homework.

The group counsellors were provided with the following background information for conducting the session: an article on the piloting of the EHIL tool by Niemelä et al. [1], an article by the same authors in Finnish [11] and a blog text published on the website of a major Finnish weekly magazine titled *Suomen kuvalehti* in Finnish [12]. They were also provided with PowerPoint slides on the definition of the concepts of EHIL and health information source, and criteria of a reliable health information source. Of these, the blog text was also delivered to each group member to read.

Next a detailed description of the entire session "Everyday Health Information Literacy" is provided. In the introduction phase the focus was placed on introducing the concept of EHIL and the screening tool for the members of this group session. Fifteen out of ninety minutes were allocated for this fundamental issue. First as a part of the opening discussion, the group members were reminded of the questionnaire on EHIL which they filled in online during the screening visit to the University Hospital at the beginning of the intervention study. A couple of the ten statements from the screening tool were read aloud. This was followed by a discussion of how the group members found the screening tool, for example, whether they could recollect filling in the questionnaire, and what kind of thoughts that brought to mind.

The discussion itself was concerned with the group members' perceptions of the importance of health information literacy (this was supported by a PowerPoint slide on the definition of EHIL along with the three dimensions of EHIL). The group members were informed about their EHIL level in general. This result was used to justify the focus of this seventh session of the intensive, face-to-face counselling on their ability to assess the quality of health information.

The interim phase aimed at learning about health information sources and assessment of their quality. Forty-five minutes were allocated for this most critical issue. First, the concept of health information sources was introduced. Different sources of health information were discussed including magazines, journals, newspapers, free leaflets, advertisements, books, TV and radio programs, the internet with its services, advertisements, noticeboards, and online journals, as well as social media with its applications such as Facebook, Twitter, and blogs. Moreover, the role of other people and organizations such as health associations, public health care, private health service providers and foundations as information providers was discussed. It was emphasized that according to the latest research, people close to the one in need of health information, such as family members, relatives and friends, are important sources of health information [13], that women are more active in seeking health information, use the internet more as a source of health information, and they also retrieve health information for their closest people more often than men [14–16].

After that, the focus turned to health information sources used by the group members, with the help of exercises for pairs. The group members were asked to list those health information sources they were most familiar with, and this was followed by a peer-to-peer

discussion. Then the pairs were asked to list from three to five most important ones. This was followed by a joint processing of the lists created in the group as a whole. Of these lists from two to three most important sources were further shortlisted, and the group members were encouraged to share their views about the reliability of these sources.

Thereafter a more specific health topic preselected by the group counsellors was taken up and the members were asked to talk over the potential sources for information on metabolic syndrome. They listed the sources they outlined in pairs, and then the lists were processed together and the most important ones shortlisted. Again, this was followed by a discussion of the reliability of these sources, and how to assess their reliability. These were the critical issues brought up.

Before concluding the session, the discussion focused on the internet as a source of health information for twenty minutes. The group counsellors had preselected specific web-based health information sources which they introduced for the group members "hands-on". These were: The online medical library of the Association of the Finnish Medical Doctors (Duodecim), Current Care Guidelines, national public health associations including the Finnish Heart Association as an example, consumer information centers of food industry, such as Finnish Bread Information, and major Finnish companies in the field, for example, Valio Ltd.

These sources were selected as examples of information providers whose interests vary according to their fields of activity. For example, a medical health library provides information based on scientific research, and Current Care is an official guideline. National health associations also provide practical guidance, whereas private companies aim at promoting their sales. After this, the group members were encouraged to share their perceptions of the reliability of these web-based information sources, and also the group counsellor brought up examples of non-reliable mass media sources.

Then, the group counsellor presented a list of common criteria against which the reliability of an information source can be assessed (supported with a PowerPoint slide). These included the quality of the publisher and the author(s), the subject area and content, grammar and spelling, references to other professional sources, background organizations, and date of publication/publishing. These criteria were discussed along with the relevance of sources used by the group members.

The session concluded with a ten-minute wrap up for the group members, in which a web-based blog text on the importance of education on everyday health information literacy [12] was delivered. Besides reminding them about the three dimensions of EHIL, the basic, advanced and critical levels of health information literacy were introduced, as well (cf. [7]). Homework was given in terms of the following questions: How can you assess your own health information literacy? What is the level of your own health information literacy? How could you pursue developing your own health information literacy? The purpose of this was to increase the group members' interest in developing their own health information literacy in everyday life. Counsellors discussed this homework at the beginning of the final concluding session of this intensive, face-to-face group counselling.

## 4 Discussion

In this study the everyday life information literacy screening tool was used in an applied manner as a component of preventive health care that focused in improving the lifestyle of pre-diabetic individuals. The tool was utilised in the counselling practice, whose design was based on cognitive behavioural therapy. As a case study our approach is descriptive and reports the idea and its application in practice. To our knowledge this is the first time that the concept of health information literacy is applied in this type of context, and, therefore, it is challenging to assess the quality of our findings in comparison to other related studies.

From a theoretical perspective we find the design as having potential in achieving positive outcomes in the practice of counselling. Through the viewpoint of cognitive therapy it is possible to get hold of health related dysfunctional thoughts and emotions, which prohibit action and may relate to avoidance of information. According to indicative evidence, avoidance of health information is associated with low everyday health information literacy [17]. People may avoid information if it necessitates an undesired action such as behaviour change, or if the information itself is expected to result in negative emotions [18]. Individuals with a tendency to avoid information seem to possess relatively less cognitive, affective and instrumental resources that may be important in terms of health [19]. Moreover, there are indications that avoidance is associated with poorer health [20].

The counselling aimed at developing participants' metacognitive competences, which also enrich activities related to health information. Also this may have a positive impact on their health behaviour. Furthermore, the group counsellors' understanding of the importance of the informational aspect of preventive health care grew deeper during the collaborative process of the multidisciplinary research team conducting this study. This understanding may provide a firm foundation for developing further multidisciplinary studies in the context of health promotion.

A negative aspect of applying the EHIL screening tool in a medical intervention study of this kind is that our approach did not allow us to reach each participant at the individual level. However, it must be noted, that the tool was developed in the first place for identifying those people who have major difficulties with their everyday health information literacy. Such difficulties may include a very low level in general, or very low levels in one or two of the three dimensions of EHIL, namely, low motivation, low self-confidence in finding, assessing and using health information, or poor self-perceived ability to evaluate the quality of the content and source of health information. Now, the findings of screening were utilised only at the group level.

EHIL was the theme of the seventh of the total of eight counselling sessions. Therefore, its main message might have not been integrated well with the content of the entire intensive, face-to-face counselling provided for this group. In the future the timing and sequence of the content provision should be reconsidered at the design phase.

We are also concerned about whether we managed to sufficiently train the clinical nutritionists who conducted the counselling, in order to make them understand issues of health information literacy in relation to health behaviour in the context of everyday life. Increasing the impact of this theme may require tighter interdisciplinary collaboration at

the design phase. Moreover, it could be considered whether counselling on everyday health information literacy could be conducted by specialists of information studies. In this case the session or these sessions should be designed very thoughtfully, as it is known that counselling aiming at preventing obesity is very challenging and authorized clinical nutritionists have their professional strengths for this. For example, communication problems related to group dynamics may emerge when the session counsellor changes, and that should be taken into account.

Furthermore, there is an ongoing debate on whether health literacy represents a skill-based construct for health self-management, or if it also more broadly captures personal activation or motivation to manage health [21]. However, both aspects are important and they also make independent contributions to health [21]. In general, the EHIL screening tool may reflect confidence (or self-efficacy) rather than actual skills. A wide concept such as EHIL is difficult to study objectively and usually objective measurements focus on some narrow aspect of the concept, such as numeracy skills.

## 5 Conclusion

Group counselling has the potential to improve the participants' everyday health information literacy. The screening of EHIL is a new component of counselling in practice. It is a promising instrument for counselling in this intervention study based on cognitive behavioural therapy with a premise that cognitive change is a prerequisite of long-term behaviour change [4]. When it is applied together with cognitive behavioural therapy a novel approach to counselling is gained. The study also clearly shows that it is important to increase health care professionals' understanding of issues related to health information literacy in people's everyday life contexts.

As the intervention study is still going on, a follow-up study will be conducted focusing on assessing how the participants' EHIL levels have developed during the one year intervention and during the entire period of two years, including the one year follow-up. It is also possible to dig deeper into the relation between EHIL and positive outcomes of this medical intervention study. Namely, we can investigate whether there are improvements in the EHIL levels of those intervention participants who have managed to maintain their weight loss for two years. Moreover, their EHIL levels could be compared with those participants who did not manage to lose weight during the intervention. Furthermore, the EHIL screening tool used in this study should be further developed, validated and tested among other populations in future studies.

## References

1. Niemelä, R., Ek, S., Eriksson-Backa, K., Huotari, M.-L.: A screening tool for assessing everyday health information literacy. Libri **62**(2), 125–134 (2012)
2. Pálsdóttir, Á: Information behaviour, health self-efficacy beliefs and health behaviour in Icelanders' everyday life. Inf. Res. 13(1), paper 334 (2008). http://www.informationr.net/ir/13-1/paper334.html
3. Eriksson-Backa, K., Ek, S., Niemelä, R., Huotari, M.-L.: Health information literacy in everyday life: a study of Finns aged 65–79 years. Health Inf. J. **18**(2), 83–94 (2012)

4. Medical Library Assocation: The Medical Library Association Task Force on Health Information Literacy (2003). https://www.mlanet.org/resources/healthlit/define.html
5. Enwald, H.: Tailoring Health Communication: the Perspective of Information Users' Health Information Behaviour in Relation to their Physical Health Status. Acta Universitatis Ouluensis. Series B, Humaniora 118. Oulu. Doctoral dissertation, Information Studies, University of Oulu, Finland (2013). http://urn.fi/urn:isbn:9789526202792
6. Nutbeam, D.: The evolving concept of health literacy. Soc. Sci. Med. **76**(12), 2072–2078 (2008)
7. Berkman, N.D., Davis, T.C., McCormack, L.: Health literacy: what is it? J. Health Commun. Int. Perspect. **15**(Suppl. 2), 9–19 (2010)
8. International Diabetes Federation: Global Guideline for Type 2 Diabetes (2012). http://www.idf.org/sites/default/files/IDF-Guideline-for-Type-2-Diabetes.pdf
9. Van Dorsten, B., Lindley, E.M.: Cognitive and behavioral approaches in the treatment of obesity. Endocrinol. Metab. Clin. N. Am. **37**, 905–922 (2008)
10. Fabricatore, A.N.: Behavior therapy and cognitive-behavioral therapy of obesity: is there a difference? J. Am. Diet. Assoc. **107**(1), 92–99 (2007)
11. Niemelä, R., Ek, S., Huotari, M.-L.: Terveystiedon lukutaito lisää hyvinvointia. In: Reivinen, J., Vähäkylä, L. (eds.) Kansan Terveys, Yksilön Hyvinvointi, pp. 150–162. Gaudeamus, Helsinki (In Finnish) (2012)
12. Huotari, M.-L., Ek, S., Niemelä, R.: Terveystiedon lukutaito kansalaistaidoksi. Suomen Kuvalehti, Eri mieltä -Blogi. (In Finnish) (2013). http://suomenkuvalehti.fi/jutut/mielipide/puheenvuoro/terveystiedon-lukutaito-kansalaistaidoksi/
13. Redmond, N., Baer, H.J., Clark, C.R., Lipsitz, S., Hicks, L.S.: Sources of health information related to preventive health behaviors in a national study. Am. J. Prev. Med. **38**(6), 620–627 (2010)
14. Rice, R.E.: Influences, usage, and outcomes of internet health information searching: multivariate results from the pew surveys. Int. J. Med. Inf. **75**, 8–28 (2006)
15. Ek, S.: Gender differences in health information behaviour: a Finnish population-based survey. First published online, August 23, 2013. Health Promotion International (2013). http://heapro.oxfordjournals.org/content/early/2013/08/28/heapro.dat063.full
16. Wellstead, P.: Information behaviour of Australian men experiencing stressful life events: the role of social networks and confidants. Inf. Res. 16(2), paper 474 (2011). http://informationr.net/ir/16-2/paper474.html
17. Hirvonen, N.: Health Information Matters. Everyday Health Information Literacy and Behaviour in Relation to Health Behaviour and Physical Health among Young Men. Acta Universitatis Ouluensis. Series B, Humaniora 133. Oulu. Doctoral dissertation, Information Studies, University of Oulu, Finland (2015). http://herkules.oulu.fi/isbn9789526210407/isbn9789526210407.pdf
18. Sweeny, K., Melnyk, D., Miller, W., Shepperd, A.: Information avoidance: who, what, when, and why. Rev. Gen. Psychol. **14**(4), 340–353 (2010)
19. Ek, S., Heinström, J.: Monitoring or avoiding health information - the relation to inner inclination and health status. Health Inf. Libr. J. **28**(3), 200–209 (2011)
20. Jung, M., Ramanadhan, S., Viswanath, K.: Effect of information seeking and avoidance behaviors on self-rated health status among cancer survivors. Patient Educ. Couns. **92**, 100–106 (2013)
21. Smith, S.G., Curtis, L.M., Wardle J., von Wagner, C., Wolf, M.S.: Skill set or mind set? associations between health literacy, patient activation and health. PLoS ONE 8(9), e74373 (2013). http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0074373#pone-0074373-t004

# Senior Citizens, Media and Information Literacy and Health Information

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**Abstract.** This study examined the development of information seeking and evaluation of the usefulness and reliability of information, in three information channels, Media, Health specialist and Internet, in the period 2002 to 2012. Random samples were used, participants were categorized into two groups, 60 to 67 years old and 68 years or older. Data analysis was performed with ANOVA (one-way). Health specialists were considered most useful and reliable, although rated lower in 2012 than in 2002. Usefulness and reliability of information in the Media was comparable in 2012 and 2002. Information seeking on the Internet had increased since 2002. The younger group considered the information less useful and reliable in 2012 than in 2002. For the older group the evaluation was identical in 2012 to what it was in 2002. Thus, information seeking on the Internet had increased since 2002 but participants had also become more critical of the information.

**Keywords:** Health information · Information seeking · Internet · Media and information literacy · Reliability · Usefulness · Senior citizens

## 1 Introduction

It is essential for elderly people to take an active part in health promotion and to practice a healthy lifestyle. Media and Information Literacy (MIL) is important in this context as it allows individuals to "…access, retrieve, understand, evaluate and use, create, as well as share information and media content in all formats…" [1].

Access to quality information, appropriate to people's needs regarding content and which can be sought through the preferred information channels, is of significance for elderly people to be able to improve their knowledge. While health information is increasingly being disseminated digitally, concerns have been raised that due to lack of access and practice at using the internet, as well as mistrust in the information, senior citizens may not benefit as much from the digitalization as others [2]. Particularly those who belong to the older age groups [3]. Recent results about social media show for example that over 80 % of people 60 years or older have never posted, commented, signed up as friends or "liked" Facebook sites about health and lifestyle and over 70 % have never received or forwarded these information [4]. Others have, however, suggested that, because those who are younger are more accustomed to using the internet in their work or private life, older people will gradually become more active users of the internet [5].


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Access to the internet is widespread among Icelanders' and has been growing. In 2012 a total of 95 % of Icelandic homes had internet access, compared to 84 % in 2007 and 78 % in 2002 [6–8]. These figures are impressive and may indicate that the digital divide is relatively low in Iceland. Nevertheless, it is important to keep in mind that these statistics may hide lower internet access by certain groups. Furthermore, although internet use by the age group 65 to 74 years has been increasing, findings still show that the older people are, the less frequently they connect to the internet [6–8]. The same trend can be seen internationally, for example findings about internet usage in the U.S. which show that age is negatively related to online health information seeking [9].

Recent studies of have mainly focused on how elderly people have adopted to the digitalization of health information. The present study aims at gaining a more holistic picture. The paper will present findings about how the preferences of Icelanders ages 60 years and older for health and lifestyle information has developed in the years 2002, 2007 and 2012. This will be done by comparing the frequency of information seeking and evaluation of the quality of information on the internet with information in the more traditional channels media and health professionals.

## 2 Methods

### 2.1 Data Collection

Data were gathered as postal surveys in 2002 and 2007. For both data sets random samples consisting of 1,000 people aged 18 to 80, from the whole country, was used. The response rate was 51 % in 2002 and 47 % in 2007. In 2012 data was gathered using an internet and a telephone survey from two random samples of 600 people each, aged 18 years and older from the whole country (oldest respondent was 92). The datasets were merged allowing answers from all individuals belonging to each set of data. Total response rate was 58.4 %.

The current study involves participants who are 60 years and older. In western countries it has been traditional to use the retirement age to define "elderly" [10] and as mentioned above, it has been implied that although those who belong to the elderly generation today are reluctant to use digital information this will change with the coming elderly generation. Therefore it was decided to compare people at the age 60 to 67 years old, a group who is approaching retirement, with those who are 68 years or older, who in Iceland are defined by law as elderly [11]. The number of participants in each age group is presented in Table 1.

**Table 1.** Number of participants by age group in 2002, 2007 and 2012

| Participants | 2002 | 2007 | 2012 |
|---|---|---|---|
| 60–67 | 32 | 55 | 90 |
| 68+ | 44 | 61 | 90 |
| Total | 76 | 116 | 180 |

### 2.2 Measurements and Data Analysis

Over the years, the questionnaire used in the surveys has developed in line with advances in technology and includes more digital sources in 2012 than in 2002. However, for comparison reasons it is important to use the same sets of measurements for the data from 2002, 2007 and 2012.

(1) *Age groups*. Socio-demographic information included traditional background variables, however in the current analysis only the variable age is used. To better assess how the internet adoption has developed and how it may relate to age the participants were divided into two groups, those who are aged 60 to 67 years and those who are 68 years and older.
(2) *Purposive information seeking*. Respondents purposive information seeking was examined by asking: 'Have you sought information about health and lifestyle in any of the following sources'? A list of over 20 information sources was presented and people asked to provide answers about every source. A five-point response scale was used (5: Very often – 1: Never).
(3) *Evaluation of information* was examined by asking two questions: 'How useful do you find information about health and lifestyle in the following sources'?, and 'How reliable do you find information about health and lifestyle in the following sources'? The questions had a five-point response scale (5: Very useful/reliable - 1: Don't know). The same list of information sources was presented at both questions as at the question about purposive information seeking.

Factor analysis was used to extract latent factors on the questions about information seeking, evaluation of the usefulness and evaluation of the reliability of information, in the data from 2002, 2007 and 2012. The Principal Component Factoring method of extraction was employed to examine the factor structure of each question. In all cases, the criteria for factor loadings were set above 0.4, and oblique rotation (Oblimin) was adopted in all the analyses. For all the analyses, multiple criteria, based on eigenvalue > 1.00, a scree test and conceptual interpretability of the factor structure, suggested that extracting three factors, which together contained 15 information sources, would be adequate. The factors were named: Media, Health specialists and Internet.

The Media contains information in television, radio and printed newspapers, Health specialists contains information in print from health specialists, as well as discussions with specialists of the health professions. The Internet contains all digital information, including websites by the health care system or health specialists.

For the question about purposive information seeking the factors explained 63.8 % of the total variance in the data from 2002, 65.0 % in 2007 and 71.5 % in the data from 2012. The scales were checked for internal reliability and Cronbach's alpha ranged from 0.80 to 0.88 in 2002, from 0.81 to 0.87 in 2007 and 0.87 to 0.90 in 2012. For the question about usefulness of information the factors explained 66.5 % of the total variance in the data from 2002, 67.3 % in 2007 and 75.4 % in the data from 2012. Cronbach's alpha ranged from 0.84 to 0.88 for the scales in 2002, from 0.83 to 0.90 in 2007 and 0.87 to 0.92 for the scales in 2012. For the question about reliability of information the factors explained 67.2 % of the total variance in the data from 2002, 70.3 % in 2007 and

75.0 % in 2012. Cronbach's alpha ranged from 0.84 to 0.87 for the scales in 2002, from 0.85 to 0.90 in 2007 and from 0.86 to 0.91 in 2012.

The analysis of the two age groups purposive seeking in the information channels Media, Health specialists and Internet, as well as their evaluations of the usefulness and the reliability of information in these channels was performed with ANOVA (one-way).

## 3 Results

The chapter starts by presenting results about how frequently the participants belonging to the two age groups, 60 to 67 years and those who are 68 years and older, sought information in the three information channels, Media, Health specialists and Internet. After that, results about their evaluation of the usefulness and reliability of information in the same information channels will be presented.

Figure 1 shows that both age groups sought information most often in the Media. Furthermore, for both age groups, the frequency of information seeking in the Media and from Health specialists was similar in 2012 to what it was in 2002 and the frequency was comparable for both age groups. The frequency for information seeking on the Internet, on the other hand, had increased for both age groups and this happened mainly between 2007 and 2012.

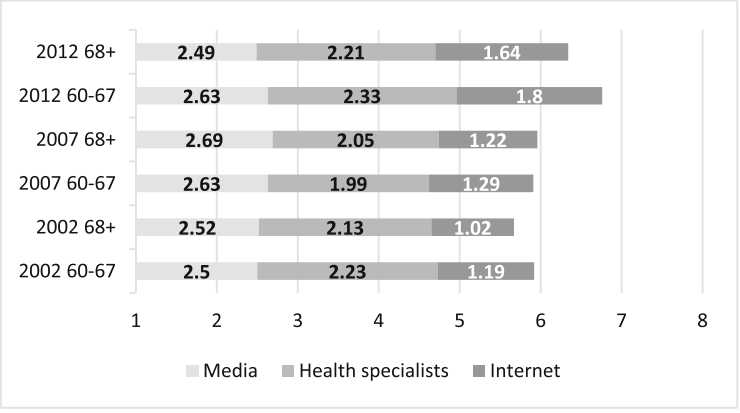


**Fig. 1.** Information seeking in the media, health specialists and the internet

When the development in information seeking in the Media and Health specialists is compared, the results revealed that difference across these two information channels was identical in 2012 to what it was in 2002, for both age groups. The difference across the Internet on the one hand and both the Media and Health specialist on the other hand had diminished for both age groups.

Figure 2 shows that although information from Health specialists was considered somewhat less useful in 2012 than in 2002 it was, nevertheless, evaluated as more useful than information in the Media and on the Internet. Evaluation of information in the Media was almost identical for both age groups. Both groups considered the information to be

slightly less useful in 2012 than in 2002 and 2007. In 2002 information on the Internet were considered to be more useful by those who belonged to the age group 60 to 67 years old, compared to the age group 68 or older. In 2012 the younger age group still regarded the information as more useful than the older group but the difference across them had declined somewhat. In addition, there had been a decrease in how the younger age group evaluated the information in 2012 compared with 2002. The results for those who are 68 years or older revealed a temporarily increase in the evaluation of usefulness between 2002 and 2007, however, it decreased again in 2012 and was identical to what it was in 2002.

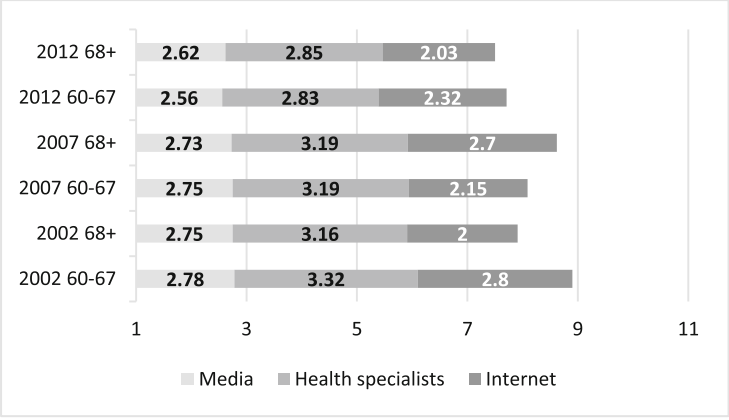


**Fig. 2.** Usefulness of information in the media, health specialists and internet

A comparison of the development in evaluation of the usefulness of information from Health specialists with the Media revealed that for the younger group there had been a slight, but steady, decrease in the difference across these two information channels since 2002. For the older age group, the difference across the channels was also slightly less in 2012 than in 2002. When the development in evaluation of Health specialists was compared with the Internet, the results show that for the older age group the difference across these channels decreased temporarily in 2007. However it increased again in 2012, although it was less than in 2002. For the younger age group the difference across the channels increased temporarily in 2007 but decreased again and was the same in 2012 as in 2002. When the development for the Media and the Internet is compared, the results show that the younger group considered information in these channels equally useful in 2002 but in 2012 information on the Internet were evaluated as somewhat less useful than in the Media. For the older group the difference decreased in 2007, when information in these channels were considered equally useful. In 2012, the difference had increased again although it is somewhat less than it was in 2002.

Figure 3 reveals that although information from Health specialists were seen as somewhat less reliable in 2012 than in 2002, by both age groups, it was nevertheless considered more reliable than information in both the Media and on the Internet. Both age groups evaluated the reliability of information in the Media in similar way, and for

the younger group the evaluation was identical in 2012 to what it was in 2002 and 2007. Results about the Internet show that in 2002, the age group 60–67 years old regarded the information to be more reliable than the age group 68 years and older but in 2012 there was only a slight difference across the age groups. For the age group 60–67 years old, there was a decrease in the evaluation of reliability between 2002 and 2007, but it remained almost the same in 2012 as in 2007. For the age group 68 years and older there was a temporarily increase in the evaluation of reliability between 2002 and 2007, however, it decreased again in 2012 and was similar as in 2002.

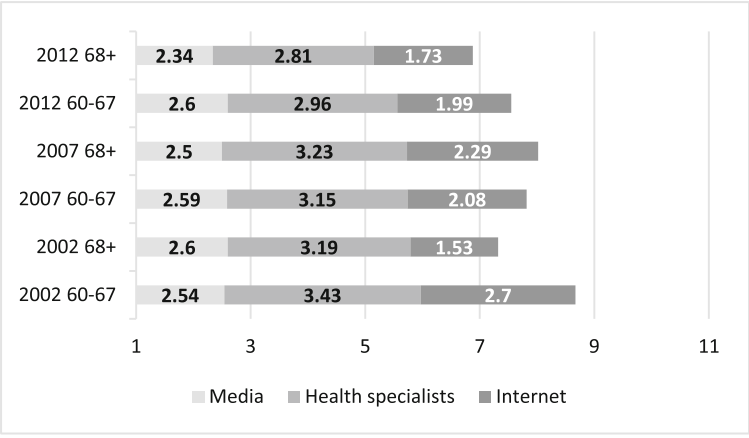


**Fig. 3.** Reliability of information in the media, health specialists and internet

When the development in evaluation of information from Health specialists and the Media is compared, the results show that for the older age group the difference across these two channels was similar in 2012 to what it was in 2007 and 2002. For the younger age group, on the other hand, the difference across these two information channels had decreased steadily since 2002. A comparison of the development in evaluation of information from Health specialists with information on the Internet revealed that the difference across these channels had increased slightly for the younger age group but for the older age group the difference had diminished. The development in evaluation of information in the Media and on the Internet shows that for the younger group the difference across these channels was less in 2012 than in 2002 but for the older group it had increased.

## 4 Discussion

Elderly people form the fastest growing group of citizens in western societies and in many other parts of the world [12]. Concerns have been raised that because of inadequate MIL they do not have sufficient possibilities to benefit from digital health information [2, 4]. By comparing results about three information channels, the Media, Health specialist and Internet for two age groups, people 60 to 67 years old and those who are

68 years and older, the study gives evidence about how the preferences of elderly Icelanders´ for health and lifestyle information have developed from 2002 to 2012.

The study results demonstrate that for both age groups the frequency of information seeking in sources on the Internet had increased since 2002. This, however, did not happen at the expense of the other information channels. For both age groups, the frequency of information seeking in the Media and in sources from Health specialist was similar in 2012 to what it was in 2002.

The results show that evaluation of information in the Media was comparable in 2012 to what it was in 2002. Evaluation of usefulness and reliability of the information was almost identical for both age groups. Both groups considered the information to be slightly less useful in 2012 than in 2007 and 2002. The older group also considered the information to be slightly less reliable in 2012 but for the younger group the evaluation of reliability was identical in 2012 to what it was in 2007 and 2002. The changes in evaluation of information in the Media were, however, small and no conclusions can be drawn from it.

Information from Health specialists were considered to be more useful and reliable than information in the Media and on the Internet, by both age groups. Yet, both groups considered information from Health specialists to be somewhat less useful and reliable in 2012 than in 2002. Furthermore, a comparison of the development in evaluation of the usefulness and reliability of information from Health specialists with information in the Media revealed that there was less difference across these two information channels in 2012 than in 2002. In addition, for the older group, the difference in evaluation of the usefulness and reliability of information across Health specialists and the Internet had diminished in 2012, compared to what it was in 2002. For the younger group, however, the difference in the evaluation of usefulness of information across Health specialists and the Internet was the same in 2012 as in 2002.

Although the results indicate that people considered the quality of information from Health specialist to be lower in 2012 than in 2002 it is, nevertheless, necessary to examine how this develops over a longer period before any specific conclusions can be drawn about changes in evaluation of the information.

The results about the Internet show that the younger group considered the information to be more useful and reliable than the older group in 2002 and still did so in 2012, even though the difference across the age groups had diminished somewhat. The younger group considered the information to be both less useful and less reliable in 2012 than in 2002. For the older group there was a temporary increase in the evaluation of usefulness and reliability of the information between 2002 and 2007, however, it decreased again in 2012 and was identical to what it was in 2002. Thus, while the frequency of information seeking on the Internet had increased since 2002, as suggested by Bromley [5] the participants in both age groups had also become more critical of the information.

The study is limited by a response rate of 51 % in 2002, 47 % in 2007 and 58 % in 2012, which raises the question whether or not those who answered the survey are giving a biased picture of those who didn't respond. Nevertheless, the findings provide valuable information about the development that has happened since 2002.

Though information technology develops rapidly it is important to realize that people may not always change their information behaviour in line with it, particularly the older

generation who has formed their habits during a lifetime. An overview of the development in information behavior, where information seeking and the evaluation of the quality of the information is examined within a broad network of information sources, is essential for the design of better education procedures which are built on realistic goals and expectations. Thus, the findings provide important knowledge about elderly peoples MIL, how they can be reached with information and knowledge and provided with support that is likely to enhance their abilities to adopting healthier lifestyles.

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## References

1. UNESCO: Media and Information Literacy (2014). http://www.uis.unesco.org/Communication/Pages/information-literacy.aspx
2. Fischera, S.H., David, D., Crottya, B.H., Dierksa, M., Safran, C.: Acceptance and use of health information technology by community-dwelling elders. Int. J. Med. Inf. **83**, 624–635 (2014)
3. Saied, A., Sherry, S.J., Castricone, D.J., Perry, K.M., Katz, S.C., Somasundar, P.: Age-related trends in utilization of the internet and electronic communication devices for coordination of cancer care in elderly patients. J. Geriatr. Oncol. **5**(2), 185–189 (2014)
4. Pálsdóttir, Á.: Preferences in the use of social media for seeking and communicating health and lifestyle information. Inf. Res. 19(4) paper 642 (2014). http://InformationR.net/ir/19-4/paper642.html
5. Bromley, C.: Can britain close the digital divide? In: Park, A., Curtice, J., Thomson, K., Bromley, C., Phillips, M. (eds.) British Social Attitudes: The 21st Report, pp. 73–97. National Centre for Social Research, London (2004)
6. Statistics Iceland: use of ICT and internet by households and individuals 2002 and 2003. Stat. Ser. Inf. Technol. 89(12) (2004). https://hagstofa.is/lisalib/getfile.aspx?ItemID=921
7. Statistics Iceland: use of computers and the internet by households and individuals 2007. Stat. Ser. Inf. Technol. 92(39) (2007). https://hagstofa.is/?PageID=421&itemid=b2f90b6b-6383-4c04-83ac-2385068d1722
8. Statistics Iceland: computer and internet usage by individuals 2012. Stat. Ser. Tourism Transp. IT 97(33) (2012). https://hagstofa.is/lisalib/getfile.aspx?ItemID=14251
9. Fox, S., Duggan, M.: Information Triage (2013). http://www.pewinternet.org/2013/01/15/information-triage/
10. Thane, P.: History and the sociology of ageing. Soc. Hist. Med. **2**(1), 93–96 (1989)
11. Lög um málefni aldraða nr. 125/1999
12. WHO: Global Health and Aging (2011). http://www.who.int/ageing/publications/global_health.pdf

# Searching for Visual Literacy: Secondary School Students are Creating Infographics

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**Abstract.** Visual literacy is an essential group of competencies for interpreting and generating visual messages within the scope of 21st century skills. More than interpreting visuals, 21st century learners should be equipped with knowledge and ability to generate complex visual messages, which is a harder skill to teach and achieve. In this study, creating infographics is handled as a learning strategy to teach secondary school students how to generate effective visual messages. Research was carried out with the collaboration of science and technology, visual arts, and information technology teachers within a design model research method perspective. The effectiveness of the model is investigated by pre and posttests, retention, and transfer tests. Through the findings on effectiveness of first implementation loop of the infographic design model, a co-constructed design model is proposed. According to the design model proposal, "content" and "visual design" generation was determined central components related to Information Technology, Visual Arts fields for creating infographic.

**Keywords:** Infographics · Secondary school · Visual literacy

## 1 Introduction

Visual literacy is an increasingly important group of acquired competencies that should be developed for success in an ever more visual and digital world. Because we are perpetually surrounded by technology, it has become a necessity to be able to "communicate more instantly and universally," which can be met by visuals [1]. Nowadays "pictorial turn" is taking place, which means the existence of images is more crucial for communication and meaning making than entertainment and illustration [2].

Although the students are experienced users of digital media, they lack the skills and vocabulary for deciphering an image and communicating nonverbally [3]. Becoming visually literate enables students to interpret and compose more complex visual messages during communication or meaning making processes. While "Living in an image-rich world, how-ever, does not mean students naturally possess sophisticated visual literacy skills, just as continually listening to an iPod does not teach a person to critically analyze

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or create music [2, p. 60].", visual literacy centered learning strategies should be developed. Whatever it is, the strategy should inform learners about visual communication principles, which can also be used in other subject areas [4].

In this study creating infographics is handled as a learning strategy within the design model proposal covering the entire process. An infographic is defined as the "visualization of data or ideas that tries to convey complex information to an audience in a manner that can be quickly consumed and easily understood" [5, p. 3]. Infographics are found to be the most memorable visualization type containing pictograms, more color, low data-to-ink ratios, and high visual densities [6]. In addition to being "the sweet spot where linguistic and nonlinguistic systems converges" [7, p. 11], infographics enable learners to visualize the *"big picture"* of a complex idea or content [8].

The design model of the study for creating infographics through the learning process is based on generative learning theory which promotes "learner generated activities" [9]. The implementation process was carried out with the collaboration of science and technology, visual arts, information technology, and technology design teachers, involving much collaboration which makes this study seriously different from other studies. Research was conducted with two separate groups (experimental and control groups) comprise of 45 twelve years old secondary school students who had never created infographics before. The experimental group created individual infographics themed "Pulleys and Levers". The infographics were assessed with detailed rubric comprised of two main dimensions for evaluating the content and the visual structure of the infographics. The pre and post-tests, retention, and transfer tests were applied for investigating the effect of creating infographics on the transfer and retention of the infographic theme. Within this paper the design model proposal and the actual process of the pilot study will be explained; the evaluation results of infographics and the pre-post test, retention and transfer test results will also be presented.

## 2 Method

This study presents the first cycle of an ongoing design-based research about the development of a design model on creating infographics at secondary school level. Through connecting design interventions with existing theories, design-based research purposes to clarify how people think, know, act and learn by developing models [10]. Within this perspective for the purpose of understanding infographic design process of secondary school students, the interrelations of infographic design process components are handled by considering Generative Learning Theory and Visual - Information Design Principles. Accordingly the infographic design model proposal is explained on the basis of process and components forming a model by depicting two separate schemas (Figs. 1, 2). The two main purposes of the infographic design implementation was (1) to make a complex topic more clear for students by making them visualize their knowledge, (2) to instruct students how to design complex visual messages for making them more visual literate.

### 2.1 Research Group and Implementation

The study was conducted with 42, 13 years old seventh grade students from two different classrooms (Group A, Group B) of a private secondary school who had never heard or designed infographics. Without manipulating natural settings, the first cycle of research was carried out with Group A (9 female, 12 male) as a research group and Group B (7 female, 14 male) as a control group for testing the model proposal. The whole process was implemented by collaborating with science and technology, visual arts, information technology teachers and researcher from the research-development group of the school. The science and technology department determined content of the infographic design task as "Levers and Pulleys" which is the subject of simple machines unit. The science and technology department selected levers and pulleys because of relevance to infographic design and complexity of the topic.

### 2.2 Infographic Design Model Proposal Components

Infographic Design Model has three main integrated components: Content Generation, Visual Design and Digital Design, related to knowledge and abilities for designing infographic (Fig. 1). In order to design effective infographics, students should first research and understand the information to generate the content of infographic that is going to be designed.

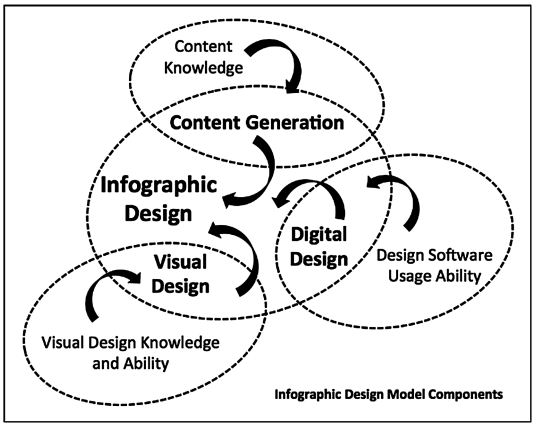


**Fig. 1.** Infographic Design Model components

Related to generated content and design purpose, students should be able to find visualization solutions for conveying messages effectively. Without digital design knowledge and abilities, successfully completed content generation and visual design outcomes could not be made visible to others. That is why students should be able to use digital tools effectively. Considering infographic design process, content generation and visual design begins with appearance of infographic design idea and lasts until the

design is completed. Although digital design seems to begin after content generation and visual design, digital design knowledge and ability affects the whole process. Students, who know what can be done with design application software and have experience using it, spend their time more efficiently on content generation and visual design process and put forward a draft that can be performed.

### 2.3 Infographic Design Process

The infographic design process (Fig. 2) was implemented through following stages: Content Preparation, Lecture on Creating Infographics, Content and Draft Generation, Teacher Feedback to Draft, Design Generation, Teacher Feedback to Design and Regeneration of Design. Infographic design process begins with Content Preparation stage, which is handled as substantial as *Design Generation* stage within infographic design model. Content preparation of this implementation starts with the lecture on simple machines in their science and technology course without doing any modification on natural settings of the curriculum.

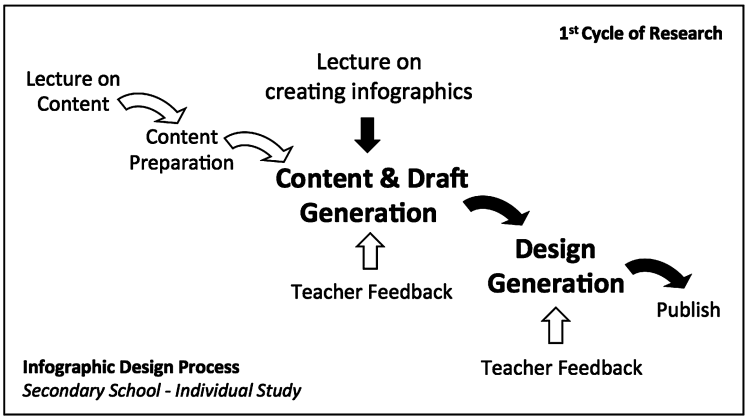


**Fig. 2.** The implementation process of infographic design model proposal

**Lecture on Infographic Design.** The main purpose of this stage was to show a way to the students of designing effective infographics approximately in 45 min. While students had never heard of infographic, the first step was introducing the infographic term by showing them a short animation prepared by the researchers. For making the infographic concept more concrete for students, various kinds of visualizations were displayed to the group to make them to see the difference. Considering the definition, for showing the effectiveness of infographics, the students were provided comparisons of different kinds of visualizations and infographics prepared on the same subject.

The second step was conducted by following a presentation (30 slides) and infographic worksheets focused on components of infographic and design tips to aid effectiveness. The six slides which discuss analyzing the meaningful information

groups consist of text and images, using infographics and finding out their position on the layout according to the grid principle. Immediately after examining meaningful information and layout examples all together from presentation slides, students practiced finding out the meaningful information and the relations between them by gridding their infographic examples on their worksheets individually. The third and the final step of this stage was related to examining the infographics in detail in terms of typography, images and color. Related to gridding in the second step, in this step the way of organizing information by grouping and positioning is accentuated via analyzing infographics. Furthermore what can be done for focusing, emphasizing and using visual cues to direct the viewer were discussed.

At the end of this course the infographic design task on *Levers and Pulleys* was given to students (Fig. 3) and the questions related to content of the task was clarified by the science and technology teacher. For the next *Content and Draft Generation* stage, the students were asked to prepare raw content bearing text and images about the task by using a word processor.

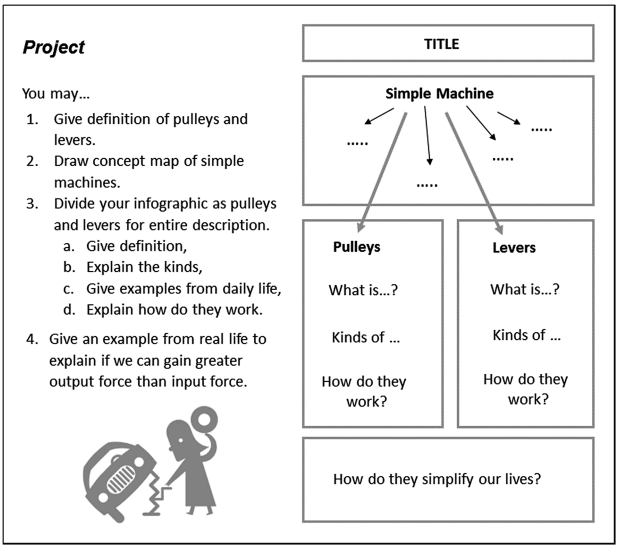


**Fig. 3.** Infographic design task on *Levers and Pulleys*

**Content and Draft Generation.** Before designing an appealing infographic, the most important step is to have comprehensive knowledge of the content related to the aim of designing infographic. Connected to this requirement, two interrelated aims must be achieved at this stage: *extensive content generation* and *holistic draft generation*. For carrying out this stage, defined steps were followed that are depicted in Fig. 3. Interrelated Content and Draft Generation begins with content generation steps and intertwines with draft generation steps with the step on generating the layout and determining the fields of components. Students got to work on generating their

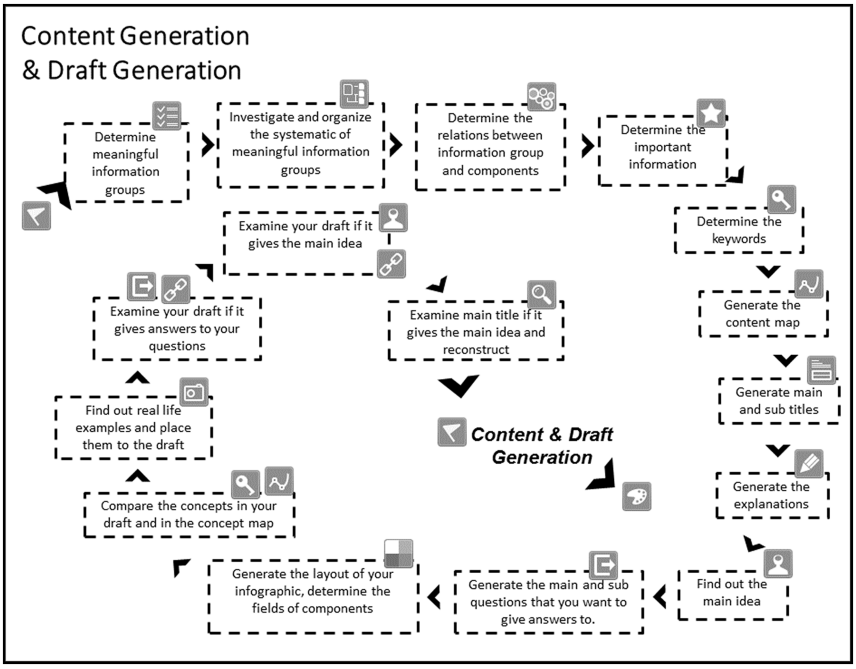


**Fig. 4.** The content - draft generation road map

prepared content by determining meaningful information groups and then tried to follow the following steps shown in content - draft generation road map (Fig. 4). The researcher clarified any misunderstandings of the steps. The science and technology teacher helped the students conceptualize the process further by giving examples from content. After 15 min of individual content generation work, in 35*50 cm sizes sheets were delivered for draft generation. Students began generating the layout of their infographic draft by determining the fields of components. For the next *Design Generation* stage, the students were asked to complete their infographic drafts and deliver them to their science and technology teacher for getting content feedback.

**Teacher Feedback to Draft.** Subsequent to delivery of infographic drafts, the science and technology teacher, and the visual arts teacher gave feedback to the drafts respectively. The science and technology teacher focused on content accuracy and competency. The visual arts teacher critiqued the drafts' visual design features and gave suggestions. In addition, the researcher prepared information visualization tips and supported feedback as an instructional design expert using sticky notes for the next *Design Generation* stage.

**Design Generation.** The longest lasting stage of the infographic design stage was carried out at Computer Laboratory. MS PowerPoint application software was used for digital design. Because allocated time for entire implementation was limited, it was preferred to use software with which they were already familiar. At this stage, the

technology design teacher, information technology teacher and the researcher met with the students four times for 45 min over a three-week period.

**Teacher Feedback to Design and Regeneration.** Students began by examining the feedbacks that were given to their infographic drafts. Following two 45 min meetings on their digital infographics, students were delivered A3 printed posters of their digital infographic drafts with sticky feedback notes on them. Showing them printed versions in real dimensions was considered very important because the display of the computers used to create the designs is approximately 50 percent smaller than the actual size. Likewise, giving them information design tips was seen as essential because digital design tool features influences the design.

**Infographics Delivery and Exhibition.** Students continued to work on their digital infographics individually and delivered them to the science and technology teacher three weeks later on CDs. The designed infographic posters in A3 size on Levers and Pulleys were exhibited at school board.

## 3 Data Collection Tool

**Infographic Design Rubric.** The infographic design of students was evaluated using the Infographic Design Rubric, developed by the researchers. The rubric is comprised of two main dimensions: *Content Generation* and *Visualization* (Table 1). Content generation dimension is handled in two sub-dimensions: *Information Organization* and *Information Quality*, which are evaluated with 11 items. Visualization is handled also in two main sub-dimensions: *Big Picture* and *Components,* and includes 22 items.

**Table 1.** Infographic design rubric dimensions and sub-dimensions

| Content Generation | Visual Design Generation |
|---|---|
| Title | Big Picture |
| Subtitles | Hierarchy |
| Information Organization | Relation |
| Grouping | Guidance |
| Systematic | Rhythm |
| Continuity | Emphasis |
| Information Quality | Continuity |
| Important Information | Balance |
| Key Concepts | Unity |
| Explanations | Components |
| Exampling | Typography |
| Conclusion | Colors |
| Identity | Images |

**Pre-post, Retention and Transfer.** In addition to infographic evaluation, to investigate the effect of the process of students' knowledge acquisition and retention of pulleys and levers, pre-post, retention tests and transfer test were applied. The data of pre-post tests

and retention were collected via the same multiple-choice test comprised of 13 questions. The science and technology teacher selected the test items from a question pool created by the research and development department of the school. The transfer test questions were prepared by the researchers with expert opinions of teachers from the science and technology department of the school. The transfer test comprised of three questions focused on the working mechanism of pulleys and levers from real life examples such as (1) finding the pivot, force and load points and explaining the gain of simple machines, (2) solving a real life problem by suggesting a simple machine for lifting up a load to a craftsman and, (3) giving a suggestion to a fisherman for carrying the fishing rod more easily.

## 4 Findings

**Infographic Design Rubric Results.** Based on infographic design rubric results (Table 2), it is seen that the lowest ranks were obtained for "Continuity", "Systematic" and "Explanations"; the highest ranks were obtained for "Subtitle", "Key Concepts" and "Conclusion" within content generation. Identity was omitted because infographic design task does not require complete identity information like references. The highest ranks were reached for "Typography", "Rhythm" and "Relation"; the lowest ranks were reached for "Images", "Colors" and "Emphasis" within visual design generation. In terms of overall results it could be clearly seen that most of visual design generation dimension ranks are lower than content generation dimensions.

**Table 2.** Mean and std. deviation for infographic design dimensions

| Content Generation | *M* | *SD* | Visual Design Generation | *M* | *SD* |
|---|---|---|---|---|---|
| Title | 3.28 | .461 | Big Picture | | |
| Subtitles | 3.50 | .786 | Hierarchy | | |
| Inf. Organization | | | Relation | 3.28 | .958 |
| Grouping | 3.39 | .850 | Guidance | 3.11 | .758 |
| Systematic | 3.17 | .786 | Rhythm | 3.39 | .698 |
| Continuity | 2.89 | 1.132 | Emphasis | 2.72 | 1.074 |
| Inf. Quality | | | Continuity | 3.17 | .857 |
| Important Inf. | 3.22 | .808 | Balance | 3.11 | .832 |
| Key Concepts | 3.72 | .575 | Unity | 3.06 | .938 |
| Explanations | 3.17 | .857 | Components | | |
| Exampling | 2.89 | .900 | Typography | 3.89 | .13 |
| Conclusion | 3.44 | 1.149 | Colors | 2.73 | .98 |
| Identity | 4.00 | 0 | Images | 2.55 | .88 |

**Pre-post and Retention Test Results.** Independent samples t-tests were conducted to compare improvement scores (the post test score minus the pretest score) for the experimental group (infographic design implementation) and the control group (without infographic design implementation) conditions. There was not a significant difference in the improvement scores for experimental group ($M = 5.00$, $SD = 1.60$) and

control group ($M$ = 5.20, $SD$ = 2.59) conditions; $t$ (31) = -2.71, $p$ = 0.78. A Mann-Whitney test indicated to compare retention scores. Again there was not a significant difference in the retention scores for experimental group ($Mdn$ = 10.50) and control group ($Mdn$ = 9) conditions ($U$ = 97.50, $p$ = .43).

**Transfer Test Results.** The aim of transfer was to investigate the relationship between designing infographics and the transfer of information. Ten out of eighteen students volunteered to participate in the transfer test. A Spearman's Rho correlation was run to determine the relationship between the ten students' transfer test and infographic design scores. There was a strong, positive correlation between transfer test and infographic design scores, which was statistically significant ($r_s$ = .68, $p$ = .031). Based on the results of the test, the students who got higher infographic design scores got higher ranks also in Transfer Test.

Three examples that received high scores are seen in Fig. 5.

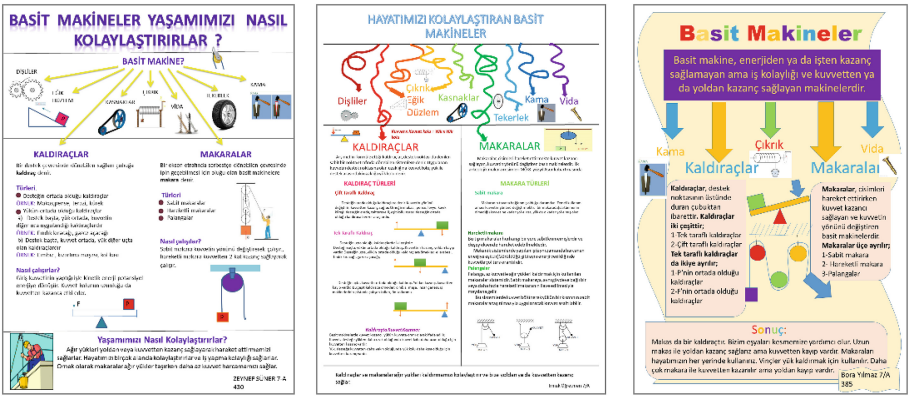


**Fig. 5.** Infographic design examples on simple machines

## 5 Conclusion, Discussion and Recommendations

Infographics enable the presentation of complex information in a holistic way within a big picture which enables the designer to express their knowledge effectively by combining various visualization methods. In this study, infographics are handled as a knowledge visualization method at the secondary school level to help students comprehend a complex topic as simple machines and to increase their visual literacy by instructing them how to design infographics.

The Infographic Design Model and the steps of whole process are constructed based on Generative Learning Theory and Information Design Principles. This study is just a part of an ongoing research which aims to produce a model of designing infographics as a learning strategy within design based research perspective. In direction with this main aim, the first loop of implementation on secondary school students is investigated. The model process was extended and an adapted version of the first loop of the study was performed with university students [11].

The infographic design scores of this study show that visual design generation is more challenging to achieve than content generation. This result may be due to the content of the infographic design task which was selected from their science and technology course and which they had heard lectures and had practiced. On the other hand, it was the first time they created infographics, which necessitates knowledge and ability of information design. According to the overall results, "continuity", "systematic" and "explanations" dimensions of content generation and "images", "colors" and "emphasis" dimensions of visual design generation come to the forefront for first revision of infographic design process. In order to develop the infographic design process in terms of these weaker dimensions, some embodying practices can be strengthened. Discovering the continuity and systematic methods used by information groups in an infographic would be an instructive pre-study. Probably generating effective abstract explanations is the most crucial and the hardest to achieve as well, which could be solved by summing up practices and giving more feedback during creating infographics. With the purpose of developing visualization knowledge and abilities, students should be allowed plenty of time for analyzing, imitating infographic examples and then trying to create their own visuals. Practices on constructing four or five color set or breaking up visuals in to main shapes will help them to create simple but appealing visuals.

While this research was based on design based research method, the process was carried out without any change on naturalistic settings as much as possible. Findings related to pre-post and transfer tests should be considered within this condition. Obtainment of higher transfer test findings by the implementation group could be a result of concluding part of task involving an example from daily life. In future studies, using a topic which is not part of the students' course curriculum for the infographic design task could give experimental results.

## References

1. Metros, S.E.: The educator's role in preparing visually literate learners. Theor. Pract. **47**(2), 102–109 (2008)
2. Felten, P.: Visual Literacy. Change: the magazine of higher learning **40**(6), 60–64 (2008)
3. Metros, S.E., Woolsey, K.: Visual literacy: an institutional imperative. Educause Review **41** (3), 80–81 (2006)
4. Sims, E., et al.: Visual literacy: what is it and do we need it to use learning technologies effectively? Paper presented at Australasian Society for Computers in Learning in Tertiary Education (ASCILITE 2002), pp. 8–11, Auckland, New Zeland, 8–11 December 2002
5. Smiciklas, M.: The Power of Infographics: Using Pictures to Communicate and Connect with Your Audiences. Pearson Education Inc., New Jersey (2012)
6. Borkin, M.A., et al.: What makes a visualization memorable? IEEE Trans. Visual. Comput. Graphics **19**(12), 2306–2315 (2013)
7. Krauss, J.: Infographics: more than words can say. Learn. Leading Technol. **39**(5), 10–13 (2012)
8. Lamb, A., Johnson, L.: Infographics part 1: invitations to inquiry. Teacher Librarian **4**, 54–58 (2014)

9. Grabowski, B.L.: Generative learning contributions to the design of instruction and learning. In: Jonassen, D.J. (ed.) Handbook of Research on Educational Communications and Technology, pp. 719–743. Lawrence Erlbaum Associates, Hillsdale (2004)
10. Barab, S., Squire, K.: Design-based research: putting a stake in the ground. J. Learn. Sci. **13** (1), 1–14 (2004)
11. Nuhoğlu Kibar, P., Akkoyunlu, B.: A new approach to equip students with visual literacy skills: use of infographics in education. In: Kurbanoğlu, S., Špiranec, S., Grassian, E., Mizrachi, D., Catts, R. (eds.) ECIL 2014. CCIS, vol. 492, pp. 456–465. Springer, Heidelberg (2014)

# Scientific Literacy and Its Role in Students' Academic and Professional Development

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**Abstract.** This paper presents results from the research study of students at the Faculty of Humanities and Social Sciences in Zagreb, University of Zagreb, Croatia about their views and perceptions of scientific literacy. The results show that students are interested in scientific discoveries, that they partially have trust in outcomes of scientific research and that they mostly understand work of scientists. To become acquainted with news from science, students use various digital information resources, mostly digital. What is most important, they have clear understanding of what it means to be scientifically literate and what are the competencies that constitute a scientifically literate person. They prefer an institutionalized type of education about science. The results of this research study indicate a mature approach to the understanding of the concept of scientific literacy and that students rely on their knowledge about science and scientific research in their academic (and later in professional) development.

**Keywords:** Scientific literacy · Higher education · Croatia

## 1 Introduction

Science and technology influence our lives both in both professional and private spheres because our society is dominated and even "driven" by its ideas and products [1]. Modern society needs individuals with scientific and technological qualifications at the top level as well as a general public possessing a broad understanding of its contents, methods, and its power as a social force shaping the future [2]. Such individuals would be considered scientifically literate, that is, they would be familiar with the notion of scientific literacy which represents the understanding of scientific concepts and processes required for personal decision making, participation in civic and cultural affairs, and economic productivity [3]. To become scientifically literate, individuals have to participate in some type of education, preferably from their earliest age and continue to build their scientific literacy competencies throughout their entire life. Following this idea of the importance of education in scientific literacy, this paper will focus on students as one of the most important groups in the general population that is strongly influenced by science during their education. The following parts of the paper will present the concept of scientific literacy in short and the results of the research study of students at the Faculty of Humanities and Social Sciences in Zagreb, University of Zagreb, Croatia (FHSS) and


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their perceptions and views on scientific literacy as a perquisite for their academic and professional development in their post-academic life.

## 2 Scientific Literacy

The initial idea of scientific literacy appeared in the 1950 s in the United States and continued to develop in 1960 s when public concerns about science education became even more present in public media [1]. From that moment on, science topics started to enter school curriculums and professional literature creating grounds for even wider acceptance of the concept [1]. Since that early period in development of scientific literacy, many definitions were developed to describe the very concept of scientific literacy. Miller [4] defined civic scientific literacy as "… the level of understanding of science and technology needed to function as citizens in a modern industrial society". For Van Eijck and Roth [3] it "… means knowledgeably participating in and contributing to worldly affairs where scientific literacy is required". The Organisation for Economic Co-operation and Development (OECD) [2] defined scientific literacy as "the capacity to use scientific knowledge, to identify questions and to draw evidence-based conclusions in order to understand and help make decisions about the natural world and the changes made to it through human activity". In addition to these definitions, scientific literacy can be described and analyzed in different ways. Authors like Brickhouse [5] analyzed further the concept of scientific literacy and differentiated four dimensions of scientific literacy that signify its importance in the life of individuals: 1. civic dimension (participation in public life and ways which supports, critiques and directs professional science); 2. personal dimension (making good use of scientific information to make personal decisions); 3. cultural dimension (appreciation and understanding of scientific ideas for their own sake); and 4. critical dimension (understanding why scientific texts were written, what the authors were trying to do with the scientific text etc.). One of many aspects of scientific literacy is that it strengthens challenges to the nature of scientific research as well as the direction of technological innovation. This has become possible because of the scientifically literate population which possesses a rational view of the world, has a predisposition to think critically and the capacity to appraise scientific evidence for themselves [6]. The document "PISA Assessing Scientific, Reading and Mathematical Literacy: a Framework for PISA 2006" [7] analyzed scientific literacy and described four of its interrelated aspects: recognizing life situations involving science and technology (that is, context); understanding the natural world on the basis of scientific knowledge (that is, knowledge); demonstrating competencies that include identifying scientific issues, explaining phenomena scientifically and drawing conclusions based on evidence (competencies); indicating an interest in science, support for scientific research and motivation to act responsibly towards natural resources and environments (that is, attitudes). It also includes competencies to: explain phenomena scientifically; evaluate and design scientific research; and interpret data and evidence scientifically [8]. All these competencies are important because they should be included in university courses about science and scientific research. Scientific literacy has many applications in real life. According to Van Eijck and Roth [3] "in the everyday world,

scientific literacy likely does not mean doing well on a test, but it means knowledgeably participating in and contributing to worldly affairs where scientific literacy is required". For Hodson [6] scientifically literate individuals will be able to "to cope with the demands of everyday life in an increasingly technology-dominated society, better positioned to evaluate and respond appropriately to the supposed "scientific evidence" used by advertising agencies and politicians, and better equipped to make important decisions that affect their health, security and economic wellbeing". This rather short insight into scientific literacy explains some of the most important elements of the concept of scientific literacy and its applications, which are the foundations for the research study in the following part of this paper.

## 3 Research Study

Although science has been around us for centuries, some groups in the general population perceive it differently on the grounds that their lives are influenced differently by science. This paper focuses on one specific group – students, who should already have a clear and deep view on science in general, and the work of scientists by the time they enroll in a university. However, that is not always the case and students sometimes see scientists "as withdrawn and remote from real life, sometimes selfish and antisocial, and certainly less friendly than 'normal' people" [2]. To discover their current perceptions and views about selected aspects of science and scientific literacy, a research study was initiated. The purpose of the research was to get an insight into the connection of science and scientific literacy and the students at the FHSS. The objective of this study was to collect data about the importance of science to the students, and about their understanding of the term of scientific literacy and its acquisition in important segments of students' everyday activities. This research is an addition to the previous two researches on the topic of scientific literacy conducted in 2012 [9] and 2013 [10]. An online (Web) survey with nine closed type questions was chosen as the research method in this study. While this method has its shortcomings, it is still a legitimate and practical method for collecting data from a large number of research participants. The research was initiated on June 17, 2015, by sending an e-mail invitation to the students' mailing list and by publishing the invitation on the main Web page of the FHSS. The invitation was sent to all students regardless of their age and study program to attract as many participants as possible. The online survey was closed on June 26, 2015, with the total of 218 student participants.

## 4 Results and Discussion

In a series of questions the students in the research study were asked about selected aspects of scientific literacy. Because of space restrictions, only partial results will be presented in the next part of the paper.

### 4.1 The Year of the Study Students Are Attending

The results in the first question indicate that most respondents were students in advanced years of study including postgraduate students. Students in the category "Not a student of a reformed study program" were students of the old pre-Bologna study programs which still haven't finished their study. Since the participation in the research study was offered to the students of all study groups at the FHSS, including students of the old (pre-Bologna) study programs, it was not possible to estimate the share of the participants in this research study in the total number of students at the FHSS. While this is a restriction of this research study, the results are still very indicative and valuable foundation for further research (Table 1).

**Table 1.** The year of the study students are attending (N = 218)

| Year of the study | N | % |
|---|---|---|
| First year (undergraduate study) | 17 | 7.8 |
| Second year (undergraduate study) | 15 | 6.9 |
| Third year (undergraduate study) | 28 | 12.8 |
| Fourth year (undergraduate study) | 2 | 0.9 |
| First year (graduate study) | 31 | 14.2 |
| Second year (graduate study) | 32 | 14.7 |
| Advanced university student | 41 | 18.8 |
| Not a student of a reformed study program | 17 | 7.8 |
| Postgraduate study | 35 | 16.1 |

### 4.2 The Degree of Students' Interest for Scientific Discoveries

The answers in this question indicate that almost half of the respondents were partially interested in scientific discoveries, and less than half were completely interested in scientific discoveries. Since the students are in direct and daily contact with science and scientific research during their study at the university, the percentage of the answers about complete interest for scientific discoveries should be higher as their study programs require proficiency in science. Respondents declaring no interest for scientific discoveries were hardly present. Higher percentages of interest for scientific discoveries could be achieved by involving all students more actively in practical scientific research taking into consideration their study groups and their interests. The students who are already involved in scientific activities will, presumably, be more familiar with numerous aspects of scientific work and would progress more easily through the study program (Table 2).

**Table 2.** The degree of students' interest for scientific discoveries (N = 218)

| | N | % |
|---|---|---|
| Completely uninterested | 1 | 0.5 |
| Partially uninterested | 6 | 2.8 |
| Neither interested nor uninterested | 11 | 5.1 |
| Partially interested | 106 | 48.6 |
| Completely interested | 94 | 43.1 |

### 4.3 The Degree of Students' Trust in Outcomes of Scientific Research

Over 72 % of the respondents partially trust the outcomes of scientific research, while only 8.7 % of the students in this research study have the complete trust in outcomes of scientific research. Over 9 % of the respondents do not partially believe in outcomes of scientific research, while 7.8 % neither have trust nor distrust in outcomes of scientific research. Reasons for trust or distrust could be many; for instance, normative nature of information, that is, the norm within a certain community which tells us how many people would agree or disagree on some important issue [11] or some other influences the respondents acquired during their earlier education that shaped their views on science. A deeper insight into this matter is necessary to understand factors that influence someone's trust or distrust in science (Table 3).

**Table 3.** The degree of students' trust in outcomes of scientific research (N = 218)

| | N | % |
|---|---|---|
| Complete trust | 19 | 8.7 |
| Partial trust | 159 | 72.9 |
| I have neither trust nor distrust | 17 | 7.8 |
| Partial distrust | 20 | 9.2 |
| Complete distrust | 3 | 1.4 |

### 4.4 The Degree of Understating of Work of Scientists

Familiarity with work of scientists could help students in accepting science in general. Fifty-six percent partially understand the work of scientists, while 42.2 % understands it completely. Only 1.8 % of the respondents do not understand work of scientists. The results in this question show that the students who participated in this research are familiar with work of scientists which makes them more open to scientific concepts and practice, which is, again, important for raising the level of scientific literacy (Table 4).

**Table 4.** The degree of understating of work of scientists (N = 218)

| | N | % |
|---|---|---|
| I completely understand work of scientists | 92 | 42.2 |
| I partially understand work of scientists | 122 | 56.0 |
| I do not understand work of scientists | 4 | 1.8 |

### 4.5 Information Resources Students Use in Order to Acquire News from the World of Science

The respondents were given 19 information resources (plus the answer "in some other way") from which they could choose which information resources for acquisition of news from the world of science they use. The results show that the students in this research study frequently use: for example, scientific journals, books, certain categories of Web pages available freely on the internet, materials from scientific conferences, and television broadcasts. In general, the students use mostly digital information resources available to them depending on their information needs. It is worth noting that online information resources are a common source of scientific news among the students in this research while radio broadcasts, public lectures in public institutions, and materials from scientific conferences, personal Web pages of scientists, Web pages of weekly magazines, and specialized social networks are less popular. Further research into reasons or criteria for choosing certain information resources would give a more precise picture about use of scientific information resources (Fig. 1).

### 4.6 Being Scientifically Literate

This question investigates the perceptions of the students about elements of the concepts scientific literacy. Most of them perceive scientifically literate persons as people who are well familiar scientific method, who are familiar with basic scientific concepts, who know how to determine the validity of scientific information resources, who know how to determine correct and incorrect use of scientific information resources, who know how to organize, analyze and interpret data from scientific research and know how to draw a conclusion from scientific proofs. These are the most frequently chosen answer by the respondents indicating that a scientifically literate person should be more than just familiar with the most important aspects of science. All choices the students made in this question suggest that they have very clear idea about what a person should be able to do to call himself or herself a scientifically literate person (Table 5).

### 4.7 Areas Important for Developing Competencies Related to Scientific Literacy

The top five answers in this question were: know how to design hypotheses, know how to analyze research data and draw proper conclusions, know how to differentiate arguments based on scientific proofs and theories from those based on other foundations,

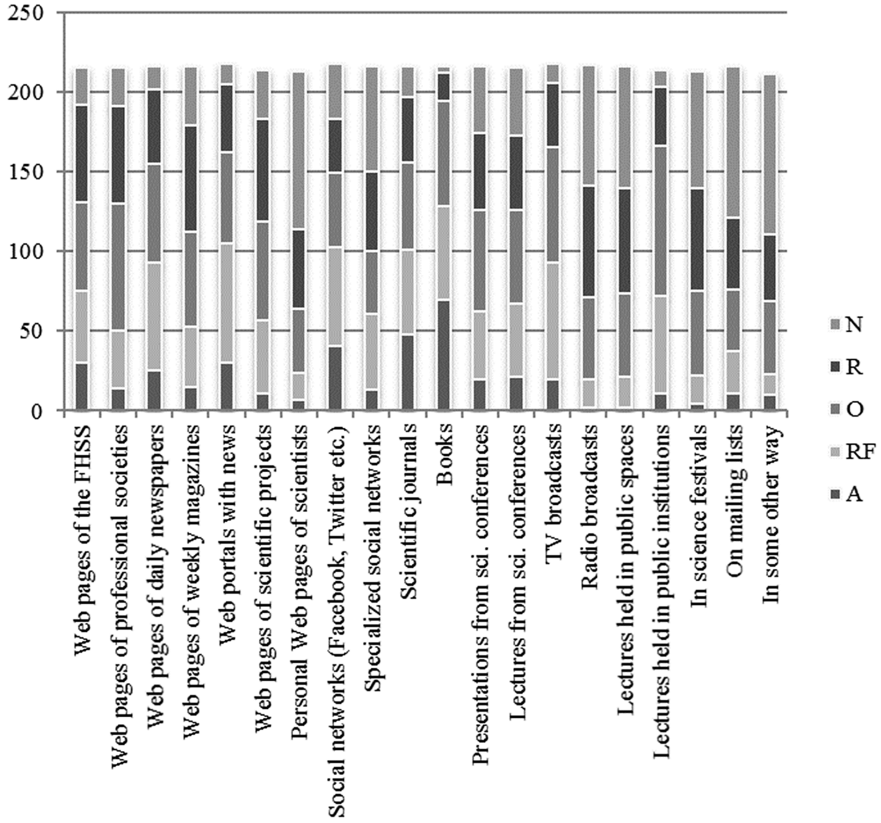


**Fig. 1.** Use of information resources for acquisition of news from the world of science. A = Always, R = Rather frequently, O = Occasionally, R = Rarely, N = Never (multiple answers)

know how to evaluate scientific arguments and proofs which originate from different sources and know how to identify main scientific question in research. These five answers suggest that the students recognized areas of knowledge important in becoming scientifically literate. Areas not recognized by students could be further elaborated to students during their program of study in order to reach better science proficiency (Table 6).

### 4.8 Types of Education Students Received in Order to Familiarize Themselves with Science

The respondents prefer a formal type of education about science, that is, lectures at the university. Lectures at university are followed by lectures outside the university and online lectures (live and recorded) while other types of education about science were chosen less frequently by the respondents. It is interesting to observe that the online lectures are not used more frequently by the students in this research. The respondents were also given a possibility of including some other types of education: self-learning

– by using different information resources (2), documentaries (1), communication with colleagues (1), congresses (1), practical work in science (1), lectures in audio format (1), literature review (3), exchange of knowledge with colleagues and other people (1), collaboration with colleagues and other people (1), books (2), conferences (1), communicating with people who are involved in science (1), podcasts (1), doing research on my own (1), journals and other media (1), individual work (1), field trips (1), and scientific meetings (1). These answers could be accepted as the supplement to the predefined answers in this questions which include some of the most frequent types of education offered to students at the university level. It remains to be investigated further what online types of education in science will prevail in the following years and what will be reasons for that (Table 7).

**Table 5.** Being scientifically literate (N = 217) (multiple answers)

| A person should: | N | % |
|---|---|---|
| Be familiar with application of scientific methods of research | 180 | 83.0 |
| Know how to determine the validity scientific information resources | 166 | 76.5 |
| Be familiar with basic scientific concepts | 164 | 75.6 |
| Know how to determine correct and incorrect use of scientific information resources | 164 | 75.6 |
| Know how to draw a conclusion from scientific proofs | 160 | 73.7 |
| Know how to organize, analyze and interpret data from scientific research | 158 | 72.8 |
| Know how to recognize a scientific problem | 131 | 60.4 |
| Know how to create a plan for scientific research | 127 | 58.5 |
| Know how to explain some phenomenon in scientific terms | 102 | 47.0 |
| Understand nature around yourself with the help of scientifically based knowledge | 98 | 45.2 |
| Know how recognize situations in which it is possible to apply a scientific discovery | 96 | 44.2 |
| Be familiar with development of ICT | 76 | 35.0 |
| Know how to create representations of results of scientific research | 68 | 31.3 |
| Be responsible to natural resources and environment | 57 | 26.3 |
| Show interest for science | 50 | 23.0 |
| Provide support to scientific research | 34 | 15.7 |

**Table 6.** Areas important for developing competencies related to scientific literacy (multiple answers)

| A person should: | N | % |
|---|---|---|
| Know how to design hypotheses | 164 | 75.6 |
| Know how to transform research data from one representation to another | 163 | 75.1 |
| Know how to evaluate scientific argument and scientific proofs from different information resources | 162 | 74.7 |
| Know how to evaluate scientific arguments and proofs which originate from different sources | 161 | 74.2 |
| Know how to identify main scientific question in research | 146 | 67.3 |
| Know how to evaluate types of scientific research | 135 | 62.2 |
| Know how to differentiate arguments based on scientific proofs and theories from those based on other foundations | 133 | 61.3 |
| Be able to recall scientific knowledge and know how to apply it | 132 | 60.8 |
| Know to identify, use and model scientific facts | 132 | 60.8 |
| Know how to describe in which scientists create safe environment for research data and to be able to generalize conclusions and explanations | 118 | 54.4 |
| Know how to explain potential implications of implementation of scientific knowledge on society | 117 | 53.9 |
| Know how to differentiate questions which can be scientifically researched | 113 | 52.1 |
| Know how to analyze research data and draw proper conclusions | 90 | 41.5 |
| Know how to evaluate assumptions, proofs and explanations in scientific texts | 78 | 35.9 |

**Table 7.** Types of education received in order to familiarize oneself with science (multiple answers)

| | N | % |
|---|---|---|
| Lectures at the university | 211 | 97.2 |
| Lectures outside the university | 130 | 59.9 |
| Online lectures (live and recorded) | 84 | 38.7 |
| Workshops at the university | 78 | 35.9 |
| Workshops outside the university | 58 | 26.7 |
| Short courses | 44 | 20.3 |
| Online short courses | 40 | 18.4 |
| Summer schools | 31 | 14.3 |
| Some other type of education | 22 | 10.1 |

## 5 Conclusion

Science is integral part of society which depends on ideas and products coming from science and technology. To continue its development, society needs scientifically literate

citizens. Education in scientific literacy can begin at an early age and it should continue throughout one's life. This paper presented the results of the research study of university students at the FHSS. According to the results, students are interested in science, have trust in outcomes of scientific discovery and understand well the work of scientists. They most commonly use digital information resources to inform themselves about science. They also understand well what it means to be scientifically literate as well as what are the competencies that constitute scientific literacy. They prefer formal education in science but sometimes they also acquire knowledge about science outside the university. The results suggest that scientific literacy is important for education of the students who participated in this research study. The results in this research study also indicate that the students are well acquainted with the concept of scientific literacy, which is encouraging since they are already active citizens who influence their society. Therefore, we can conclude that science and scientific literacy play an important role in students' academic (and later on) professional development.

## References


1. Roberts, D.A.: Linne scientific literacy symposium. In: Promoting Scientific Literacy: Science Education Research in Transaction, pp. 9–17. Uppsala University, Uppsala (2007)
2. Sjøberg, S.: Science and Technology in Education – Current Challenges and Possible Solutions. http://www.iuma.ulpgc.es/users/nunez/sjobergreportsciencetech.pdf
3. Van Eijck, M., Roth, W.M.: Theorizing scientific literacy in the wild. Educ. Res. Rev. **5**, 184–194 (2010)
4. Miller, J.: Civic scientific literacy: a necessity in the 21st century. FAS Public Interest Reports **5**, 3–6 (2002)
5. Brickhouse, N.W.: Scientific literates: what do they do? who are they. In: Promoting Scientific Literacy: Science Education Research in Transaction, pp. 90–94. Uppsala University, Uppsala (2007)
6. Hodson, D.: Towards Scientific Literacy A Teachers' Guide to the History, Philosophy and Sociology of Science. Sense Publishers, Toronto (2008)
7. PISA Assessing Scientific, Reading and Mathematical Literacy: A Framework for PISA 2006 http://www.oecd.org/edu/school/assessingscientificreadingandmathematicalliteracyaframeworkforpisa2006.htm
8. Pisa 2015 Draft Science Framework. http://www.oecd.org/pisa/pisaproducts/Draft%20PISA%202015%20Science%20Framework%20.pdf
9. Vrana, R.: Teaching Scientific Literacy by the Help of ICT. In: Proceedings 35. Jubilee International Convention on Information and Communication Technology, Electronics and Microelectronics, pp. 1533–1538. Croatian Society for Information and Communication Technology, Electronics and Microelectronics - MIPRO, Rijeka (2012)
10. Vrana, R.: Promotion of scientific literacy and popularization of science with support of libraries and internet services. In: Kurbanoğlu, S., Grassian, E., Mizrachi, D., Catts, R., Špiranec, S. (eds.) ECIL 2013. CCIS, vol. 397, pp. 324–330. Springer, Heidelberg (2013)
11. Van der Linden, S., Lewandowsky, S.: How to Combat Distrust of Science. Scientific American. http://www.scientificamerican.com/article/how-to-combat-distrust-of-science/

# Metadata Literacy Skills: An Analysis of LIS Students

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**Abstract.** Resource description, one of the key components of the Library and Information Science (LIS) field, represents a set of processes based on standards and changes according to needs and new developments. Resource description processes and utilization of related standards require special skills and competencies for information professionals. Resource description skills are also known and described as metadata literacy skills. Metadata literacy skills are mainly composed of three sets of skills, namely basic skills, information object description skills and decision-making skills. LIS departments play an important role in equipping their students, in other words, future information professionals, with these skills. This study aims to explore the level of metadata literacy skills of undergraduate students in the Department of Information Management of Hacettepe University. A questionnaire was used as a data collection instrument. Findings of the survey indicate that these students have a higher level of confidence regarding basic and information object description skills, in comparison with decision-making skills.

**Keywords:** Metadata · Metadata literacy · Metadata literacy skills · LIS students · Turkey

## 1 Introduction

One of the services provided by cultural memory institutions to meet ever changing expectations of their users is increasing visibility and accessibility of their collections by the use of high quality metadata. Metadata is defined as "structured information that describes, explains, locates, or otherwise makes it easier to retrieve, use, or manage an information object. Metadata is often called data about data or information about information" [1, p.1]. Metadata as a concept is understood and used differently in different environments. Some use it to refer only to records that describe digital objects, while others use it to refer to records that describe both digital and non-digital objects. In the library environment, the term metadata is used for any formal scheme of resource description (including traditional cataloging), applied to any type of object.

Skills used by information professionals for resource description processes (i.e. conceptualization, metadata creation and studies on metadata issues) are also referred to as metadata literacy skills [2–4].


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There are some connections between metadata literacy skills and information literacy skills. First of all, resource description itself requires the use of searching, analyzing and critical thinking skills that can be described as high level information literacy skills [5–7]. Secondly, since developing a deeper understanding of how metadata is created helps to understand how information resources can be located and retrieved, metadata literacy seems to be, to a certain extent, a part of information literacy.

There is no doubt that metadata literacy skills are important for information professionals not only to perform their professional activities towards resource description in order to increase the accessibility and visibility of their collections, but also to teach information literacy in a more enhanced way.

Therefore, equipping LIS students with metadata literacy skills during their formal education is important, and that is why it is generally among the core courses and one of the main objectives of the curricula in many LIS schools.

The purpose of this study is to explore the perceived proficiency levels of students of the Department of Information Management of Hacettepe University regarding metadata literacy skills. Findings provide information about the current level of undergraduate students' perceived metadata literacy skills and also provide guidance to faculty as they prepare the curricula.

## 2 Related Works

As a concept, metadata literacy was first used in 2009 by Eric T. Mitchell in his doctoral dissertation titled *Metadata Literacy: An Analysis of Metadata Awareness in College Students* [2]. Mitchell describes metadata literacy under the skill-based literacies and defines the concept as "the ability to conceptualize, create and work with metadata within information environments" [2, p. 62]. He claims that some of these skills are already a part of information literacy skills set. He also points out other studies which analyze cataloging, critical thinking and abstracting skills of students in the context of information literacy skills [8, 9].

There are numerous studies in the literature on metadata skills. American Library Association's (ALA) Metadata Interest Group refers to metadata skills as understanding metadata standards, computer literacy skills, use of web tools and technical skills such as markup languages (especially XML), OAI, RDF structures and CSS [10]. The report published by the National Research Council reflects metadata related competencies as management abilities, understanding complex system structures, collaboration and communication skills, skills related to conceptualization of digital documents, and algorithmic thinking skills [11].

Some studies describe metadata skills by listing the skills of a metadata librarian, in some cases in comparison with the skills of a cataloging librarian. According to Chapman, for instance, skills metadata librarians should possess can be classified under the following titles: collaboration, research, education, and development. There are also studies determining metadata librarians' skills based on job announcements. In one of these studies, Mkhize indicates that metadata librarians should have adaptation and independent working abilities, critical thinking and problem solving skills, organizational and communication skills, as well as collaboration skills [12]. Park and Lu [13],

based on their analysis of 107 job postings, describe metadata skills as metadata creation, electronic resource management, awareness of trends, and digital library development. They also reveal that traditional cataloging and classification standards and skills are highly relevant as well.

In addition, a review of literature indicates that, skills required for resource description processes change with the effects of technology and new information environments. For instance, the importance of skills related to description of audio-visual formats and new information resources has been increasing [14]. Additionally, metadata related skills become important not only for library and information science but also for data literacy especially in e-science [15].

Besides librarians, some have studied students' metadata skills and competencies. In one such study, it was found that students use metadata in social networks and that their metadata literacy level was sufficient. A statistically significant difference was reported on the level of metadata literacy skills of students who have knowledge and experience of digital information and information literacy [2].

## 3 Methodology

The main aim of this study is to identify proficiency levels of LIS students regarding metadata literacy (use of metadata and decision making about metadata related issues). With this aim, an online survey was conducted of undergraduate students of Department of Information Management of Hacettepe University. At the Department, both core and elective courses are offered related to metadata literacy skills and competencies within the undergraduate curricula.

The research question of the study is "what is the perceived proficiency level of students about metadata literacy skills?"

A questionnaire, which consists of 21 statements under three main categories, was designed based on a five-point Likert Scale. It was disseminated to all students enrolled in the Department (281 students) via email and an internal information system. The survey generated 88 responses. Almost one third of the total students (31 %) in the Department were represented.

Collected data was analyzed by Predictive Analytics SoftWare (PASW). Descriptive statistics were used for analyses. Reliability level of gathered data was calculated via internal consistency tests of PASW software. Internal consistency was found significantly high with the Cronbach Alpha value calculated as 0.96.

## 4 Findings

Demographic data has shown that the majority were third year students (almost 40 %–35 students), while almost 33 % were second year students, 13.6 % were first year and final year students (29 and 12 students, respectively).

The results reported in this section of the study present findings according to three components of metadata literacy and metadata related skills: basic skills which are also related to information literacy skills, information object description skills, and decision making skills.

### 4.1 Basic Skills

Basic metadata skills/competencies were identified in six statements. According to the findings, almost 80 % of the students defined their proficiency level regarding *finding citations in texts* as either good or very good, while only 20 % defined it either as fair or poor or very poor (17 %, two percent, and one percent, respectively). While 86 % of students claim to be good or very good at *describing the elements in a citation,* only 33 % claim to be good at *understanding the standard used in a citation.* These findings indicate a gap in their knowledge regarding different citation styles, although they can recognize its components (Table 1).

**Table 1.** Basic skills

| | Very Poor | | Poor | | Fair | | Good | | Very Good | | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | |
| Finding citations in a text | 1 | 1.1 | 2 | 2.3 | 15 | 17 | 30 | 34.1 | 40 | 45.5 | 4.2 |
| Description of the elements in a citation | 0 | 0 | 5 | 5.7 | 7 | 8 | 27 | 30.7 | 49 | 55.7 | 4.4 |
| Understanding the standard used in a citation | 11 | 12.5 | 15 | 17 | 33 | 37.5 | 21 | 23.9 | 8 | 9.1 | 3 |
| Understanding preferred metadata standard in a digital library | 18 | 20.5 | 9 | 10.2 | 24 | 27.3 | 19 | 21.6 | 18 | 20.5 | 3.1 |
| Understanding preferred metadata standard in a digital library | 18 | 20.5 | 9 | 10.2 | 24 | 27.3 | 19 | 21.6 | 18 | 20.5 | 3.1 |
| Understanding preferred classification system in a library | 6 | 6.8 | 14 | 15.9 | 17 | 19.3 | 24 | 27.3 | 27 | 30.7 | 3.6 |
| Finding description elements in a document or a resource. | 3 | 3.4 | 1 | 1.1 | 9 | 10.2 | 28 | 31.8 | 47 | 53.4 | 4.3 |

As for *understanding preferred metadata standard in a digital library* 42 % defined their level as either good or very good, while 27 % define their level as fair, and 31 % as either poor or very poor. More than half the students indicated a deficiency in their proficiency regarding *metadata standards used in digital libraries*. On the other hand, when it comes to *understanding preferred classification system in an information center*, more than half the students (58 %) claimed to be good or very good (Table 1). Yet, almost 23 % evaluated their level as poor or very poor. *Finding description elements in a document or a resource* seems to be a metadata skill about which the majority of students (85.2 %) feel competent.

### 4.2 Information Object Description Skills

Students were asked to describe their information object description skills over six statements. Results show that more than half the students (55.7 %) claimed their levels to be either good or very good at *creating an abstract for a video,* while more than

one-fifth of them rated their level as poor or very poor. The majority of students feel competent (rating their level either good or very good) in *identification of keywords for a video* (70 %), *finding description elements of photograph or an image* (66 %), *understanding the structure of an electronic resource (navigation, content and context)* (60 %), and *adding tags and comments to a web page* (69 %). On the other hand, the majority (56 %) feels less competent (rating their level either fair or poor or very poor) when it comes to *finding descriptive elements of different information objects* (Table 2).

In this part of the study, mean scores are relatively lower compare with the basic skills, especially about the statements regarding *creation of an abstract for a video* and *finding description elements of different information objects* (Table 2).

**Table 2.** Information object description skills

| | Very Poor | | Poor | | Fair | | Good | | Very Good | | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | |
| Creating an abstract for a video | 5 | 5.7 | 15 | 17.0 | 19 | 21.6 | 31 | 35.2 | 18 | 20.5 | 3.5 |
| Identification of keywords for a video | 2 | 2.3 | 4 | 4.5 | 20 | 22.7 | 34 | 38.6 | 28 | 31.8 | 3.9 |
| Finding description elements of a photograph or an image | 4 | 4.5 | 10 | 11.4 | 16 | 18.2 | 26 | 29.5 | 32 | 36.4 | 3.8 |
| Understanding the structure of an electronic resource (navigation. content and context) | 2 | 2.3 | 10 | 11.4 | 24 | 27.3 | 26 | 29.5 | 26 | 29.5 | 3.7 |
| Adding tags and comments to a web page | 2 | 2.3 | 6 | 6.8 | 19 | 21.6 | 28 | 31.8 | 33 | 37.5 | 4.0 |
| Finding description elements of different information objects | 6 | 6.8 | 13 | 14.8 | 30 | 34.1 | 27 | 30.7 | 12 | 13.6 | 3.3 |

### 4.3 Decision Making Skills

Students were asked to describe their levels related to decision-making processes of metadata related activities that can potentially be used in any information center. More than one third of the students (37.5 %) rated their level fair about *determining description standard for resources in an information center*. Additionally, 28 % rated their level as poor or very poor while 34 % rated it as good or very good. There seems to be a deficiency regarding this specific skill.

More than half the students seem to be more competent (rating their level either good or very good) in *deciding on the elements for description of an information resource* (52.3 %), *deciding on description fields for object description* (62.5 %), *providing directive information about a resource via its metadata descriptions* (53.4 %), and *choosing information resources that can meet their information needs by metadata descriptions* (58 %). *Determining the type of an information resource* is the skill which gets the highest confidence level. 85 % of the students rated their level either as good or very good (36.4 % and 48.9 % respectively) (Table 3).

**Table 3.** Decision making skills

| | Very Poor | | Poor | | Fair | | Good | | Very Good | | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | n | % | n | % | |
| Determining description standard for resources in an information center | 6 | 6.8 | 19 | 21.6 | 33 | 37.5 | 24 | 27.3 | 6 | 6.8 | 3.1 |
| Deciding on the elements for description of an information resource | 5 | 5.7 | 10 | 11.4 | 27 | 30.7 | 27 | 30.7 | 19 | 21.6 | 3.5 |
| Deciding on description fields for object description | 3 | 3.4 | 8 | 9.1 | 22 | 25.0 | 22 | 25.0 | 33 | 37.5 | 3.8 |
| Providing directive information about a resource via its metadata descriptions | 6 | 6.8 | 9 | 10.2 | 26 | 29.5 | 34 | 38.6 | 13 | 14.8 | 3.4 |
| Determining the type of an information resource | 2 | 2.3 | 4 | 4.5 | 7 | 8.0 | 32 | 36.4 | 43 | 48.9 | 4.3 |
| Choosing information resources that can meet my information needs by browsing their metadata | 5 | 5.7 | 10 | 11.4 | 22 | 25.0 | 32 | 36.4 | 19 | 21.6 | 3.6 |
| Choosing appropriate description fields of an information resource in different description standards | 5 | 5.7 | 15 | 17.0 | 36 | 40.9 | 22 | 25.0 | 10 | 11.4 | 3.2 |
| Choosing an appropriate metadata standard that can be served for an information center and its objective | 11 | 12.5 | 17 | 19.3 | 31 | 35.2 | 19 | 21.6 | 10 | 11.4 | 3.0 |
| Understanding the quality of metadata of an information resource | 15 | 17.0 | 17 | 9.3 | 23 | 26.1 | 27 | 30.7 | 6 | 6.8 | 2.9 |

On the other hand, students seem to be feeling less competent on some skills in this category such as *choosing appropriate description fields of information resources in different metadata standards* (41 % of the students rated their level as fair, while 23 % rated it as poor or very poor), *choosing an appropriate metadata standard for an information center or its aims and objectives* (35 % of the students rated their level as fair, while 32 % rated it as poor or very poor), and *understanding the metadata quality of a resource* (31 % rated their level as fair, while 26 % rated it either as poor or very poor).

## 5 Conclusions and Recommendations

Libraries and information centers are memory institutions that are strongly affected by advancements in technology and changes in information environment. Therefore they have to update their infrastructures, policies and services in order cope with changes

and increase service quality to meet their users' expectations. Developments and changes in the information environment also have an impact on resource description units of these institutions along with the skills and competencies required from professionals who work in these units. As a result, there has been a transition from cataloging librarian to metadata librarian, as it is clearly seen in related job announcements. It is LIS departments' responsibility to follow up the change and make adaptations in their curricula accordingly to make sure that their students are equipped with new skills required in the field. There is no doubt that empowering students with such new skills will support their professional efficiencies.

This study attempts to determine LIS undergraduate students' perceptions on their metadata literacy skills. Findings indicate a high level of competence regarding most of the basic skills such as *determining the type of an information resource* and *understanding preferred classification system in an information center*, and skills heavily used on web and social media, such as, *identification of keywords for a video*, *finding description elements of photograph or an image,* and *adding tags and comments to a web page.* However the study also found that students feel less competent mostly in higher level skills which are listed under the decision making category, such as *understanding the standard used in a citation, understanding preferred metadata standard in a digital library, finding description elements of different information objects, determining description standard for resources in an information center, choosing appropriate description fields of information resources in different metadata standards, choosing an appropriate metadata standard for an information center or its aims and objectives*, and *understanding the metadata quality of a resource.*

Students' lack of confidence regarding certain skills could be affected by several factors such as the year of the study, subject specific elective courses they have taken, the experience they gained from practical work they carried out during their practicum, personal interest, and gaps in curricula. To the best of authors' knowledge, the Department's curricula cover all the aspects mentioned related to metadata skills, however some only addressed in elective courses but might not be detail. Further study is needed to uncover the factors behind the lack of certain metadata skills.

## References

1. NISO: Understanding Metadata. NISO, Bethesda (2004)
2. Mitchell, E.T.: Metadata literacy: an analysis of metadata awareness in college students. Unpublished PhD Thesis. University of North Carolina at Chapel Hill, North Caroline (2009)
3. Intner, S.S.: A Plea for universal metadata literacy. Technicalities **27**(1), 13–15 (2007)
4. Martin, K.: Post Details: Nrmig Meeting at ALA Annual, Sunday 28 June 2008. http://blogs.ala.org/nrmig.php?title=nrmig_meeting_at_ala_annual_sunday_june_&more=1&c=1&tb=1&pb=1
5. Caplan, P.: Metadata Fundamentals for All Librarians. American Library Association, Chicago (2003)

6. Iannella, R., Waugh, A.: Metadata: enabling the internet. In: Proceedings of CAUSE 1997, The Information Professions and the Information Professional, pp. 87–98. Distributed Systems Technology Centre, Brisbane (1997)
7. Liu. J.: Metadata and its applications in the digital library: approaches and practices. Libraries Unlimited, Westport (2007)
8. Walczak, M.M., Jackson, P.T.: Incorporating information literacy skills into analytical chemistry: an evolutionary step. J. Chem. Educ. **84**(8), 1385–1390 (2007)
9. Pinto, M., Fernández-Ramos, A., Doucet, A.-V.: Measuring students' information literacy skills through abstracting: case study from a library & information science perspective. Coll. Res. Libr. **69**(2), 132–154 (2008)
10. Han, M., Hswe, P.: Metadata Librarians Today: Roles and Competencies. https://www.ideals.illinois.edu/bitstream/handle/2142/13624/ALA2009Annual_Han+Hswe.pdf?sequence=5
11. National Research Council: Being Fluent with Information Technology. National Academy Press, Washington DC (1999)
12. Mkhize, T. C.: A Transition! from Cataloguing Librarian to Metadata Librarian. http://liasa.org.za/sites/default/files/notices/mkhize_tholakele.pdf
13. Park, J., Lu, C.: Metadata professionals: roles and competencies as reflected in job announcements, 2003–2006. Cataloging Classification Q. **47**(2), 145–160 (2009)
14. Buttlar, L., Garcha, R.: Catalogers in academic libraries: their evolving and expanding roles. Coll. Res. Libr. **59**(4), 311–321 (1998)
15. Qin, J., D'ignazio, J.: The central role of metadata in a science data literacy course. J. Libr. Metadata **10**, 188–204 (2010)

# Information Literacy Instruction

# Argument-Driven Inquiry in the Information Literacy Instruction in Taiwan

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**Abstract.** The purpose of this study was to investigate the effects of argument-driven inquiry information literacy (IL) instruction on fifth-graders' argumentative learning, and teachers' opinions on the instruction. The research site was a fifth-grade classroom of 30 students in Taiwan and lasted seventeen weeks. IL instruction was taught a period of time per week by a teacher librarian, who collaborated with a classroom teacher. An inquiry project was used in the IL and Chinese courses. The Argument Test was used for the pretest and posttest. Research data was collected from interviews, participant observations, tests, and document analysis. Results showed that argument-driven inquiry was an effective project for cultivating these students' argument skills; their overall argument performance improved significantly, though some challenges remained. Both the teacher librarian and classroom teacher suggested that we systematically design argument-driven inquiry projects in IL curriculum, to progressively improve students' argumentative reasoning.

**Keywords:** Argumentative skills · Argument-driven inquiry · Information literacy instruction · Big6 model

## 1 Introduction

Many researchers allege that acquiring argumentative reading and writing strategies as well as practices are important for school curricular reforms, because the ability to identify the underlying argument, and its claims, warrants, and evidence are crucial for academic success [1–3]. In fact, the essence of argument contains logical and critical thinking, which is a skill decisive to participating in a democratic society.

Two main challenges in teaching argument are mentioned in studies [3]. First, both teachers and students lack clear concepts about structures of argumentative texts because most textbooks often favor narrative and explanatory texts over argumentative ones. Second, there is no actual audience for students formulating arguments in a classroom setting where their primary audience is their teacher. Thus, Kuhn [2] and Llewellyn [4] suggested that there is a need to build an argument-driven inquiry to engage students in a meaningful learning environment, so their critical thinking can be developed.


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### 1.1 Purpose of Study

The main purposes of this study were to examine the effects of argument-driven inquiry information literacy instruction on fifth-graders' argumentative learning and to understand teachers' reflections towards the instruction. Specific research purposes were as follows:

- To examine students' overall argument performance in the information literacy instruction.
- To examine students' argumentative writing performance in the information literacy instruction.
- To understand teachers' opinions about the integrated information literacy instruction.

## 2 Literature Review

### 2.1 Importance of Argument Learning

A democratic society is one where people have common visions and make reasonable decisions through constant communication, compromise, and respect for each other. However, there are many conflicts happening in the democratic countries recently, such as highway toll collectors conflict in Taiwan, events of white police officers shooting black men in the United States, anti-austerity movement in Europe. It seems that reasonable communication is not an easy goal for us to achieve. Researchers indicate that the most promising path to resolving conflicts is to make an argument using logical reasoning and relevant evidence to convince an audience and consider his/her perspective at the same time [1, 2, 5].

There are three basic elements of argument: claim, evidence, and warrant [1, 5, 6]. First, a claim is the statement and position proposed by the author; it is persuasive if it demonstrates an insightful understanding of topics. Secondly, evidence is the data which supports the claim; regardless of types of evidence, they should be substantial, correct, and related to the topic. Third, a warrant provides insightful analysis of how evidence supports the claim.

Thus, for the complex structure of argumentative texts, it is not easy to learn and teach arguments compared with narratives and expository writing. Furthermore, students in Taiwan start to learn argumentative texts relatively late in the fifth grade; before that, they had few chances to encounter this kind of text in school. Sandoval and Millwood [7] found that many high school students could cite evidence for their claims, yet they often failed to notice whether these data contradicted their claims or not. Hillocks [1] also revealed that in the U.S.A. one textbook of over 1100 pages devoted only 45 pages to persuasive writing and only 1.5 pages to argumentative texts. These textbooks did not emphasize the differences between facts and opinions, nor instruct students how to make logical inferences when facing controversial problems.

Therefore, regardless of country, scholars claimed that we should pay more attention to argument learning and teaching because the essence of argument is crucial for students to participate in their daily lives and academic disciplines [3].

### 2.2 Teaching Argument Skills

There are several bottlenecks for teaching argument skills, such as lacking clear concepts about structure of argumentative texts and no actual audience for students formulating arguments [2, 3, 5]. Thus, researchers propose many teaching strategies from different perspectives to promote students' argument skills. Within a cognitive perspective, studies found that fourth through eighth-grade students who were assigned to write argumentative essays with more elaborated goals and specific audience generated higher quality essays than did students in the control condition [8, 9]. In addition, analysis of reading-writing relationships indicated that reading instruction influenced argumentative writing. Integrating reading and writing argument instruction would help students build argumentative schema and reduce 'myside' bias [10, 11].

Furthermore, Kuhn [2] and Llewellyn [4] suggested that creating a classroom culture of argumentation and inquiry which integrates different teaching strategies is another alternative to develop students' argumentative reasoning.

### 2.3 Learning Through Argumentation and Inquiry

Both learning through argumentation and inquiry are teaching trends today, which start from the examination of data, then give rise to questions and critical thinking. They can empower students with knowledge, competence, and dispositions to become independent thinkers, problem solvers, and effective decision-makers. Kuhn [2] indicated that only pursuing knowledge is not the final goal of education; students need to develop facility in the skills of inquiry and argument to acquire knowledge and to use it to make sound judgements. Furthermore, this kind of learning had better be integrated horizontally across subject areas and vertically across grade levels [2].

National Research Council suggested that science laboratory activities need to be more inquiry-based and argument-driven, so students can design their own investigations, gather and analyze data, and engage in critical discussions as they work [12]. Besides science, information literacy curriculum also emphasizes the ability of inquiring, critical thinking, and decision making. Recently it has been promoted eagerly by numerous countries around the world [13]. Many studies suggested that information literacy instruction should be integrated across various content areas using inquiry-based learning [14, 16, 17]. Super3 and Big6 are two of the inquiry process models used widely by practitioners and researchers for integrating information literacy into curriculum [15, 16], and their impacts were verified by many studies [18, 14]. Though the integrated content areas were numerous and diverse (for example: science, social studies, language arts), most inquiry projects did not relate to argumentative topics. Thus, there is a need to further investigate the effects of argument-driven inquiry information literacy on students' learning.

# 3 Methodology

## 3.1 Research Design

This study employed a case study to investigate the effects of argument-driven inquiry information literacy instruction on fifth graders' argument skills.

## 3.2 Research Site and Participants

The main research site was a fifth-grade classroom which had a total of 30 students (15 boys and 15 girls). Chiachia Elementary School has adopted the information literacy curriculum since 2005, designed by the researchers and school teachers. The information literacy curriculum was integrated into various subject matters via the framework of inquiry-based learning, such as Super3 and Big6 models. A series of inquiry projects has been implemented in information literacy instruction in each semester since the second semester of grade one. Therefore, all of participants were familiar with inquiry-based learning, but had little experience with argument writing. Ms. Chang, a teacher librarian was responsible for teaching the information literacy instruction, while Ms. Lin, the classroom teacher, taught argumentative writing. They both were the collaborative teachers in this study. The information literacy instruction was taught once a week for a 40-min period over seventeen weeks.

## 3.3 Instructional Contents

Argumentative text was first time introduced in fifth-grade Chinese language arts class this semester. Thus, Ms. Chang, Ms. Lin and researchers designed an inquiry project, titled "Controversial Persons Inquiry" in the information literacy course to cultivate students' understanding of argumentative reasoning and writing. Students worked in groups of three and were free to choose any controversial persons based on their interests or the list Ms. Chang provided. Ten groups of students were asked to collect and find more relevant information as well as perspectives on the persons of interest from a number of resources, including books, websites, newspaper articles, and magazine articles. After reading the materials, each group cooperatively drew concept maps to define the framework of the controversial person. At the same time, students recorded useful information and perspectives in worksheets.

Based on the concept map, each student wrote an essay containing both pro and con perspectives about the person with supporting evidence, reasons, and his/her final position. Then each group presented their inquiry project to peers with PowerPoint, and answered questions asked by peers. At last, students reviewed the whole inquiry process, such as reflecting on whether they have done their best to complete the inquiry projects.

### 3.4 Instrument

The Argument Test, designed by researchers was used for the pretest and posttest in this study. It was composed of 13 questions which included seven multiple-choice questions and six open-ended items for measuring students' comprehension of argumentative texts. The Cronbach's α reliability coefficient of the test was 0.707. Open-ended questions were scored 0-5 on the basis of their correctness and completeness by the first author and an independent judge; the inter-rater reliability as indicated by percentage agreement was 0.719. Some example items are listed in Appendix A.

The Argumentative Writing Rubrics included six criteria (claims, evidence, warrants, organization, sentences, and conventions); each criterion described qualitative differences between three levels of proficient, basic, and below basic (see Appendix B). Students' essay containing claims, evidence, and warrants were scored using the rubrics.

### 3.5 Data Collection and Analysis

Data collection methods included interviews, participant observations, tests, and document analyses. The researchers interviewed the teachers and several students about their opinions about the instruction by asking open-ended questions such as "What do you think about integrating information literacy into Chinese course?" The researchers also observed the teaching and learning activity each week and helped teachers collect instructional materials. The documents collected included the reflective article Ms. Lin wrote, school mid-term tests, and argumentative essays students wrote. All of the qualitative data were organized, coded, reviewed and analyzed multiple times. The quantitative test data were analyzed using a paired sample *t-test*, which examined the differences between participants' pretest and posttest scores.

## 4 Results

### 4.1 Students' Overall Argument Performance in the Information Literacy Instruction

This research was a case study without a control group design, so the results should not be inferred generally. However, according to the Argument Test results in Table 1, the paired sample t-test was significant ($t = 5.855$, $p = .000 < 0.05$). It meant that fifth graders acquired the overall argument skills after learning the argument-driven inquiry information literacy instruction.

Except the overall statistical data, students' argument performance can be analyzed in detail based on the items in the Argument Test and other documents. Understanding purposes of argumentative texts was an important learning objective for this study because fifth-graders learned this text type for the first time. In the pretest of Argument Test, only 6 among 30 students knew that the purpose of argumentative texts was to "state your position with convincing reasons in order to persuade others." After

**Table 1.** Summary of *t-test* in argument test

| Number | Pretest | | Posttest | | *t* | *p* |
|---|---|---|---|---|---|---|
| | M | SD | M | SD | | |
| 30 | 11.77 | 5.097 | 15.77 | 4.360 | 5.855 | .000 |

$\alpha = .05$

seventeen-week information literacy instruction, the subjects took the posttest. Twenty-seven among 30 subjects answered this question correctly.

Furthermore, understanding the features of argumentative texts was another learning objective in this study. There was a reading section in the school mid-term test which asked students to read a short passage and to decide its structure and support it with reasons. Of 30 subjects, 20 could make right judgements and wrote down reasons. For example, S23 wrote, "*An argumentative text includes claims, evidence, and warrants. The claim is asking others without feeling shame; warrants is knowledge coming from ignorance; evidence is author's own experience.*" (Mid-tem S23) Another question in the mid-term test was to require students to "*support the claim of Asking without Shame with two reasons*." There were 26 students who could find two reasons. For example, S5 stated that "*first, the author said 'A person is a fool when he has never asked questions.' It means that we should ask more. Secondly, the author said 'Don't be afraid to ask stupid questions.' It means that we should ask questions without fear.*" (Mid-term S5) According to the above data, the subjects understood the structural differences between argumentative texts and others. Most fifth graders could find evidence in short argumentative passages.

However, some students could not flexibly apply the three elements of claims, evidence and warrants in a new context. In the Argument Test, students needed to write a short passage about the importance of cooperation with a positive example. Regardless of pretest and posttest, only half of students could provide positive cases, such as ants storing food, playing basketball, and doing a project (AT S2, 3, 8, 9, 15 et al.). The other half of students wrote this passage with negative examples, "*If we don't cooperate with each other, we can't make a boat move…*" (AT S29).

Furthermore, some students had problems in integrating different perspectives from longer argumentative texts. One question in the Argument Test asked students to rewrite an argumentative passage based on two legends concerning moving a mountain using different methods. Based on the evaluation rubrics with a 5-point scale, students' average score was 3.23, which meant they performed well. For example, the student S23 who got 5 points could identify the differences between the methods to move a mountain and propose her own position and reasons, such as: "*When we have troubles, we should learn to change a method, because we can't be just like Yu-Kon to shovel a mountain away. Instead, we can follow Min-Lou to take a detour. Although to be indomitable is important, we still need to learn to take alternative routes to reach a final goal.*" (AT S23)

However, there were one-third of students, who got $0 \sim 2$ points according to the rubrics, could not pose a claim or evidence, nor analyze it logically.

### 4.2 Students' Argumentative Writing Performance in the Information Literacy Instruction

There were six criteria in the Argumentative Writing Rubrics and each criterion included three levels from proficient (5 points), basic (3 points) to below basic (1 points). The minimal score for students' argumentative writing was 70 points. If an essay got 5 points in each criterion, it would get a perfect score. According to the writing rubrics, of the 30 subjects, 6 were above 95 points, which meant that the criteria of claims, evidence, warrants, organization, and sentences all reached the proficient level, and only the conventions criterion was below basic level. Ten students' essays scores were 90 $\sim$ 94, which meant that at least two criteria were proficient level, others were basic. However, 14 students' essay scores were 80 $\sim$ 89, which showed that at least one criterion was below basic level. Based on the data, around half of the students could apply what they learned in writing argumentative texts. The other half of students had problems with it, especially in warrant criterion. They could not support their claims with insightful reasoning, though they had substantive evidence.

In addition, many students were not familiar with the usage of transitional expressions, such as but, however, and therefore. Several students expressed the difficulties they had in reflection notes: "*In the writing process, I can't find suitable conjunctions to connect the key points.*" (RS21) "*I have never written arguments before. I found the most difficult was to find enough evidence to support my position. The easiest part was writing a conclusion because I just followed the information I organized.*" (RS10)

### 4.3 Teachers' Opinions About the Integrated Information Literacy Instruction

During the study, researchers formally and informally interviewed Ms. Chang and Ms. Lin several times. They both stated that fifth graders could investigate a figure from different perspectives after the argument-driven inquiry instruction, but part of them had problems in writing an argumentative text with pro and con views simultaneously. The teachers indicated that time was the key problem in this study. There was not enough time to guide students to think critically because the information literacy course was one period of time per week. Ms. Chang said, "*If students can discuss in groups in class rather than after class, their performance will be much better. But right now a 40-min period per week is only enough for teacher giving instruction. Students have to find their own spare time for discussion.*" (Interview Chang) The classroom teacher also expressed her opinions about the argument-driven inquiry information literacy instruction in her reflection article. She said, "*To students, learning structure of argumentative texts means to build a new schema. They are used to employing the schema of narrative texts in an argumentative text. The basic elements of claims, evidence and warrants all are new to students. We should continue to implement this kind of project later on. Only one time is not enough.*" (Reflect Lin)

Therefore, Ms. Chang and Ms. Lin suggested a feasible solution was to develop a series of learning projects involving argument to cultivate student's argument skills. In

fact, Chiachia Elementary School has integrated information literacy into school curricula for ten years, but all inquiry projects from grade 1 through grade 4 just asked students to write narrative or expository texts. Neither controversial topic nor argumentative reading and writing were introduced. Thus, argument skills teaching had better be divided into a series of learning projects, from simple to complex, in different grade levels, so that students have more chances to develop critical thinking (Interview Chang and Lin).

## 5 Discussion and Conclusions

Using argument-driven inquiry in fifth-grade information literacy curriculum was an effective project for cultivating students' argument skills. Their overall argument performance improved significantly. They understood the purposes and basics of argumentative texts. However, fifth-graders had problems in integrating different perspectives from longer argumentative texts, and in flexibly applying claims, evidences and warrants in a new context. Half of students performed well in argument writings with insightful claims about the controversial figures inquired.

This was the first time fifth-graders experienced controversial issue and argumentative texts. Although fifth-graders' performance still needed to be improved, what they performed was impressive. Both the teacher librarian and classroom teacher suggested that we should systematically design argument-driven inquiry projects in information literacy curriculum from the lower grades in elementary level, so that students' argumentative reasoning can be progressively developed. As Kuhn [2] and Llewellyn [4] state, argument skills are higher-order cognitive competencies, so we need to provide more opportunities and enough time to engage students in an argument-driven inquiry. Hillocks [1] indicated that doing all of this takes time, but it is well worth the time and effort. Hopefully, through such curriculum we can effectively empower an inclusive and informed future citizenry capable of critical thinking, empowered argumentation, and meaningful participation in our democratic society.

## Appendix A: Argument Test (Sample Items)

1. (⋯) What is the purpose of argumentative texts? (A) state your position with convincing reasons in order to persuade others (B) describe the various scenery you saw and heard about (C) explain topics and meanings (D) express your own feelings such as happiness, anger, sorrow, or delight.
2. (⋯) Which of the following sentences contradicts to itself? (A) She often receives an outdoor training, so she looks suntanned. (B) Although his father is sick, he insists to keep working. (C) His voice is clear, so many people are attracted to his singing. (D) It is impossible having an answer to this question, but every student must find the answer.

3. Please write a short passage about the importance of cooperation with a positive example.

4. Please write down the three basic elements of argument (**claims**, **evidence**, **warrants**) based on the following passage.
*When we face problems, we should have the courage to ask others; Don't be shy. This is an effective learning method. Our great thinker Confucius always actively asked for help when encountering things which he did not understand. For example, when he entered a temple, he asked everything regardless of others' laughs. Confucius became a knowledgeable man because he asked questions without hesitation. Therefore, bravely asking others questions is indeed an effective learning means.*

## Appendix B: Argumentative Writing Rubrics

| Criteria | 5 proficient | 3 basic | 1 below |
|---|---|---|---|
| Claims | States a claim that demonstrates an insightful understanding of topic. | States a claim that demonstrates limited understanding of topic. | Do not state a claim and demonstrates little to no insightful understanding of topic. |
| Evidence | Supports a claim skillfully with substantial and relevant evidence. | Supports a claim with relevant but minimal evidence. | Supports a claim with minimal and irrelevant evidence. |
| Warrants | Provides insightful analysis of how evidence supports a claim. | Provides some analysis of how evidence supports a claim. | Provides no analysis of how evidence supports a claim. |
| Organization | Includes an elaborated introduction, structured body, and insightful conclusion. | Includes introduction, body, and conclusion. | Misses introduction, body, or conclusion. |
| Sentences | Uses relevant linking words to connect reasons to claim. | Uses some linking words to connect reasons to claim | Uses no linking words to connect reasons to claim. |
| Conventions | Uses correct punctuations and words. Use appropriate phrases. | Uses correct punctuations or words. | Uses incorrect punctuations and words. |

## References


1. Hillocks, G.: Teaching argument for critical thinking and writing: an introduction. Engl. J. **99**(6), 24–32 (2010)
2. Kuhn, D.: Education for Thinking. Harvard University Press, Cambridge (2008)
3. Newell, G.E., Beach, R., Smith, J., VanDerHeide, J.: Teaching and learning argumentative reading and writing: a review of research. Read. Res. Q. **46**(3), 273–304 (2011)
4. Llewellyn, D.: Teaching High School Science Inquiry and Argumentation. Corwin, Thousand Oaks (2013)
5. Hillocks, G.: Teaching Argument Writing, Grades 6-12: Supporting Claims with Relevant Evidence and Clear Reasoning. Heinemann, Portsmouth (2011)
6. Mason, L., Scirica, F.: Prediction of Students' Argumentation Skills about Controversial Topics by Epistemological Understanding. Learn. Instr. **16**, 492–509 (2006)
7. Sandoval, W.A., Millwood, K.A.: The quality of students' used of evidence in written scientific explanations. Cogn. Instr. **23**, 23–55 (2005)
8. Ferretti, R.P., MacArthur, G.A., Dowdy, N.S.: The effects of an elaborated goal on the persuasive writing of students with learning disabilities and their normally achieving peers. J. Educ. Psychol. **92**(4), 694–702 (2000)
9. Midgette, E., Haria, P., MacArthur, C.: The effects of content and audience awareness goals for revision on the persuasive essays of fifth and eighth-grade students. Read. Writ. **21**(1/2), 131–151 (2008)
10. Kuhn, D., Udell, W.: The development of argument skills. Child Dev. **74**(5), 1245–1260 (2003)
11. Wolfe, C.R., Britt, M.A., Butler, J.A.: Argumentation schema and the myside bias in written argumentation. Writ. Commun. **26**(2), 183–209 (2009)
12. Sampson, V., Grooms, J., Walker, J.: Argument-Driven inquiry: a way to promote learning during laboratory activities. Sci. Teach. **76**(8), 42–47 (2009)
13. Kurbanoglu, S., Grassian, E., Mizrachi, D., Catts, R., Spiranec, S. (eds.): Worldwide Commonalities and Challenges in Information Literacy Research and. ECIL 2013. CCIS, 397. Springer, New York (2013)
14. Chu, S.K., Tse, S.K., Loh, E.K., Chow, K.: Collaborative inquiry project-based learning: effects on reading ability and interests. Libr. Inf. Sci. Res. **33**(3), 236–243 (2011)
15. Eisenberg, M.B., Berkowitz, R.: Teaching Information & Technology Skills: The Big6 in Elementary Schools. Linworth, Worthington (1999)
16. Eisenberg, M.B., Robinson, L.E.: The Super3: Information Skills for Young Learners. Linworth, Worthington (2007)
17. Kuhlthau, C.C., Maniotes, L.K., Caspari, A.K.: Guided Inquiry: Learning in the 21st Century. Libraries Unlimited, Westport (2007)
18. Chen, L.C., Huang, T.W., Yen, R.D.: The effects of inquiry-based integrated information literacy: four-year trends. J. Educ. Media Libr. Sci. **51**(4), 561–595 (2014)

# One Size Doesn't Fit All – Effectiveness and Subjective Evaluations of Adaptable Information Literacy Instruction

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**Abstract.** The paper examines whether effects of an adaptable information literacy instruction program are associated with (a) adherence to the recommendations of online learning contents derived from a test of prior knowledge and (b) subjective evaluations of the program. An adaptable blended learning training for German psychology students was evaluated in a study with a pretest-posttest design. $N = 64$ advanced students completed two tests of scholarly information literacy, an information literacy self-efficacy scale, and an evaluation questionnaire. Participants who worked on more online materials than recommended based on their pretest performance did not differ in their gain scores from participants who exactly followed the recommendations. However, both groups outperformed participants who omitted recommended materials. According to subjective evaluations, the latter participants constitute a "risk group" with low subjective acceptance of online teaching which might need additional support during online learning or alternative forms of instruction.

**Keywords:** Information literacy · Blended-learning · Adaptability · Learning-on-demand · Psychology

## 1 Introduction

The importance of information literacy in higher education is widely emphasized [1]. Nevertheless, information literacy instruction is often not well integrated into curricula and is mostly provided in one-shot-sessions which are insufficient to convey information literacy comprehensively [2, 3]. Thus, students usually acquire most of their corresponding knowledge and skills unsystematically during informal processes of learning in practice without being guided by library staff or faculty. As a consequence, they vary greatly in their levels of information literacy. These individual differences have to be taken into account when designing information literacy programs. An adaptable approach to instruction seems most suitable for this purpose because it implies that learners are given the opportunity to adjust the learning materials to their individual competencies and deficiencies [4]. These adjustments may be supported by


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recommendations which are tailored to learners' current level of competence. The paper illustrates the potential usefulness of adaptable instruction by presenting a blended learning training of scholarly information literacy tailored to the domain of psychology.[1] It aims at providing evidence that the training is effective overall and that learning achievements are associated with (a) the adherence to individualized recommendations of adaptable online materials which are provided based on a test of prior knowledge, and (b) subjective evaluations of the course.

### 1.1 Adapting Instruction to Individual Differences

Individual differences in learners' competencies and preferences constitute a major challenge in teaching [5]. Research has provided ample evidence for intervention effects dependent on interactions of individual characteristics and treatment variables [6]. As a consequence, it has been suggested that instruction should be delivered in a differentiated or personalized fashion [7]. Regarding the way differentiated instruction is offered, two approaches may be distinguished [8]. In *adaptive* instruction, teaching is individualized by the instructor or the learning environment (for example, an online learning management system) based on information about the learner, such as age, choices the learners made when interacting with the system, or learners' past performance. In contrast, *adaptable* instruction permits learners to control the learning process, for example by choosing among the materials and tasks according to individual competencies or needs ("learning on demand"; [9]). Adaptable instruction is assumed to have numerous benefits compared to adaptive instruction [4, 10]: As learners are given personal control over learning, they are expected to develop feelings of self-efficacy and, by monitoring and adjusting the learning process, to become more effective self-regulated learners. However, adaptable instruction does not always lead to learning benefits. According to a meta-analysis, including learner control within educational technology produced near zero effects [11]. One of the reasons for this finding lies in the fact that learners differ in their ability to assess their individual competence levels and to set adequate learning goals. Especially learners with little prior knowledge are often unaware of their deficits [12]. Therefore, it has been suggested to support the choice of learning materials by recommendations based on pretests [4]. The finding that especially less advanced learners benefit the most from recommendations [13] seems to emphasize this assumption. Providing individual recommendations is particularly relevant for information literacy instruction as students often have inadequate information literacy skills [14] and grossly overestimate their level of prior knowledge [15]. Thus, they will have problems selecting learning contents appropriately without support [2].

When designing an adaptable approach to information literacy instruction, two challenges have to be mastered: First, recommendations have to be adequately tailored to participants' characteristics. This task is by no means trivial: It may difficult to select characteristics that are most relevant for success and to assess the individual level of these characteristics [16]. Second, care must be taken that learners do not fail to follow

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these recommendations, for example, because they prefer to make decisions based on individual interests instead of competencies [17]. There is reason to assume that adherence to recommendations goes along with positive subjective evaluations of instruction which indicate that the program meets the participants' needs and interests. These positive evaluations should in turn be associated with more learning gains. For example, it was found that high achievers in a blended learning course were more satisfied with the blended format and reported to have learned better [18].

### 1.2 Hypotheses

Based on previous work reported above, the following hypotheses are tested:

- Hypothesis 1: The blended learning training is effective overall, yielding gains on knowledge tests as well as an information literacy self-efficacy scale.
- Hypothesis 2: Training gains are associated with more positive subjective evaluations of the training.
- Hypothesis 3: Participants who follow the recommendations for the materials will achieve larger training gains than participants who omit recommended materials.

## 2 Methods

### 2.1 Design and Participants

The hypotheses were tested in a field study with a pretest-posttest design. Participants were $N = 64$ psychology students ($n = 31$ bachelor level, and $n = 33$ master level; $M = 24.97$ years, 87.5 % female) from the University of Trier, Germany. Participation in the study was voluntary; participants were paid for their participation in the data collection sessions but not for their completion of the training materials.

### 2.2 Intervention

The domain-specific blended learning training BLInk ("Blended learning of information literacy"[2]) includes online materials and a classroom seminar. The selection of contents is based on the psychology-specific information literacy standards of the Association of College and Research Libraries (ACRL) [19]. Most of the content is imparted by the online materials. The materials are allocated to eight chapters. The majority of them refer to scholarly information searching, such as using reference databases like PsycINFO™ and PSYNDEX™ or web search engines like Google Scholar. Others deal with the evaluation of scholarly publications based on general as well as domain-specific quality criteria. Each chapter is preceded by an advanced organizer and contains textual materials with screenshots, videos, and presentations.

[2] Online materials and a training manual are available online (currently in German language only): http://www.zpid.de/blink.

Exercises prompt participants to conduct literature searches on individually relevant topics. By this means, students are encouraged to apply their newly acquired skills, for example to search publications relevant for a term paper, the bachelors' or masters' thesis. At the end of each chapter, participants have the opportunity to check their knowledge by answering a self-assessment test.

The classroom seminar is designed to integrate and reflect the online materials. It includes additional hands-on exercises related to the participants' individually relevant search topics. Furthermore, it provides room for critical discussions, for example about the nature of psychology as a science and about the possibilities and limits of web search engines and reference databases.

### 2.3 Measures and Procedure

In the pretest session, data was collected in small groups with 8 to 14 participants in a computer lab at the University of Trier. Participants completed three measures of information literacy via online survey software: A test of declarative knowledge about scholarly information search and evaluation (extended and revised version of the test published in [20]), the Procedural Information Literacy Knowledge Test – Psychology version (PIKE-P; [21]), and an information literacy self-efficacy scale. The declarative knowledge test is a fixed-choice test which contains 50 items. For each item, three response options are provided. Participants are instructed to mark all response options that are correct. Total scores may vary from 0 to 1. In the current study, this test was used to derive individual recommendations concerning the chapters of the online materials that should be completed. The PIKE-P is a situational judgment test containing 22 items. Each item gives a short description of a situation requiring an information search. This description is followed by four response options. All options are rated on a 5-point Likert-Scale for their usefulness in the given situation. Scoring is based on a scoring key derived from expert ratings (for a detailed description see [20]). Total scores may vary from 0 to 1. Satisfying reliabilities of the test have been reported. High correlations ($r > .60$) between test scores and performance in standardized information search tasks point to its validity. Information literacy self-efficacy was assessed by a ten item scale developed by the authors. Each item (sample item: "I know how to use bibliographic databases to find relevant references.") is answered on a 5-point Likert-Scale. In previous studies, satisfactory internal consistencies were found [22].

Following the pretest, each participant received an email with individual recommendations concerning the chapters of the online learning materials to be completed. Recommendations were based on participants' scores on the declarative knowledge test. For this purpose, the test items were assigned to the eight chapters of the online materials. Each chapter was represented by at least five items. If a participant achieved less than 66 % of the maximum test score per chapter, the recommendation was given to work on that chapter. If 66 % or more were achieved, the chapter was marked as "optional". During the online learning phase (see "Sect. 2.2 Intervention"), participants were given four days to work on the online materials. They had access to all materials, including "recommended" as well as "optional" chapters, on the learning platform

Moodle. Log files were recorded to monitor the participants' online activities and to check whether they followed the individual recommendations. According to additional self-reports, participants spent between three and seven hours working on the online materials. In the subsequent face-to-face learning phase, each small group of participants attended a 150 min classroom seminar which was held by a faculty member with considerable teaching experience and a student assistant.

The posttest took place two days after the classroom session. The small groups of participants again completed the pretest instruments in a computer lab. Additionally, the Inventory for the Evaluation of Blended Learning (IEBL; [23]) was used to assess subjective evaluations of the course. The IEBL comprises 8 subscales with a total of 46 items. Most items are to be rated on a 7-point Likert scale. Three subscales are used in this paper because of their particular relevance for its objectives: "General usefulness of the course" (6 items; sample item: "I learned something meaningful and important."), "Acceptance of online teaching" (5 items; sample item: "It seems reasonable to offer online materials instead of conveying content exclusively in classroom sessions."), and "Acceptance of classroom teaching" (5 items; sample item: "By the classroom session, my understanding of learning content is consolidated.").

## 3 Results

Internal consistencies of all measures reached at least satisfactory levels at pretest as well as posttest (see Table 1). To test the hypothesis that participation in the training increases information literacy, t-tests for dependent samples were performed. The results are in line with Hypothesis 1, corroborating highly significant training effects on both knowledge tests as well as the self-efficacy scale.

**Table 1.** Mean scores, standard deviations, results of the t-test for dependent samples, and internal consistencies of the dependent measures.

| Instrument | α t1 | α t2 | *M*(*SD*) - t1 | *M*(*SD*) - t2 | *t*-value (*df* 63) |
|---|---|---|---|---|---|
| *Information literacy measures* | | | | | |
| Fixed-choice test | .80 | .76 | 0.61 (.07) | 0.75 (.07) | 18.53*** |
| PIKE-P | .66 | .63 | 0.69 (.10) | 0.77 (.09) | 9.98*** |
| Self-efficacy scale | .66 | .69 | 3.02 (.65) | 3.75 (.47) | 9.89*** |
| *IEBL* | | | | | |
| General usefulness of course | | .81 | | 5.92 (0.79) | |
| Acceptance of online materials | | .80 | | 6.08 (0.90) | |
| Acceptance of classroom seminar | | .83 | | 5.41 (1.16) | |

*** $p < .001$ (1-tailed)

Note. α = Cronbach's alpha; *M* = Mean; *SD* = standard deviation; t1 = pretest, t2 = posttest

For further analyses of training effects, residualized gain scores [24] were estimated by regressing the posttest scores on the pretest scores and computing the difference

between observed and predicted values. Compared to simple difference scores (posttest – pretest), the advantage of these scores is that they are (by definition) independent of the level of information literacy prior to training. Residualized gain scores are *relative* measures, representing deviations from the average change within the sample: Negative values indicate that a group's score changed less than average, while positive values indicate that a score changed more than average.

To test Hypothesis 2, which refers to associations between relative learning gains and subjective evaluations of training on the IEBL scales, Pearson correlation coefficients were computed (see Table 2). Residualized gain scores on the PIKE-P and the self-efficacy scale corresponded with subjective usefulness of the course, suggesting that participants who learned more were more positive about the value of the course for their further studies. Additionally, gain scores were correlated with more positive evaluations of the online materials but not with evaluations of the classroom seminar. Accordingly, acceptance of the online elements seems to be particularly relevant for training effects.

**Table 2.** Intercorrelations of training effects (residualized gain scores RES) and subjective evaluations of training (absolute scores).

| | Instrument | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| | *Information literacy measures* | | | | | | |
| 1 | Fixed-choice test (RES) | 1.00 | .29* | .25* | .16 | .07 | -.04 |
| 2 | PIKE-P (RES) | | 1.00 | .01 | .28* | .23* | .01 |
| 3 | Self-efficacy scale (RES) | | | 1.00 | .32** | .23* | .14 |
| | *IEBL* | | | | | | |
| 4 | General usefulness of course | | | | 1.00 | .46** | .31** |
| 5 | Acceptance of online materials | | | | | 1.00 | −.11 |
| 6 | Acceptance of classroom seminar | | | | | | 1.00 |

** $p < .01$; * $p < .05$ (2-tailed)

To test Hypothesis 3, participants were divided into three groups based on the analyses of the Moodle log files: About 17 % of the participants had worked on fewer online chapters than individually recommended (group 1, $n = 11$), while 33 % had exactly followed the recommendations (group 2, $n = 21$), and 42 % had additionally worked on at least one of the optional chapters (group 3, $n = 27$).[3] The results of the one-factorial ANOVA with planned contrasts of means (see Table 3) demonstrate that the efficiency of information literacy instruction was increased by using adaptable online materials: Group 2 did not differ from group 3 in the gain scores on both knowledge tests and the self-efficacy scale while they outperformed students in group 1 who failed to follow the recommendations (as proposed in Hypothesis 3).

[3] Five participants could not be assigned to one of the groups because they did not comply with recommendations in a systematic fashion, i.e. they omitted recommended but worked on optional chapters.

**Table 3.** Means and standard deviations of training effects and subjective evaluations of training in participant groups with different levels of adherence to study recommendations.

| Instrument | Group 1 | Group 2 | Group 3 | ANOVA | Contrast | Contrast 2-3 |
|---|---|---|---|---|---|---|
| | *M*(*SD*) | *M*(*SD*) | *M*(*SD*) | *F*(2, 58) | 1-2 *t*(56) | *t*(56) |
| *Information literacy measures* | | | | | | |
| Fixed-choice test (RES) | −0.04 (0.05) | 0.00 (0.04) | 0.01 (0.05) | 3.89* | −2.01* | −0.85 |
| PIKE-P (RES) | −0.80 (0.76) | −0.07 (0.90) | 0.20 (0.90) | 5.13** | −2.25* | −1.06 |
| Self-Efficacy Scale (RES) | −0.62 (1.49) | 0.15 (0.89) | 0.05 (0.80) | 2.40+ | −2.09* | 0.33 |
| *IEBL* | | | | | | |
| General usefulness of course | 5.53 (1.20) | 5.68 (0.72) | 6.14 (0.55) | 3.44* | <1 | −2.07* |
| Acceptance of online materials | 5.24 (1.46) | 6.29 (0.48) | 6.21 (0.73) | 6.52** | −3.38** | 0.33 |
| Acceptance of classroom seminar | 5.65 (1.10) | 5.45 (1.27) | 5.36 (1.14) | <1 | <1 | <1 |

** $p < .01$; * $p < .05$; + $p < .10$

Note. *M* = Mean; *SD* = standard deviation; RES = residualized gain score

Comparisons of the three groups on the IEBL revealed that group 1 was more critical about the online materials but not about the usefulness of the training and the classroom seminar. Additionally, group 3 surpassed group 2 in ascribing usefulness to the training. Finally, concerning the subjective evaluations, it should be noted that possible scores range from 1 to 7 and a score of 4 corresponds with "neutral" evaluations. Accordingly, all groups valued the course well above the theoretical mean score of the scale.

## 4 Conclusions

The findings corroborate that the adaptable information literacy training presented in this paper is effective: Participation increased knowledge about scholarly information searching and evaluation as well as information literacy self-efficacy in psychology students, and participants were generally positive about the usefulness of the course. It is particularly important to stress that training gains were associated with adherence to recommendations of online materials: Participants following the recommendations (group 2) gained more from the course than those students in group 1 who failed to work on all recommended chapters. These findings demonstrate that omissions of recommended online materials could not be compensated by taking part in the classroom session. The causes for participants' non-adherence might be investigated in

additional studies. However, subjective evaluations give reason to assume that participants in this group were more critical about online teaching. These students might have been overtaxed by the self-regulatory demands of online learning. Additional analyses showed that they also scored lower than both other groups on all pre-test measures. Thus, a possible interpretation is that they are (at least with regard to information literacy) generally low-performing students who might benefit from additional support during the online phase of the course or need alternative forms of information literacy instruction to optimize their learning achievements.

Furthermore, working on additional materials (as observed in group 3) was associated with higher subjective usefulness, but did not increase training effects. Thus, recommendations were adequately tailored to the participants' individual level of prior knowledge. The adequacy of recommendations is also documented by the high level of compliance: About 75 % of the participants completed all materials recommended or even worked on more chapters. It may be argued that participants perceived the feedback provided based on their knowledge test scores as valid. This might have, in turn, increased their motivation to learn [25].

These conclusions are, however, tempered by several limitations: The training was domain-specific and tailored to field of psychology, and the study only comprises a small and possibly selective sample of predominantly female students who are possibly particularly interested in developing their information literacy skills. In addition, participants were paid for completing the evaluation assessments which may have biased their learning behaviors as well as their evaluations of the course. Therefore, the positive results may not easily be generalized and should be replicated in further studies.

Particular attention should be paid to the replication of results across domains and contexts. The conceptualization of information literacy as a set of "generic skills" must be questioned in the light of empirical findings that revealed qualitatively different conceptions of information literacy in different domains [26]. In addition, model-based skill decompositions point to differences between scholarly disciplines like psychology (as an empirical, "soft" science) and computer sciences (as a "hard" science) with regard to the subskills relevant for information seeking [27].

Notwithstanding these limitations, the findings may be useful for practitioners, instructors and teachers. They corroborate that assessments of prior knowledge allow for individualized recommendations which increase the efficiency of adaptable literacy instruction. However, care must be taken to identify participants with low acceptance of online teaching who are "at risk" of not complying with the recommendations and therefore will not make the most of their participation.

## References

1. Spitzer, K.L., Eisenberg, M.B., Lowe, C.A.: Information Literacy: Essential Skills for the Information Age. Information Resources Publications, Syracuse University, Syracuse (1998)
2. Grassian, E.S., Kaplowitz, J.R.: Information Literacy Instruction Theory and Practice, 2nd edn. Neal-Schuman, New York (2009)
3. Mery, Y., Newby, J., Peng, K.: Why one-shot information literacy sessions are not the future of instruction a case for online credit courses. Coll. Res. Libr. **73**, 366–377 (2012)

4. Snow, R.: Aptitude, learner control, and adaptive instruction. Educ. Psychol. **15**, 151–158 (1980)
5. Jonassen, D.H., Grabowski, B.L.: Handbook of Individual Differences, Learning, and Instruction. Erlbaum, Hillsdale (1993)
6. Cronbach, L.J., Snow, R.E.: Aptitudes and Instructional Methods - A Handbook for Research on Interactions. Halsted Press, New York (1977)
7. Heacox, D.: Differentiating Instruction in the Regular Classroom. Free Spirit Publishing, Minneapolis (2002)
8. Leutner, D.: Instructional design principles for adaptivity in open learning environments. In: Seel, N.M., Dijkstra, S. (eds.) Curriculum, Plans, and Processes in Instructional Design, pp. 289–307. Erlbaum, Mahwah (2004)
9. Fischer, G.: Supporting learning on demand with design environments. In: Birnbaum, L. (ed.) Proceedings of the First International Conference on the Learning Sciences, pp. 165–172. Association for the Advancement of Computing in Education, Evanston (1991)
10. Brophy, J.E.: Motivating Students to Learn, 3rd edn. Routledge, New York (2010)
11. Karich, A.C., Burns, M.K., Maki, K.E.: Updated meta-analysis of learner control within educational technology. Rev. Educ. Res. **84**, 392–410 (2014)
12. Kruger, J., Dunning, D.: Unskilled and unaware of it: how difficulties in recognizing one's own incompetence lead to inflated self-assessments. J. Pers. Soc. Psychol. **77**, 1121–1134 (1999)
13. Shin, E.C., Schallert, D.L., Savenye, W.C.: Effects of learner control, advisement, and prior knowledge on young students' learning in a hypertext environment. Educ. Technol. Res. Dev. **42**, 33–46 (1994)
14. Andretta, S.: Information Literacy: a Practitioner's Guide. Chandos, Oxford (2005)
15. Gross, M., Latham, D.: Undergraduate perceptions of information literacy: defining, attaining, and self-assessing skills. Coll. Res. Libr. **70**, 336–350 (2009)
16. Park, O., Lee, J.: Adaptive instructional systems. In: Spector, J.M., Merrill, M.D., Elen, J., Bishop, M.J. (eds.) Handbook of Research on Educational Communications and Technology, vol. 25, 3rd edn, pp. 469–484. Routledge, London (2008)
17. Kirschner, P.A., van Merriënboer, J.J.: Do learners really know best? Urban legends in education. Educ. Psychol. **48**, 169–183 (2013)
18. Owston, R., York, D., Murtha, S.: Student perceptions and achievement in a university blended learning strategic initiative. Internet High. Educ. **18**, 38–46 (2013)
19. Association of College and Research Libraries (ACRL): Psychology information literacy standards (2010). http://www.ala.org/acrl/standards/psych_info_lit
20. Leichner, N., Peter, J., Mayer, A.-K., Krampen, G.: Assessing information literacy among German psychology students. Ref. Serv. Rev. **41**, 660–674 (2013)
21. Rosman, T., Mayer, A.-K., Krampen, G.: Measuring psychology students' information-seeking skills in a situational judgment test format: construction and validation of the PIKE-P test. Eur. J. Psychol. Assess. (2015). doi:10.1027/1015-5759/a000239
22. Leichner, N.: Multimethodale Erfassung von Informationskompetenz bei Psychologie studierenden [Multimethodal Assessment of Information Literacy in Psychology Students]. Doctoral Dissertation, University of Trier, Trier (2015)
23. Peter, J., Leichner, N., Mayer, A.-K., Krampen, G.: Das Inventar zur Evaluation von Blended Learning (IEBL). Konstruktion und Erprobung in einem Training professioneller Informationskompetenz [Inventory for the Evaluation of Blended Learning. Construction and Testing Within a Training of Scholarly Information Literacy]. In: Krämer, M., Weger, U., Zupanic, M. (eds.) Psychologiedidaktik und Evaluation X [Didactics of Psychology and Evaluation X], pp. 275–282. Shaker, Aachen (2014)

24. Cronbach, L.J., Furby, L.: How we should measure “change”: or should we? Psychol. Bull. **74**, 68–80 (1970)
25. Price, R., Becker, K., Clark, L., Collins, S.: Embedding information literacy in a first-year business undergraduate course. Stud. High. Educ. **36**, 705–718 (2011)
26. Webber, S., Boon, S., Johnston, B.: A comparison of UK academics’ conceptions of information literacy in two disciplines: English and marketing. Libr. Inf. Res. **29**, 4–15 (2005)
27. Rosman, T., Birke, P.: Fachspezifische Erfassung von Recherchekompetenz durch prozedurale Wissenstests: Psychologie vs. Informatik [Domain-Specific Assessment of Information Searching Skills by Procedural Knowledge Tests: Psychology vs. Computer Sciences]. In: Mayer, A.-K. (ed.) Informationskompetenz im Hochschulkontext – Interdisziplinäre Forschungsperspektiven [Information Literacy in the University Context – Interdisciplinary Research Perspectives], pp. 103–120. Pabst, Lengerich (2015)

# Information Problem Solving Instruction in Higher Education: A Case Study on Instructional Design

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**Abstract.** Information problem solving (IPS) is the process of locating, selecting, evaluating, and integrating information from various sources to fulfill an information need. In academia, it is central to conducting literature reviews in research projects. This paper presents a case study on effective and efficient instructional design for learning this complex skill. It includes an analysis of students' output and (perceived) studiability of an online IPS-course that was designed according to the 4C/ID-model, a contemporary holistic instructional design model. Results were based on data retrieved from 49 Open University premaster students. The results show that a holistic approach to instructional design is effective: all students passed the course and they appreciated course studiability. However, due to the holistic ('whole task') design approach, the students' time on task was relatively high as was the time teachers spent on providing instructional support, which questions efficiency.

**Keywords:** Instructional design · Information problem solving · Information literacy · Completion strategy · Whole-task models · 4C/ID-model

## 1 Introduction

Information problem solving (IPS), a term that is similar to information literacy [1, 2], is a vital skill for academics. It is central to research and learning, two critical constituents of academic proficiency. IPS entails processes that involve locating, selecting, evaluating, and integrating information from various sources and is initiated to fulfill an information need [3–7]. Although IPS is widely acknowledged to be pivotal to academic work, formal IPS instruction has long been an insignificant element of curricula in higher education. In the past, IPS-instruction was often added as an appendage to curricula, for instance by means of a set of tutorials each focusing on learning distinct IPS-constituents. In the last decade or two, these 'part-task' instructional materials were gradually replaced by more extensive programs that included meaningful, domain-related, 'whole-task' learning activities (see e.g., [8–10]). Although these programs were increasingly integrated into curricula, they were often too small to include a *variety* of such whole, authentic IPS-tasks, necessary for transfer of learning [11].


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In 2012, the Open University of the Netherlands (OUNL) noticed that a substantial group of students aspiring to pursue a master's program in Educational Sciences lacked basic IPS skills necessary to conduct educational research projects. Existing bachelor-level IPS instruction was judged insufficient and, therefore, a new premaster's course was designed. This course was based on the latest insights on instructional design for complex learning. Merrill [12], who analyzed various contemporary instructional design models to derive a series of basic principles for designing instruction, concluded that the Four-Component Instructional Design model (4C/ID-model) of Van Merriënboer [11, 13–16] was one of the most comprehensive instructional models for complex learning. Therefore, it was decided to use the 4C/ID-model to design the IPS-course for premaster's students.

The result of applying the 4C/ID-model is an instructional blueprint that includes four components. The first component refers to *learning tasks* that are based on authentic or 'real-life' tasks. They form the backbone of an instructional program. A varied set of learning tasks facilitates a process called inductive learning. The second component consists of *supportive information*. This information is necessary to carry out the non-routine aspects of learning tasks and is acquired through elaboration and understanding. The third component comprises *procedural information* that enables learners to perform the routine aspects of learning tasks. It is the result of a process called knowledge compilation. The fourth component is *part-task practice* that consists of the training of routine parts of the task that need to be automated. This is done by a process called strengthening.

We decided that the new course would focus on the skill of 'Conducting a literature review', a complex IPS-skill that is at the heart of academic work. Due to time limits (this was a 120-h course) we decided to limit the level of complexity and provide the students with a confined set of learning tasks. We elaborate further upon the instructional blueprint for the course in the method section and Appendix 1.

The aim of the case study is to show that a holistic approach to instructional design (i.e., 'whole task'-centered design as presented by the 4C/ID-model) is suitable to design effective and efficient IPS-instruction. We analyzed students' output (i.e., grades) and students' perceptions of the quality of course components (i.e., studiability) in order to explore the effectivity of the course (i.e., 'Did it hit the target?'). Additionally, we explored students' time on task to make inferences about instructional efficiency (i.e., 'Was it the shortest route to the goal?').

## 2 Method

### 2.1 Participants

Students (n = 49; 8 male) of the Educational Sciences pre-master's program of OUNL followed a 4.3 EC (120-h) online course on conducting a systematic literature review called 'Information skills for social scientists' (code O40). This course is part of a transitions program that consists of a series of methodology, academic, and domain-specific skill courses that prepare aspiring master's students holding a professional bachelor degree for admission to the master's program. Students enrolled in

the course individually at various times across the academic year 2013–2014. For this study we selected students who finished the course in 2014.

## 2.2 Materials

**Course O40.** The 'Information skills for social scientists' course (code O40) aims at teaching students the fundamentals of conducting a literature review. The 4C/ID-model was used to design this course of which the structure is presented in Fig. 1.

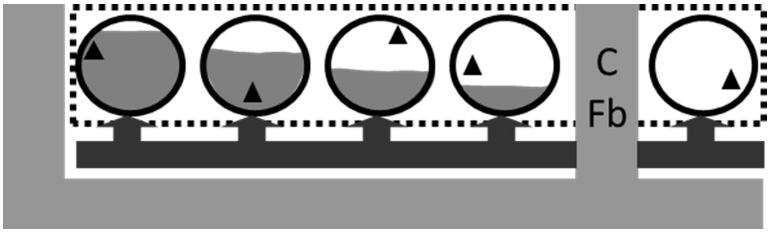


**Fig. 1.** Representation of Course O40 that comprises learning tasks (circles), supportive information (grey beam), and procedural information (black beam with upward pointing arrows).

Appendix 1 elaborates on this figure and presents a simplified design blueprint of the main components of the course that we briefly discuss in this section. The backbone of the course is a set of five learning tasks that is based on authentic, real-life literature review tasks in the domain of Educational Sciences. This is 'a task class'; the dotted box in Fig. 1 comprises the learning tasks. The complexity level of this task class is basic: students' topic familiarity for all tasks is relatively high, topics are well-researched within the domain, and the type of review central to all tasks is relatively simple (i.e., a traditional and systematic review instead of a meta-analysis, see [17]). Due to preconditions related to course design like time on task (i.e., 120 h study load), learning tasks are simplified: for each task students select a limited number of journal articles and write a concise review of a maximum of 600 words.

In order to enhance inductive learning (i.e., schema construction), the task class comprises five different tasks of the same complexity level. These are seen as the five circles in Fig. 1; variability is represented by small triangles within each circle. The selected review topics are 'Outlining as learning tool' (Learning Task 1), 'Multimedia learning' (Learning Task 2), 'Student evaluations' (Learning Task 3), 'Cooperative learning' (Learning Task 4), and 'Self-regulated learning' (Learning Task 5). Although these five learning tasks introduce the learner to the whole review task, the instructional emphasis within each task differs (see Table 1). In Learning Task 1 the whole process of conducting a literature review is *demonstrated* to the learner in order to get a first overview of all constituents of conducting a literature review. These constituents relate to five main steps in the review process, namely (1) defining the research question(s), (2) searching sources, (3) selecting sources, (4) processing information, and (5) presenting information. In Learning Task 1 students study a video-recorded modeling example that presents an expert who performs all steps. Students also study the

(semi-manufactured) products of steps such as a summary table of selected resources (product step 3) and the final review article (product step 5). As can be seen in Table 1, students gradually learn to execute more steps of the review process themselves in Learning Tasks 2 to 5. In Learning Task 2 they perform steps 4 and 5 based on information from steps 1 to 3 that is provided to them. In Learning Task 3 they perform steps 3 to 5, based on steps 1 and 2. In Learning Task 4 the students execute steps 2 to 5 based on a research question that is presented to them (step 1). Finally, in Learning Task 5 they perform all steps of the review process. The students formulate a research question and after approval (and receiving feedback on this step) they continue working on the learning task. Learning Task 5 serves as assessment task.

**Table 1.** Course overview

| | Learning Task 1 | Learning Task 2 | Learning Task 3 | Learning Task 4 | Learning Task 5 |
|---|---|---|---|---|---|
| Define question(s) | Worked-out | Worked-out | Worked-out | Worked-out | Execute* |
| Search for sources | Worked-out | Worked-out | Worked-out | Execute* | Execute |
| Select sources | Worked-out | Worked-out | Execute* | Execute | Execute |
| Process information | Worked-out | Execute* | Execute | Execute | Execute |
| Present information | Worked-out* | Execute | Execute | Execute | Execute |

*= focus of instruction

Learner support –indicated by the grey filling in the circles in Fig. 1– gradually diminishes from 'high' in Learning Task 1 (modeling example), via Learning Tasks 2, 3, and 4 (completion tasks) to 'low' in Learning Task 5 (conventional task). This so-called 'completion strategy' has been found to have positive effects on inductive learning and transfer [18]. Students gradually perform more steps of the review process, starting with the last steps. In every subsequent learning task they have to perform an additional (previous) step of the original review process. This instructional guidance strategy is called 'backward fading' [19].

Supportive information is necessary to learn the non-recurrent aspects of the learning tasks. It includes cognitive strategies, mental models, and cognitive feedback. In Fig. 1 it is specified as an L-shaped shaded area. Important cognitive strategies are the systematic approaches to problem solving (SAPs). The aforementioned five steps constitute the main SAP of conducting a literature review (see Table 1). Mental models include conceptual models, structural models, and causal models. Examples of mental models in this course are conceptual models of literature review concepts and how scientific articles are organized, and structural models of how databases are organized and can be used. Cognitive feedback focuses on the quality of task performances and specifically aims at improving the non-recurrent aspects of the task. In this course

students receive extensive feedback on task performance after finishing Learning Task 4 (see CFb in Fig. 1). Supportive information is offered to the students by means of video instruction and text books [17, 20] and has been tailored to the task. This means that the delivery of supportive information is coupled to the steps that are emphasized in each learning task (see * in Table 1).

Procedural information relates to the recurrent aspects of the learning tasks. It consists of rules that should be learned at the time students need to perform the task ('just-in-time', see the black beam with upward pointing arrows in Fig. 1). For Learning Task 2 procedural information includes the procedures for academic writing [21]. Procedural information for Learning Task 3 includes procedures (i.e., tutorials) needed to operate a search program and use a thesaurus. For this course no part-task practice was specified.

The online course is presented to the students in OpenU, a contemporary digital learning and working environment of the OUNL [22]. Beside the learning tasks, supportive information, and procedural information, the OpenU system offers the students and teachers a monitoring system and Web 2.0 facilities to guide and support the learning process.

**SEIN Questionnaire.** The SEIN questionnaire is a course evaluation instrument at the OUNL [23]. After each course OUNL-students are requested to fill in the SEIN questionnaire. It consists of multiple choice, rating, and open questions that record student perceptions of course quality (e.g., studiability, feasibility, and practicability), and time on task. Rating questions focus on the (perceived) quality of course constituents, instructional guidance, and instrumental support. Open questions aim at revealing strengths and weaknesses of these elements.

### 2.3 Procedure

Students followed the online course individually and at their own pace through OpenU. Both formative and summative feedback were provided to the students via this system. Data related to both type of assessments were obtained from the system. Invitations to fill in the electronic SEIN questionnaires were sent to each student after finishing the course. Data were provided to the researchers by an educationalist responsible for SEIN.

## 3 Results

All students passed the summative assessment task (Learning Task 5). The average grade for this task was 6.98 (*SD* = .93). Mode and median were both 7 and the scores ranged from 6 to 10. The skewness of scores was 1.024, which means that the shape of the distribution of scores is skewed right.

Beside the summative assessment of the IPS-skill, students were assessed formatively. Results of the formative assessment provided after Learning Task 4 show that students had difficulty deriving search terms and synonyms from a research question, finding relevant information in scientific sources, and writing a concise essay.

Most students needed the additional cognitive feedback (CFb in Fig. 1). An analysis of the formative assessment on the formulation of a research question for Learning Task 5 shows that students needed additional instructional support on defining the research (review) question as well. The scope of the topic selected by students was often too broad.

Students' perceived course quality focused on several components of the course design. Table 2 shows that average ratings for components were encouraging as was the overall course rating. Course components such as the learning tasks, the assessment task, the supportive information, and cognitive feedback were highly rated. The latter was especially well-received. This result was validated by several comments made in the SEIN questionnaire: "Feedback was to the point, clear, useful, and appropriate", "Superb teacher feedback", and "The feedback is constructive and informative". Despite this, some students would have liked to receive cognitive feedback in an earlier stage of the course.

**Table 2.** Ratings (n = 48) for course components (scale 1 to 10; 1 = poor, 10 = excellent)

| Focus | Mean | SD | Mode | Skewness |
|---|---|---|---|---|
| Course, overall rating | 7.44 | .94 | 8 | −.53 |
| Learning tasks | 7.35 | 1.10 | 7 | −.46 |
| Assessment task (Learning task 5) | 7.57 | 1.04 | 8 | −.51 |
| Supportive information (theory/books) | 7.06 | 1.12 | 7 | −1.46 |
| Teacher support (i.e., cognitive feedback) | 7.90 | 1.28 | 9 | −.25 |
| Digital learn and work environment | 7.42 | .90 | 7 | .34 |
| Forum | 6.15 | 1.46 | 7 | −1.32 |

With regard to the course content students indicated that it met the learning goals (100 % score, see Table 3). Also the nature of the course was applauded. Table 3 shows the percentages for agreement on practical and scientific level and challenge.

**Table 3.** Opinion (n = 48) on global course features

| Focus (yes/no question) | Yes (%) |
|---|---|
| Practical level of the course is adequate | 98 |
| Scientific level of the course is adequate | 98 |
| Course is challenging | 81 |
| Learning goals are met | 100 |

The 'time on task' for completing the course was estimated by students and categorized into five categories. 10.42 % of the students needed less than 75 h to complete the course. 14.58 % spent between 75 and 100 h to complete the course. 35.42 % needed between 100 and 125 h for the course. 27.08 % spent between 125 and 150 h for the course, and 12.50 % needed more than 150 h. This means that approximately 40 % of the students needed more 'time on task' than the estimated 120 h of study.

## 4 Discussion

This case study explored the quality of an information literacy course in higher education. Our aim was to show that a holistic instructional design approach (i.e., 4C/ID) is suitable to develop effective and efficient instruction for learning to conduct a literature review. Confirmed by the output of our course we can argue that 'whole task'-centered instruction is effective: no students failed the course and the average grades were good, meaning that all students reached a basic skill level. Also, the students' perceived quality of the course components that feature the 'whole-task approach' (i.e., a series of 'whole' learning tasks that constitute the backbone of the course) confirms the effectiveness of using the 4C/ID-model to design instruction for learning complex skills like conducting a literature review. Emphasizing whole task learning and using a rigorous scaffolding method to learn a series of varied tasks thus yields a desired learning profit [11–16]. An important question is whether the instructional design for the O40-course is not only effective, but also efficient. Based on an analysis of the time on task it can be concluded that the instructional blueprint resulted in learning tasks which were time-consuming for a substantial number of students. About 40 % of the students needed more time than was estimated to finish the course. Study feasibility can thus be negatively influenced when insufficient study time is allocated to task performance. Therefore, instructional designers should realize that an important precondition for developing good quality instruction for complex learning includes offering sufficient time to complete a series of varied whole tasks. A suggestion for a redesign of the O40-course could be to (re)allocate additional time to the learning tasks that include more execution steps.

Another success factor of effective and efficient instruction is the fact that cognitive feedback is provided on time [24]. To a large extent the quality and quantity of the cognitive feedback in the O40-course has been warranted (e.g., after Learning Task 4). However, students indicate that more 'just-in-time' cognitive feedback is wished for (i.e., after Learning Tasks 1 to 3). For the instructional designers it is a challenge to design cognitive feedback for (whole) task-centered learning that is less time extensive for the teacher. Peer feedback and/or worked-out feedback might be solutions.

In this case study we analyzed a basic bachelor-level IPS-course. We used 4C/ID principles to successfully design the course. These results are encouraging but need to be 'scaled up'. For students to learn the literature review skill at high-level it is necessary to design a longitudinal learning trajectory that includes several courses (i.e., task classes) that should address skill learning at increasing complexity levels as well (i.e., master's/Ph.D.). Future research should aim at scrutinizing the design, development, implementation, and evaluation of such a longitudinal learning track. Design-based research could be a helpful approach to address this issue [25].

## Appendix 1: Blueprint Course O40

Simplified blueprint for the pre-master's course 'Information Skills for Social Scientists' (O40). It includes an overview of the components that make the course: (a) learning tasks, (b) supportive information, and (c) procedural information.

<table>
<tr><td colspan="2">Task class (basic level): In order to learn the basics of performing a literature review, students carry out five learning tasks. Topic familiarity is high for each task. Students must select a relatively small set of key articles and the essay that concludes each task may not exceed 600 words.</td></tr>
<tr><td colspan="2">Supportive information: present cognitive strategies<br><br>• Systematic approach to problem solving (SAP) of the five steps involved in performing a literature review: (1) define research questions, (2) search for sources, (3) select sources, (4) process information, and (5) present information.</td></tr>
<tr><td colspan="2">Supportive information: present mental models<br><br>• Conceptual model of literature review concepts.<br>• Structural model of how databases are organized and can be used.<br>• Conceptual model of scientific articles and how they are organized.</td></tr>
<tr><td colspan="2">Supportive information: cognitive feedback<br><br>• Feedback related to the SAP and domain models</td></tr>
<tr><td>Learning task 1: Modelling example / Worked out example<br><br>Demonstration Step 1 until 5 by an expert. Students study the example. Emphasis is on all phases of the SAP</td><td></td></tr>
<tr><td>Learning task 2: Completion<br><br>Demonstration Step 1 to 3; Students perform Step 4 and 5. Emphasis is on Step 4 of the SAP</td><td>Procedural information presentation:<br><br>• Procedures for academic writing (cf. Publication Manual of the American Psychological Association)</td></tr>
<tr><td>Learning task 3: Completion<br><br>Demonstration Step 1 and 2; Students perform Step 3, 4, and 5. Emphasis is on Step 3 of the SAP</td><td>Procedural information presentation:<br><br>• Procedures for academic writing (cf. Publication Manual of the American Psychological Association)(fading)</td></tr>
<tr><td>Learning task 4: Completion<br>Demonstration Step 1; Students perform Step 2, 3, 4, and 5. Emphasis is on Step 2 of the SAP</td><td>Procedural information presentation:<br>• Procedures for operating the search program (part of Step 2)<br>• Procedures for using a thesaurus (part of Step 2)</td></tr>
<tr><td>Learning task 5: Conventional<br>Students perform all steps. Emphasis is on Step 1 of the SAP. The research question has to be approved before a student continues the IPS-process.</td><td>Procedural information presentation:<br>• Procedures for operating the search program (fading)<br>• Procedures for using a thesaurus (fading)</td></tr>
</table>

## References


1. Association of College & Research Libraries: Information Literacy Competency Standards for Higher Education. ACRL, Chicago (2000)
2. Virkus, S.: Information literacy in Europe: a literature review. Inf. Res. **8**(4), paper no. 159 (2003)
3. Brand-Gruwel, S., Wopereis, I.: Integration of the information problem-solving skill in an educational programme: the effects of learning with authentic tasks. Technol. Instr. Cogn. Learn. **4**, 243–263 (2006)
4. Brand-Gruwel, S., Wopereis, I., Vermetten, Y.: Information problem solving by experts and novices: analysis of a complex cognitive skill. Comput. Hum. Behav. **21**, 487–508 (2005)
5. Brand-Gruwel, S., Wopereis, I., Walraven, A.: A descriptive model of information problem solving while using internet. Comput. Educ. **53**, 1207–1217 (2009)
6. Wopereis, I., Brand-Gruwel, S., Vermetten, Y.: The effect of embedded instruction on solving information problems. Comput. Hum. Behav. **24**, 738–752 (2008)
7. Wopereis, I.G.J.H., Van Merriënboer, J.J.G.: Evaluating text-based information on the world wide web. Learn. Instr. **21**, 232–237 (2011)
8. Birkett, M., Hughes, A.: A collaborative project to integrate information literacy skills into an undergraduate psychology course. Psychol. Learn. Teach. **12**, 96–100 (2013)
9. Larkin, J.E., Pines, H.A.: Developing information literacy and research skills in introductory psychology: a case study. J. Acad. Libr. **31**, 40–45 (2005)
10. Mullins, K.: Good IDEA: instructional design model for integrating information literacy. J. Acad. Libr. **40**, 339–349 (2014)
11. Van Merriënboer, J.J.G., Kirschner, P.A.: Ten Steps to Complex Learning: a Systematic Approach to Four-Component Instructional Design, 2nd edn. Routledge, New York (2013)
12. Merrill, M.D.: First principles of instruction. Educ. Technol. Res. Dev. **50**(3), 43–59 (2002)
13. Van Merriënboer, J.J.G.: Training Complex Cognitive Skills: a Four-Component Instructional Design Model for Technical Training. Educational Technology Publications, Englewood Cliffs (1997)
14. Van Merriënboer, J.J.G.: Alternate models of instructional design: holistic design approaches and complex learning. In: Reiser, R.A., Dempsey, J.V. (eds.) Trends and Issues in Instructional Design and Technology, pp. 72–81. Pearson/Merrill Prentice Hall, Upper Saddle River (2007)
15. Van Merriënboer, J.J.G., Clark, R.E., De Croock, M.B.M.: Blueprints for complex learning: the 4C/ID-model. Educ. Technol. Res. Dev. **50**(2), 39–64 (2002)
16. Van Merriënboer, J.J.G., Kester, L.: Whole-task models in education. In: Spector, J.M., Merrill, M.D., Van Merriënboer, J.J.G., Driscoll, M.P. (eds.) Handbook of Research on Educational Communications and Technology, pp. 441–456. Lawrence Erlbaum, New York (2008)
17. Jesson, J.K., Matheson, L., Lacey, F.M.: Doing your Literature Review: Traditional and Systematic Techniques. SAGE, London (2011)
18. Van Merriënboer, J.J.G., Krammer, H.P.M.: The "completion strategy" in programming instruction: theoretical and empirical support. In: Dijkstra, S., Van Hout-Wolters, B.H.M., Van der Sijde, P.C. (eds.) Research on Instruction: Design and Effects, pp. 45–61. Educational Technology Publications, Englewood Cliffs (1990)

19. Sweller, J., Ayres, P., Kalyuga, S.: The guidance fading effect. In: Spector, J.M., LaJoie, S. (eds.) Cognitive Load Theory, vol. 1, pp. 171–182. Springer, New York (2011)
20. Brand-Gruwel, S., Wopereis, I.: Word Informatievaardig: Digitale Informatie Selecteren, Beoordelen en Verwerken (2e Herziene Druk) [Become Information Literate: Selecting, Evaluating, and Processing Digital Information; Revised Edition]. Noordhoff, Groningen (2014)
21. American Psychological Association: Publication Manual of the American Psychological Association, 6th edn. APA, Washington, DC (2010)
22. Hermans, H., Kalz, M., Koper, R.: Toward a learner-centered system for adult learning. Campus-Wide Inf. Syst. **31**, 2–13 (2014)
23. Westera, W., Wouters, P., Ebrecht, D., Vos, M., Boon, J.: Dynamic probing of educational quality: the SEIN system. In: Landeta, A. (ed.) Good Practice eLearning Book, pp. 165–176. ANCED, Madrid (2007)
24. Hattie, J., Timperley, H.: The power of feedback. Rev. Educ. Res. **77**, 81–122 (2007)
25. McKenney, S., Reeves, T.: Conducting Educational Design Research. Routledge, London (2012)

# Transforming Library Instruction Through Creativity

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**Abstract.** In this conceptual paper, I provide ideas for challenging library traditions, including the habits of our institution and the habitats they occupy. As librarians, we can encourage play and manage failure through reflection and iteration rather than penalty and closure. Librarians can create a classroom environment that allows for mistakes and child-like inquiry. Once we are less afraid to make mistakes, we open up the environment for play and experimentation. As the stakes for student success in American universities rise, the university library has an opportunity to engage students in their learning through critical pedagogy and reflective information literacy. It is important to establish a sense of adventure in confronting new realities about higher education and the way students learn. As we seek creative solutions in the classroom to stimulate thinking and fuel a renaissance in education for the twenty-first century, the library can lead the way for cross-disciplinary germination.

**Keywords:** Information literacy · Critical literacy · Reflective pedagogy · Creativity · Arts

## 1 Introduction

I have been thinking for a long time about the role of creativity in the library, particularly as it relates to library instruction. I have been interested in creativity as a portal from which to transcend the predictability of library sessions and also as a response to changes in learning styles among students and to changes in the way faculty teach. Creativity can be used both as a tool to make the library class more reflective and engaging and as a platform for providing continued value to the librarian as a leader in facilitating change in the role of educator and in "speaking the language of faculty." Creativity, and the articulation of what makes for a creative assignment and a creative classroom, especially in one fifty minute library session, makes people take notice at all levels of the institutional hierarchy from students to fellow faculty, bringing added value to the library and to academia.

In a special issue of Development and Learning in Organizations: An International Journal on "Nurturing Creativity and Innovation," authors of the article, *Fostering Creativity—a holistic framework for teaching creativity,* present a framework for creativity that calls for cultivating a psychological disposition that frees students from "self-constructed obstacles" [1, p. 7]. Students must learn about the motivations for learning and applying creative thinking. Students, the authors argue,


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are endowed with the creative problem solving strategies and the capacity to apply creative techniques [1]. This involves readjusting thinking in order to reframe a problem and to search efficiently and planning time for repetition and reflective thinking.

There are opportunities for librarians to develop the capacity in their students for divergent thinking—generating many ideas to explore multiple solutions. While divergent thinking is not necessarily synonymous with creativity, it is a stepping-stone for transformative thought. The groundwork for divergent thinking in the field can be seen in the scholarship on critical and reflective literacy. I will examine these theories in relation to the work of others who call for a transformative space as instrumental to the promotion of transformative information literacy. I will also examine educational theories as they relate to creativity and what this means for librarians as educators in creating opportunities for rethinking the library as a catalyst for transformation across higher education.

## 2 Examination of Theories

### 2.1 Breaking Habits, Fostering Imagination

The nature of library service has been predicated on the research it offers which is invariably accompanied by talk on citation, plagiarism, and appropriate resources for writing an academic paper. Library instruction is very prescriptive and the rules of research often frightens students. Even with the dissemination of so much literature on the adoption of a more critical approach to information literacy, many classes take a more traditional approach to bibliographic instruction. The library should not be so focused on the user as a consumer of a service but instead on the student as a growing organism and a reflective learner. The goal of academia according to Alison James and Stephen Brookfield in their recent book, *Engaging Imagination*, is to help students to become critically reflective and in creating lively classrooms [2]. The model of the lively classroom should be extended to the library as a direct extension of the classroom.

In his important article, *The McDonaldization of Academic Libraries?*, Brian Quinn asks if academic libraries are becoming McDonaldized. Quinn talks about the dumbing down of library services through a system of efficiency, calculability, predictability, and control. Quinn states that user instruction has become highly efficient, particularly that of the "one-shot" instruction session. The one-shot class and semester-length library research courses offer "standardized, predetermined organization and content," creating is a bland world where surprise and delight are largely absent [3, p. 252]. Quinn proposes an antidote in the form of creativity-training programs that could teach staff to view problems from completely different perspectives "in order to arrive at fresh solutions" [3, p. 254]. Penetrating the culture of convergent thinking requires unconventional solutions.

### 2.2 Creating Space

Boldness and experimentation can be captured by creating a space that makes such innovation possible. James Elmborg, Professor at the School of Library and Information

Science, University of Iowa, proposes in his work, *Libraries as the Spaces Between Us: Recognizing and Valuing the Third Space*, the idea of Third Space as a counter to recent discussions in the library field on the library as place [4]. Third Space reinvents the library from the premise that libraries and librarians can develop ways of working with increasingly diverse populations in increasingly dynamic contexts. Third Space is described as the borderland between Representations of Space (spaces dominated by structures and concepts) and Representational Space (the symbolic and personal) [4, p. 344]. Represented space is rigid, controlled, policed, and defined. Library space is historically absolute, filled with the essence of a particular identity so that it resists appropriation or reinvention. Third Space can be viewed as a space of cultural, social, and epistemological change in which the competing knowledges and discourse of different spaces is brought into conversation to challenge and reshape identities [4]. The environment must be rich in inquiry rather than one dominated by process.

In a recent talk entitled *The Liminal Library*, Barbara Fister cites the new ACRL Frames as moving away from competencies that placed too much emphasis on observing the rules of finding and evaluating information [5, p. 6]. The new conceptual frames are more complex in their integration but are also more abstract. The shift from linear based competencies to threshold concepts represents a place in an intellectual journey that is between understanding—what Fister refers to as liminality. Liminality might be understood as the trenches of a battle in which one could retreat or advance. Similar to Elmborg's Third Space, liminality represents a journey in navigating uncertainty through a "transferrable learning experience… by increasing self-knowledge and confidence" by participating in the making of meaning [5, p. 7]. This making of meaning comes through a state of questioning and probing where students can rethink assumptions and participate in the making of knowledge (creation) as a continuous, successive dialog for the way information fits into a personal context of understanding. Students are no longer receivers of a standard of information but participators in a new reality of exploration and discovery that contributes to establishing a new voice based on independent experiences and a self-created authority. Similar to Elmborg, the environment is no longer dominated by process (standards) but integrated into a conversation about the place of information in one's own life.

### 2.3 Critical and Reflective Pedagogy

Troy Swanson presents an outline of information literacy that must transcend the bibliographic instruction that has been so prevalent in libraries for years. He states that before we send students to books, periodicals, and websites, we need to teach them *about* information. Swanson outlines an opportunity for both instructors and librarians working together to draw on critical literacy theory, or critical pedagogy, where the instructor introduces topics and directs learning but does so with student input and by valuing student experiences. Swanson outlines critical literacy through three points:

1. Critical literacy assumes that teaching of literacy is never neutral but always embraces a particular ideology or perspective.

2. Critical literacy supports a strong democratic system grounded in equity and shared decision-making.
3. Critical literacy assumes that the literacy instruction can empower and lead transformative action [6, p. 264][1].

He applies Paulo Freire and Ira Shor's problem-posing approach to instruction. In this approach, librarian and instructor act primarily as guides, asking students questions and challenging them to produce their own theories on the information sources presented. It also fosters a way to defer judgment and be more restrained and thoughtful. While this might appear on a first thought to oppose creativity, it supports the notion of being more reflective, and looking at information from different perspectives.

In her work, *Information Literacy and Reflective Pedagogical Praxis*, Heidi Jacobs explains that critical pedagogy invites creative, reflective dialog. Jacobs explains that "To teach students about personally meaningful information and non-analytic information processes means first and foremost to create a space where inner life can be nurtured, where creativity can emerge, where students can love the questions" [7, p. 260]. The basis of questioning is predicated on a healthy skepticism, and much of our schooling should offer more of an opportunity to foster divergent thinking. Divergent thinking is discouraged when students are scared to do the "wrong thing" in class [8, p. 2]. The library classroom should be seen as the fulcrum for transforming the library as a creative space, which involves play. Play facilitates five cognitive processes involved with creativity: problem framing, divergent thinking, mental transformations, practice with alternative solutions, and evaluative ability [9, p. 15]. Mainemelis and Ronson explain that play allows for "exploring different perspectives, creating alternative worlds, assuming different roles, enacting different identities, and also taking all these, and the players themselves, out of the cognitive contexts in which they normally operate [9, p. 15]. As James Elmborg elaborately outlined in his discussion on Third Space in referencing a transformative experience, creativity is the source of all growth and the foundation to allow us to transgress.

### 2.4 Divergent Thinking: Creativity and the Arts

Most of us in our childhood have a great capacity for divergent thinking. As we become "educated" that capacity diminishes. There is a natural opportunity to develop the creative capacity of students through the employment of technology.[2] New creative work lends itself to exploring a whole range of digital literacies that are required in our culture [10]. While technologies might not in themselves be the answer, they might provide the impetus for refiguring old patterns and search for new ones.

[1] It's the last of the three points, critical literacy as leading to transformative action, that I am most interested in here. As we will later see, the roots of critical literacy as part of a democratic framework also lend itself to creativity and transformative action.

[2] There is a real opportunity to use creativity and divergent thinking in conjunction with T. Mackey and T. Jacobson's proposal for a Metaliteracy framework. As they frame a definition, "Metaliteracy challenges traditional skills-based approaches to information literacy by recognizing related literacy types and incorporating emerging technologies".

There is also much we can learn from the arts. We can employ art strategies, such as bringing disparate images together or finding relationships based on aesthetics, absurdity, or spatial arrangements and not their literal meaning. The idea is to introduce the creative side of the library according to the ways many of us conduct our own research—through a method of "scratching." Instead of enforcing the rules of research, the goal is to inspire students through creative exercises—digging backwards, or as Twyla Tharp says, "transactionally"—asking questions and "owning" what is found through discovery [11]. Tharp allows for accidental discovery and encourages it. Many of us have heard of the study on divergent thinking where students were tested in a longitudinal study on their capacity to determine as many uses for a paper clip as possible in two minutes. Tharp invites any discipline to adopt the same types of exercises in recalibrating our thinking, and identifying hurdles when such an exercise is not effective. Risk taking, inherent in the kind of questioning and outside-of-the-box thinking promoted in creativity, is important in driving innovation [12].

As we seek creative solutions in the classroom to stimulate thinking and fuel a renaissance in education for the twenty-first century, the library can lead the way as a catalyst for cross-disciplinary germination. Inquiry-based feedback coupled with deep observation encourages a more open-ended and in-depth approach to the traditions that should be questioned. Librarians can facilitate students' capacity for observation, getting students, for example, to spend two minutes silently observing and then asking questions prefixed by phrases such as "I noticed that …" "why," and "how" [8]. Most important of all, librarians can encourage play and manage failure—failure framed by reflection and iteration and less by penalty and closure. Librarians can change the culture of the classroom as a place for mistakes and child-like inquiry. Once we are less afraid to make mistakes, we open up the environment for play and experimentation.

## 3 Conclusion

An increased interest in the way creativity permeates disciplines across campus begins with the library. The goal is to implement a method of instruction that capitalizes on the playful side of searching, understanding and utilizing information—a method of discovery. The basic idea is to get students to think transformationally and multi-dimensionally, rather than literally. From acting and drawing, to rediscovering the work at our fingertips, to channeling inspiring TV series, the library is reinvented as a place of creative discovery that forges a path to creative form and function across disciplines. The library has always been a place for adventure. It will continue to be, but librarians must be ready to re-imagine how the magic happens. It must happen intentionally, in the classroom, with an eye on a shifting paradigm that is taking place at all levels of education, but also be reclaimed in the trenches of the library at an individual level that embodies ownership and freedom.

## References


1. Berg, H., Taatila, V., Volkmann, C.: Fostering creativity - a holistic framework for teaching creativity. Dev. Learn. Organ. **26**(6), 5–8 (2012)
2. James, A., Brookfield, S.: Engaging Imagination: Helping Students Become Creative and Reflective Thinkers. Jossey-Bass, San Francisco (2014)
3. Quinn, B.: The McDonaldization of academic libraries? Coll. Res. Libr. **81**(3), 248–261 (2000)
4. Elmborg, J.K.: Libraries as the spaces between us: recognizing and valuing the third space. Ref. User Serv. Q. **50**(4), 338–350 (2011)
5. Fister, B.: The liminal library. LILAC (2015). http://barbarafister.com/LiminalLibrary.pdf
6. Swanson, T.A.: A radical step: implementing a critical information literacy model. Portal: Libr. Acad. **4**(2), 259–273 (2004)
7. Jacobs, H.: Information literacy and reflective pedagogical praxis. J. Acad. Libr. **34**(3), 256–262 (2008)
8. Goodman, S.: Fuel creativity in the classroom with divergent thinking. Edutopia (2014). http://www.edutopia.org/blog/fueling-creativity-through-divergent-thinking-classroom-stacey-goodman
9. Kurt, L., Kurt, W., Medaille, A.: The power of play: fostering creativity and innovation in libraries. J. Libr. Innovation **1**(1), 8–23 (2010)
10. Mackey, T.P., Jacobson, T.: Metaliteracy: Reinventing Information Literacy to Empower Learners. Facet Publ, London (2014)
11. Tharp, T., Reiter, M.: The Creative Habit: Learn it and Use it for Life: a Practical Guide. Simon & Schuster, New York (2003)
12. Gladwell, M.: Malcolm Gladwell on Creativity. Nordic Business Forum. https://www.youtube.com/watch?v=t_k7XRr-se4

# Information Literacy Instruction Methods for Lower Secondary Education in Finland

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**Abstract.** This paper presents a research plan about information literacy instruction methods for lower secondary education in Finland. The aim of the research is to develop new practices for information literacy instruction in collaboration with the teachers by applying a design-based research approach. Guided Inquiry, a teaching model for information literacy, is used as the pedagogical framework. The research will be conducted as a longitudinal intervention study in a Finnish comprehensive school (grades 7–9). Three modules for information literacy instruction will be designed in cooperation with teachers who have been familiarized with the Guided Inquiry model. The modules will be integrated into three courses taking place during one school year. After evaluation and redesign, the modules will be tested with new pupils the following year. Selected classes not exposed to the intervention are studied as a control group.

**Keywords:** Information literacy instruction · Guided inquiry · Design-based research · Lower secondary education

## 1 Introduction

Today's society requires competence in asking questions and seeking answers, finding information, interpreting and evaluating sources. We need to be able to identify what is real and relevant not just for school but for lifelong learning. We need new literacies.

A new version of Finland's National Core Curriculum for basic education was published in 2014. It introduces and emphasizes the learning goals of *multiliteracies* which should be integrated into all school subjects. Multiliteracies are defined as competences associated with acquiring, interpreting, producing, and evaluating a variety of texts in different situations and in different formats for different tasks and with different tools [1]. By definition, multiliteracies strongly overlap with *information literacy*.

Essay-type assignments that require independent acquisition and use of information sources are usually used to train students' information literacies. However, earlier research shows that the learning outcomes have remained poor. Although students are said to be fluent searchers of information since they daily "google" for information, recent research shows that students' skills are quite limited in more complex tasks [2–4].

These assignments create challenges also for teachers and their traditional instruction practices, as they have to guide students to work independently in information


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environments that a teacher cannot fully control. It has been noticed in several studies that the instruction is often weak and concentrates mainly on technical aspects [5–9].

In this study, information literacy instruction methods for lower secondary education in Finland will be examined. The point of departure is the tension between traditional teacher-centered pedagogical practices and learner-centered assignments [8].

## 2 Objectives of the Study

The aim of the study is to develop new practices for information literacy instruction in collaboration with the teachers by applying a *design-based research* approach. Kuhlthau's *Guided Inquiry* [10, 11] is used as a pedagogical framework. The underlying idea of Guided Inquiry is that information literacies are best learned by training appropriate information practices in a genuine collaborative inquiry process.

The preliminary research questions are:

1. What kinds of practices arise for information literacy instruction when teachers apply the model of Guided Inquiry in their teaching?
2. How do the teachers feel about the new method? What are the advantages and disadvantages?
3. How does the long-term teaching intervention change students'
   - self-efficacy in information literacy,
   - basic skills and knowledge in information literacy,
   - inquiry related attitudes, and
   - self-regulation in inquiry assignments compared to non-participating students?
4. What are students' working practices and how do they change during the intervention?
5. What are students' learning experiences?

## 3 Research Methods and Research Materials

### 3.1 Design-Based Research

The study will be conducted by using a design-based research approach. Design-based research emphasizes the participatory role of practitioners. This study will be a cooperative project in which planning and development of learning tasks are carried out in cooperation with the teachers.

Design-based research means a methodology in which both a theory and practices are developed and tested simultaneously. Design-based research deals with real world situations and aims to improve educational practices. The focus is on innovations and interventions. The research is based on continuous cycles of design, implementation, analysis, and redesign. Design-based research is usually carried out as a longitudinal study in order to make the cyclicity of the process actualize in the best possible way [12–14].

### 3.2 Guided Inquiry

Kuhlthau's Guided Inquiry is used as a pedagogical framework in this study. Guided Inquiry is a research-based teaching model for information literacy.

Guided Inquiry is grounded in the idea that information literacies are best learned by training appropriate information practices in a genuine collaborative process of inquiry. The goal is that, in addition to information literacies, students learn curriculum content, how to learn, and social skills.

In Guided Inquiry, the inquiry process is divided into eight phases. The phases are: (1) open, (2) immerse, (3) explore, (4) identify, (5) gather, (6) create, (7) share, and (8) evaluate. The teacher guides the process with well-adapted instructive interventions, offering targeted support for the specific stages of the process. The framework emphasizes the first four stages before collecting information. Students are prepared for information gathering by stimulating curiosity and interests, sharing what is known already, building background knowledge, and exploring ideas. It is important to clearly articulate the inquiry question before moving on to gathering information, creating the outcome and sharing it with the others. Guided Inquiry incorporates reflection for assessment throughout all the phases of the inquiry process, but also the evaluation at the end of the inquiry process is an essential component in Guided Inquiry. It is important that the students reflect on content and process, and assess the achievement of learning.

Guided Inquiry applies two collaborative forums. The whole class - called an *inquiry community* – is used to introduce and motivate the assignment and share results. Small groups - called *inquiry circles* - are the main forum of learning activities. Students are guided to enhance their learning by using three inquiry tools: *inquiry journals* help reflect on personal learning, *inquiry logs* help keep track of and comment on important information sources found, and *inquiry charts* help visualize, organize and synthesize ideas [10, 11].

### 3.3 Data Collection and Analysis

The study will be conducted as a longitudinal intervention study in a Finnish comprehensive school (grades 7–9). Two parallel groups at the 7th grade will be compared: a test group, and a control group.

The teachers of the test group will be familiarized with the Guided Inquiry model. Then three modules for information literacy instruction will be designed and integrated into three courses taking place during one school year. After evaluation and redesign, the modules will be tested with new pupils the following year. Selected classes not exposed to the intervention will be studied as a control group. The intervention will be integrated into the courses of Finnish literature (two modules) and history (one module). The aim is to create a pedagogical entity which supports the learning of information literacy in a cumulative way.

Collection of the material is directed (1) to the pedagogical implementation of the intervention, (2) its effects on the pupils, and (3) to the learning experiences. Data will be collected by using multiple methods. The data will consist of interviews with the pupils and teachers, questionnaires and test tasks from the pupils, and observations of

the researcher. Also the pupils' own documentation (for example inquiry journals) can be utilized.

Analysis of the interviews and observations will be conducted by using the method of content analysis. Questionnaires and tests will be analyzed by using statistical methods.

## 4 Expected Results

A longitudinal approach enables conducting the study gradually by defining clear learning objectives and designing focused learning activities for each individual course. It also enables following the development of the pupils and changes in their skills. Presumably, this approach helps to achieve cumulative and persistent learning outcomes. Following the principles of design-based research, informing and working together with the teachers enables the development of new practices for information literacy instruction during the whole process, and gradually improves educational practices.

## References

1. Perusopetuksen opetussuunnitelman perusteet. [National Core Curriculum for Basic Education (in Finland)] Opetushallitus, Helsinki (2014)
2. Kiili, C., Laurinen, L., Marttunen, M.: Skillful internet reader is metacognitively competent. In: Hin, L.T.W., Subramaniam, R. (eds.) Handbook of Research on New Media Literacy at the K-12 Level: Issues and Challenges, pp. 654–668. IGI Global, Hershey (2009)
3. Sormunen, E., Lehtiö, L.: Authoring Wikipedia articles as an information literacy assignment – copy-pasting or expressing new understanding in one's own words? Inf. Res. 16(4), paper 503 (2011)
4. Walraven, A., Brand-Gruwel, S., Boshuizen, H.P.A.: Information problem solving: a review of problems students encounter and instructional solutions. Comput. Hum. Behav. **24**(3), 623–648 (2008)
5. Hongisto, H., Sormunen, E.: The challenges of the first research paper – observing students and the teacher in the secondary school classroom. In: Lloyd, A., Talja, S. (eds.) Practising Information Literacy: Bringing Theories of Learning, Practice and Information Literacy Together, pp. 96–120. Centre for Information Sudies, Wagga Wagga (2010)
6. Limberg, L., Alexandersson, M., Lantz-Andersson, A., Folkesson, L.: What matters? shaping meaningful learning through teaching information literacy. Libri **58**(2), 82–91 (2008)
7. Merchant, L., Hepworth, M.: Information literacy of teachers and pupils in secondary schools. J. Libr. Inf. Sci. **34**(2), 81–90 (2002)
8. Sormunen, E., Alamettälä, T.: Guiding students in collaborative writing of wikipedia articles – how to get beyond the black box practice in information literacy instruction. In: Proceedings of EdMedia 2014 – World Conference on Educational Multimedia, Hypermedia and Telecommunications, vol. 2014, no. 1, pp. 2122–2130. AACE, Chesapeake (2014)

9. Sormunen, E., Alamettälä, T., Heinström, J.: The teacher's role as facilitator of collaborative learning in information literacy assignments. In: Kurbanoğlu, S., Grassian, E., Mizrachi, D., Catts, R., Špiranec, S. (eds.) ECIL 2013. CCIS, vol. 397, pp. 499–506. Springer, Heidelberg (2013)
10. Kuhlthau, C.C., Maniotes, L.K., Caspari, A.K.: Guided Inquiry: Learning in the 21th Century. Libraries Unlimited, WestPort (2007)
11. Kuhlthau, C.C., Maniotes, L.K., Caspari, A.K.: Guided Inquiry Design: A Framework for Inquiry in Your School. Libraries Unlimited, Santa Barbara (2012)
12. Barab, S.: Design-based research: a methodological toolkit for the learning scientist. In: Sawyer, R.K. (ed.) The Cambridge Handbook of the Learning Sciences, pp. 153–169. Cambridge University Press, New York (2006)
13. Design Based Research Collective: Design-based research: an emerging paradigm for educational inquiry. Educ. Res. **32**(1), 5–8 (2003)
14. Wang, F., Hannafin, M.J.: Design-based research and technology-enhanced learning environments. Educ. Tech. Res. Dev. **53**(4), 5–23 (2005)

# Teaching and Learning Information Literacy

# Using Google Sites to Promote 7th Graders' Information Literacy, Reading Comprehension, and Information Technology Through Inquiry-Based Learning in Taiwan

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**Abstract.** The purpose of this research is to analyze the effects of collaborative teaching approach and inquiry-based learning (IBL). To facilitate the study, the researcher used Google Sites, an online application, to create a team website. The participants consisted of 28 seventh-grade students, a Teacher Librarian (who is also the teacher of the subject unit) and a Computer Teacher. Quantitative data were collected through information literacy (IL) assessment, PISA, after-class test, IT measurement and questionnaires. Qualitative data were collected through Google Sites documents, interviews, and observations. The findings are: (a) two teachers played essential roles in preparing students with IL, reading comprehension and IT skills through their collaboration and instructional content design; (b) students' IT skills improved significantly after employing IBL; (c) collaborative teaching and IBL have positive impacts on the development of students' IL, reading comprehension, curriculum content, and IT skills; (d) the participants' attitude and perceptions showed positive effects towards the Google Sites collaborative process.

**Keywords:** Collaborative teaching · Inquiry-based learning · Information literacy · Information technology · Reading comprehension

## 1 Introduction

Information literacy (IL) has been an important issue for both the government and information organizations. Due to rapid changes in the information intensive society, the development of students' critical thinking, problem solving, communication, and creativity skills has become an important pedagogical goal. While developing IL instruction, the researcher found many online tools and IL modules for creating interesting learning objects. These tools motivate students to communicate effectively and collaborate with others better. We chose Google Sites as the platform because it provides an


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easy way to create a team-oriented site where multiple people can collaborate and share files, thus allowing students to engage in collaborative and interactive learning.

One study mentioned that students need to learn how to extract and use the "best" information through learning experiences, such as school projects [1]. In order to achieve this goal, librarians and teachers should integrate content with IL, so that students can learn how to make use of a wide range of resources to broaden their understanding of information [2]. Studies showed a positive relationship between teacher-librarian collaboration and increased student learning and achievement [3, 4]. Kuhlthau et al. [5] concluded that the inquiry process was the most effective way of learning. As such, students should learn five methods through inquiry teaching: IL, learning how to learn, curriculum content, literacy competence, and social skills. Collaboration among teachers makes it possible for students to acquire these skills simultaneously. Team collaboration plays an important role in the development of 21st century learning.

In Taiwan, concerns regarding student IL have arisen since 2014. Approximately a quarter of the students failed in pursuing course contents. The Ministry of Education (MOE) hence initiated various projects for digital reading in elementary and junior high. Among those projects is a learner-centered approach using 5-Cs: communication, collaboration, complex problem-solving, critical thinking, and creativity. To implement MOE's new system, the researcher set out a teaching plan to help students collaborate to create new knowledge while learning how to think critically and creatively, and to make discoveries through inquiry, reflection, and exploration. The purpose of this study is to investigate the effects of an intervention that used a collaborative teaching approach and IBL on the development of seventh-grade students' IL, reading comprehension and information technology skills with the Google Sites platform.

## 2 Literature Review

### 2.1 IBL and Information Literacy

IBL is an active and lifelong learning process based on identifying relevant questions related to research, so that the student can gain knowledge of or create solutions to issues and problems [6]. McKinney [7] considers that the competencies encompassed by IL are essential for students to be successful inquirers. He also mentioned that the ability to synthesize information and create new knowledge are competencies that lie at the heart of IBL. IBL includes asking questions, gathering and analyzing information, generating solutions, making decisions, justifying conclusions and taking action. IBL also helps develop higher-order IL, critical thinking skills, and problem solving abilities.

There are a number of inquiry-based models such as Eisenberg and Berkowitz's Big6 and Super3, McKenzie's Research Cycle, Kuhlthau's Information Search Process, Carnesi's and DiGiorgio's Newport News Public Schools (NNPS) Inquiry Process [8–11]. NNPS uses a cyclical process that begins with questioning, followed by planning, collecting, organizing, synthesizing the information into a final form, and communicating results to teachers or peers. Each step requires students to reflect, revise and evaluate the work accomplished, to either move forward or repeat the current step until the process is complete. It also complies with Standards for the 21st Century Learner

[12]. Furthermore, technology (WebQuest [13], ThinkQuest [14]) is not only a requisite in teaching today's digital native students, but also the preferred means for the teacher-librarian in guiding students through the inquiry process. Rockman presents a clear view of IL curriculum and suggests that problem-based, inquiry-based, and resource-based instruction should be required [15]. Combining a collaborative teaching approach with IBL is shown to be effective in improving primary students' IL and IT skills [16].

### 2.2 Collaborative Teaching and Learning

IL instruction commands increasing attention in the field of education lately. Cox and Lindsay stated that IL instruction is often delivered in two ways: teaching several sessions which are integrated into the subject curriculum or teaching IL as a stand-alone concept [17]. Eisenberg [18] strongly recommends that classroom teachers, librarians, technology teachers, and others work together to analyze the curriculum, develop a broad plan, design specific lessons that integrate the information skills and classroom content. "Standards for the 21st Century Learner" states that "School librarians collaborate with others to provide instruction, learning strategies, and practice in using the essential learning skills" [19]. The final goal is to provide frequent opportunities for students to learn and practice information problem solving.

Montiel-Overall [20] indicated that five essential issues would facilitate the success of collaboration: school culture, positive attributes of collaborators, communication, management, and motivation. A successful collaborative practice requires both teachers and school librarians to know each other's strengths. A study of Hong Kong revealed that the alliance between librarians and teachers on development of IL instruction for students leaves much to be desired [21]. Subramaniam et al. [22] conducted a project involving collaboration between school librarians, science teachers and middle school students. The Sci-Dentity afterschool program involved youth in connecting science-infused media such as graphic novels and science fiction. They found that school librarians are strong assets in science learning as they encourage young people to engage in authentic inquiry practices, engage learners' everyday-life interests, incorporate the diversity of students' perspectives into science discussions, and facilitate following the norms of scientific discourse.

### 2.3 Google Sites Used in Learning

Web tools allow students to engage in collaborative and interactive learning. Google Sites allows students to create a team-oriented site where they can collaborate and share files. It combines articles, images, videos and audios into one product. Chu et al. [23] found that the functions and characteristics of Google Sites serve as a good tool in collaborative work for secondary school students. Both teachers and students find it useful in teaching and learning. Teachers are satisfied with the history review function for convenient marking. Students felt comfortable and motivated with embedding videos and photos in project reports, as well as presenting their group work in a web

page format. Kovalik et al. [24] indicated that fifth grade students were successful in completing the research component of the project by using Google Sites. Students received assistance from their teammates and were able to complete the work needed in a collaborative fashion. They felt they had grown and learned how to collaborate with others. Teachers suggested that more time be allotted for the initial tutorial and peer review must be included in the project timeline.

## 3 Research Questions

This research collects data based on a sequence of questions:

1. How does the Teacher Librarian collaborate with the Computer Teacher in class planning?
2. How do the students develop their research skills through the NNPS Inquiry Process?
3. How does IBL impact on the achievement of students' information literacy, reading comprehension, content knowledge, and information technology skills?
4. What are the students' perceptions of using Google Sites for their group project?

## 4 Methods

This section describes sample selection, instructional contents, and research instruments.

### 4.1 Participants

One teacher librarian (also a Science-Tech teacher,) one Computer teacher and 28 seventh-grade students with no inquiry experiences, evenly divided into seven groups.

### 4.2 Instructional Contents and Designated Tasks

- Context: the "organism and nutrition" topic from the 7th-grade Science textbook;
- Methodology: Integrating IL, concept mapping, abstract writing, and IT skill into an inquiry-based curriculum;
- The teacher librarian taught online searching and printing skills, provided students with reading strategies, monitored students' learning progress using the NNPS inquiry process and directed the IBL project through subject learning, co-constructing writing on the Google Sites platform. The students in groups generated at least 3 questions for inquiry following the NNPS process worksheet;
- The Science Teacher introduced "organism and nutrition," encouraged students to research pertinent topics, and helped them finish the concept mapping worksheet. The students practiced searching with keywords;

- The Computer Teacher introduced Google Sites and related IT skills, such as Xmind, Word and PowerPoint. The students evaluated information from various resources to decide on the best answers;
- The students finished their final work and presented it in the class. They also reviewed their own performance and summarized their IBL experience.

The integrated instruction project was scheduled for 18 weeks, a total of 54 class sessions, 50 min for each session. Table 1 shows the syllabus for teachers.

**Table 1.** Lessons designed for teacher collaboration

| Week | Science- tech teacher | Teacher librarian | Computer teacher |
|---|---|---|---|
| 3 | IL pretest | PISA pretest | Word/Power Point pretest |
| 4 | | 1. Grouping<br>2. School library introduction | Help student set up Gmail accounts |
| 5 | | School library OPAC searching strategies | Public library account application |
| 6 | | Public library OPAC and database searching strategies | |
| 7 | Concept of organism and nutrition | Web searching strategy | Google teaching |
| 8 | Choosing group topics | KWL, 5 W + 1 H | Word |
| 9 | Concept map | Newspaper and periodical searching | Google Sites Platform |
| 10 | | Create good questions | Xmind |
| 11 | | Complete Planning worksheet | Xmind |
| 12 | Collecting data | Collecting, organizing | |
| 13 | | Information | Word |
| 14 | Writing project | Abstract writing/Synthesizing infomation | PowerPoint |
| 15 | | Editing materials | PowerPoint |
| 16 | | APA Style<br>Information ethics | Information ethics |
| 17 | | Word report & PowerPoint | |
| 18 | | Rehearsal for oral presentation | Rehearsal for oral presentation |
| 19 | Oral presentations | Oral presentations | Oral presentations |
| 20 | IL posttest, Content knowledge test | PISA post-test | Word and PowerPoint post-test |

### 4.3 Research Instrument

The surveys of students' perceptions of Google Sites learning, IL, reading comprehension and IT measurement, the online NNPS worksheet, and Observation recording paper were developed. This survey was based on Hazari et al. study and had 4 dimensions: learning, motivation, group interaction, and technology [25]. The IL instrument contained 25 multiple choice questions, edited by Trails. IT measurement contained Word and PowerPoint of a one day tour route with images. The PISA 2009 instrument was used as a reading comprehension test. In addition, two teachers and six students participated in semi-structured interviews for qualitative research purpose.

## 5 Data Analysis and Discussion

This section describes data analysis, contribution of collaborative teachers, the NNPS Inquiry Process, students' learning achievement and perceptions of Google Sites.

### 5.1 Data Analysis

The data from surveys were organized, coded, reviewed and analyzed. The data from students' Google Sites learning survey was analyzed at the mean. A *t*-test was used to analyze the pre- and post-test of IL, reading comprehension, and IT skills. Further data on the variables were obtained through semi-structured interviews with the students and teachers. Transcripts of the interviews were sent to the interviewees for final validation.

### 5.2 Contributions of Collaboration Between Teacher Librarian (Science and Technology Teacher) and Computer Teacher

Both teachers mentioned that the students found Google Sites were very convenient and motivating, in terms of sharing information and exchanging ideas from the Internet. However, students tended to carelessly copy and paste information from the Internet. Teachers needed to remind them to paraphrase and summarize main ideas. The students learned the discipline to avoid plagiarism. The researcher found struggling students got more help from peers and teachers. Teachers acknowledged the implementation of collaborative methods promoted their professional development and teaching skills. Both teachers agreed that careful planning and appropriate instructional design can assist collaborative teaching in a school environment.

### 5.3 Students' NNPS Inquiry Process

The researcher noted that students utilized NNPS steps to complete the project:

1. Questioning: the Science teacher helped students focus on the knowledge level of the questions and encouraged students to write open-ended questions with who, what, when, where, why or how. Consequently, the students applied the skills to questions

such as, "What kinds of parts do insects have?' or "How many benefits are there to using insects for protein powder?"

2. Planning: the Students planned and revised their own inquiries. The Teacher Librarian helped them find print and online resources to answer their questions.
3. Collecting information: The students filled in the appropriate information and APA citations for the bibliography page. They shared their collections on Google Sites. The researcher found students preferred obtaining online information to print.
4. Organizing information: the students learned Xmind skills from the computer teacher, and then wrote abstracts and summaries for their projects. They needed to read their information from print and online materials. This takes more time to practice computer skills and summary writing.
5. Synthesizing information: The students in each group turned in the summary to the group leader, who then reviewed and revised the final report. Every group had to present their project with their final report and PowerPoint.
6. Communicating results: the Computer Teacher demonstrated how to make good presentations. Both teachers assisted students in making oral presentations. Students and teachers evaluated their products by using product rubrics.

### 5.4 Students' Content Knowledge, Information Literacy, Reading Comprehension and Information Technology Skills

Table 2 lists the scores of the students' *t*-test results. The post-intervention scores are higher than the pre-intervention only in IT($p < .001$). After the IBL learning, the researcher and the Science teacher constructed the content knowledge test, based on each group's topic and the textbook. The average score is 86.56, improved from the last test (78.35).

**Table 2.** Information literacy, Information technology and reading comprehension *t*-test

| | Pretest | | Posttest | | |
|---|---|---|---|---|---|
| | M | SD | M | SD | *t* |
| IL | 84.74 | 11.69 | 83.11 | 10.13 | .892 |
| IT | 36.33 | 12.23 | 76.48 | 10.27 | 15.48*** |
| Reading comprehension | 9.15 | 1.94 | 9.81 | 1.64 | 1.8 |

***P<.001

### 5.5 Students' Perceptions of Google Sites

This online survey was anchored on a four point Likert-type scale and measured the extent of students' perceptions of the influence of Google Sites (GS) on their learning experience. This survey (Table 3) contains four categories, five items each. Students were positive about the influence of GS on their experience with IBL. The items in bold show the highest rating in each category:

**Table 3.** Students' perceptions of Google Sites

| | Items | M | SD |
|---|---|---|---|
| Learning/pedagogy | 1. Use of Google Sites raised my interest in the project. | 3.44 | .75 |
| | 2. I would like to see Google Sites used in other courses. | 3.52 | .70 |
| | 3. I will retain more materials as a result of using the Google Sites. | 3.52 | .70 |
| | **4. I participated in the assignment more because of using Google Sites.** | **3.67** | .48 |
| | 5. Use of Google Sites helped me achieve the course objectives. | 3.56 | .50 |
| Motivation | 6. The benefits of using Google Sites are worth the extra effort and time to learn it. | 3.30 | .72 |
| | **7. I would recommend classes use Google Sites to other students.** | **3.52** | .70 |
| | 8. I prefer projects that use Google Sites to those that do not. | 3.33 | .67 |
| | 9. I will continue to explore the use of Google Sites for project work. | 3.48 | .70 |
| | 10. I stayed on the task more because of using Google Sites. | 3.19 | .73 |
| Group interaction | 11. I liked to see other students interact with material I posted on Google Sites. | 3.33 | .83 |
| | 12. Use of Google Sites for the assignment helped me interact more with others. | 3.37 | .68 |
| | 13. Because of using Google Sites, my team was able to come to consensus more quickly. | 3.22 | .80 |
| | **14. I learned more because of information posted by others on Google Sites.** | **3.52** | .58 |
| | 15. Use of Google Sites promoted collaborative learning. | 3.44 | .50 |
| Technology | 16. The Google Sites interface and features were overall easy to understand. | 3.41 | .84 |
| | 17. The benefits of using Google Sites outweighed its technical challenges. | 3.26 | .71 |
| | 18. Browsing/editing information in Google Sites was easy. | 3.22 | .64 |
| | 19. Compared to other online discussion boards, Google Sites was easier to use. | 3.19 | .78 |
| | **20. Technical features in Google Sites helped enhance my learning.** | **3.44** | .69 |

As number four in Learning/pedagogy indicates, students perceived GS as an effective tool to foster learning. Number seven in Motivation indicates that students enjoyed the convenience of GS functions. Number 14 in Group Interaction indicates

that students were positive towards peers' contribution to projects via GS. Number 20 in Technology indicates that students agreed that GS allowed them to work on their projects simultaneously.

### 5.6 Discussion

The researcher found the students improved only their IT skills. This was slightly different from Chu et al. [26] who suggested that Google Sites was generally useful if sufficient training was provided. The researcher found one group encountered difficulty in collecting information and designing questionnaires. Both teachers felt they needed more time to cover inference and comprehension, and the students were in need of more time to practice keyword web searching, and summarizing skills.

In summary, Google Sites serves as a good tool for collaborative work for students. Similar to what Chu et al. [23] and Bonanno [7] found, IBL can be addressed well by using web-based tools The interviews with students and teachers showed that students' ability to work in teams, to solve problems, and to apply knowledge were enhanced through IBL. Although students acquired searching skills, they could not define their questions and synthesize their findings precisely. However, students learned about their content to a great extent. The result is consistent with Barron and Darling-Hammond's [27] study. Both teachers strongly agreed that completion of the IBL project requires school support, more discussion and communication between teachers, and effective management of their instructional content. This is similar to Montiel-Overall's [20] research.

## 6 Conclusion and Future Work

This study found that students gained confidence, technology skills and social skills with their peers. Students' IT ability grew significantly better after the intervention. The NNPS Inquiry Process through Google Sites had positive effects on students' IBL. The two teachers played essential roles in preparing students with IL, reading comprehension and IT, through collaboration and instructional content design. The researcher recommends the following for the future.

1. Because IBL did not improve students' IL, future class units will focus on learning how to obtain and evaluate information efficiently.
2. Based on the participants' input, the researcher suggests adding more time to cover inference, reading comprehension, and summary skills.
3. The researcher suggests developing high quality standardized testing along with effective, formative and summative assessments.
4. IBL, collaborative teaching and an interdisciplinary curriculum can increase students' confidence, collaborative, and communication skills. It should be a possible educational reform in order to prepare our students for 21st century learning.

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## References


1. Chu, S.K.W.: Assessing information literacy: a case study of primary 5 students in Hong Kong. School Libr. Res. **15**, 1–24 (2012)
2. Woolls, B.: The School Library Media Manager, 3rd edn. Greenwood, Westport (2004)
3. Immroth, B., Lukenbill, W.B.: Promoting information literacy & teacher librarian collabo ration through social marketing strategies: a human information behavior study. Texas Libr. J. **83**(2), 62–67 (2007)
4. Wimberley, C.E.: Teacher Collaboration and Student Achievement. Doctoral Dissertation, Lindenwood University (2011)
5. Kuhlthau, C.C., Maniotes, L., Caspari, A.: Guided Inquiry: Learning in the 21st Century. Libraries Unlimited, Westport (2007)
6. Web Tools to Support Inquiry-based Learning. http://www.scoop.it/t/web-tools-to-support-inquiry-based-learning
7. Inquiry-based Learning and Information Literacy: A Meta-analytical Study. http://www.sheffield.ac.uk/polopoly_fs/1.122797!/file/IL_meta-analysis_PM-FINAL.pdf
8. Eisenberg, M.B., Berkowitz, R.E.: Teaching Information & Technology Skills: The Big6 in Elementary Schools. Linworth, Worthington (1999)
9. McKenzie, J.: Beyond Technology: Questioning, Research and the Information Literate School. FNO Press, Bellingham (2000)
10. Kuhlthau, C.C.: Information search process: a summary of research and implications for school library media programs. School Libr. Media Q. **18**(1), 19–25 (1989)
11. Carnesi, S., DiGiorgio, K.: Teaching the inquiry process to 21st century learners. Libr. Media Connect. **27**(4), 32–36 (2009)
12. Standards for the 21-century learner. http://www.ala.org/aasl/standards-guidelines/learning-standards
13. WebQuest. http://webquest.org/
14. ThinkQuest Library. https://www.archive-it.org/collections/3635
15. Rockman, I.F.: Introduction: the importance of information literacy. In: Rockman, I.F. (ed.) Integrating Information Literacy into the Higher Education Curriculum: Practical Models for Transformation, pp. 1–28. Jossey-Bass, San Francisco (2004)
16. Chu, S., Chow, K., Tse, S.K.: The development of students' information literacy and IT skills via inquiry PBL and collaborative teaching. Proc. Am. Soc. Inf. Sci. Technol. **46**(1), 1–22 (2009)
17. Cox, C.N., Lindsay, E.B.: Information Literacy Instruction Handbook. Association of College and Research Libraries, Chicago (2008)
18. Eisenberg, B.M.: Information literacy: essential skills for the information age. J. Libr. Inf. Technol. **2**, 39–47 (2008)
19. America Association of School Librarians.: Standards for the 21st Century Learner. American Library Association, Chicago (2007)
20. Montiel-Overall, P.: Teacher and librarian collaboration: a qualitative study. Libr. Inf. Sci. Res. **30**(2), 145–155 (2008)
21. Lai, J., Wei, D.: Collaboration between teachers and librarians for information literacy curriculum: a case study of a Hong Kong secondary school. J. Stud. Educ. **3**(3), 75–91 (2013)
22. Subramaniam, M., Ahn, J., Waugh, A., Taylor, N.G., Druin, A., Fleischmann, K.R., Walsh, G.: Crosswalk between the framework for K–12 science education and standards for the 21st-century learner: school librarians as the crucial link. School Libr. Res. **16**, 1–28 (2013)

23. Chu, S.K.W., Chin, Y.M., Wong, C.Y., Chan, I.H.Y., Lee, C.W.Y., Wu, W.W.Y., Pun, B.L. F.: Using Google sites in collaborative inquiry project-based learning at secondary school level. In: 9th International Conference on Computer Supported Collaborative Learning, pp. 1148–1149. The University of Hong Kong, Hong Kong (2011)
24. Kovalik, C., Kuo, C.L., Cummins, M., Dipzinski, E., Joseph, P., Laskey, S.: Implementing Web 2.0 tools in the classroom: four teachers' accounts. TechTrends **58**(5), 90–94 (2014)
25. Hazari, S., North, A., Moreland, D.: Investigating pedagogical value of wiki technology. J. Inf. Syst. Educ. **20**(2), 187–198 (2009)
26. Chu, S.K.W., Cheng, E., King. R.B.: Effectiveness of the Wiki technology in facilitating group projects undertaken by seconday students. In: The University of Oxford STORIES Department of Education Conference. The University of Oxford, Oxford (2012)
27. Teaching for Meaningful Learning: A Review of Research on Inquiry-based and Cooperative Learning. http://www.edutopia.org/pdfs/edutopia-teaching-for-meaningful-learning.pdf

# Learning with Social Media: An Information Literacy Driven and Technologically Mediated Experience

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**Abstract.** This paper summarizes the theories, methods, and results of a doctoral research that integrated social media (SM) in a learning experience for students and explored the roles that information literacy, digital literacy, and new literacies played in such a learning experience. Participatory action research was the methodological approach used for two rounds of data collection, resulting in the development of the research framework 'Doing Online Relearning through Information Skills' (DORIS). The data collection methods used included students' reports, diagnostic, and final questionnaires; and semi-structured interviews. Data analysis relied on content analysis, open coding, and constant comparative analysis. This paper provides a summary of the discussion leading to the answers to the research questions, including topics such as issues and challenges of using SM for learning; participants learning experiences in such a technologically mediated environment, their engagement and the mutual shaping of SM, learning experiences, and literacies.

**Keywords:** Social media · Higher education · Teaching · Learning · Participatory action research · Information literacy

## 1 Introduction

This paper is framed within a doctoral research that integrated social media (SM) in a learning experience for students and explored the roles that information literacy (IL), digital literacy (DL), and new literacies (NL) play in such a learning experience. This research assumed a mutual shaping perspective regarding its three main elements (learning, literacies and SM), thus opposing the perspective of technological determinism [1, 2]. This stance allows gaining a better understanding about the role of technology in students' learning experiences and also for exploring how these experiences may affect the way technology is implemented into learning contexts. The main learning theories supporting this research are: constructivist [3] and problem based learning [4]; the three dimensions of learning (cognitive, social, and emotional) [5]; and the theory of affinity spaces [6]. The methodological approach used was participatory action research (PAR) [7–9], which is cyclical in nature [9]. Thus, two rounds of data collection were completed for this study, a first empirical study was conducted and as the methodology was revised, improved and enhanced, it resulted in the development of the research and methodological framework, 'Doing Online Relearning through Information Skills' (DORIS).


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This paper is structured in four main sections; Sect. 2 summarizes the main concepts and theories of this research. Section 3 details the methodology used for both rounds of data collection, as well as the methods for the analysis of the data collected. Section 4 provides a summary of the answers to the research questions and discusses the contributions of this research.

## 2 Main Concepts and Theories

The central concepts used in this study were IL [10, 11], DL [12, 13], and NL [14, 15]. These concepts were used to make a distinction of different skills involved in this research and were also grouped under the umbrella term literacies, which highlights the presence of the three concepts at the same time and in different circumstances where it is applicable. The need to state such a distinction rather than adopting a multiliteracies (or similarly integrative) approach is due to the fact that in such an exploratory study, the data needed to be gathered on how the participants were challenged by different kinds of issues and which skills they had to use in order to overcome such challenges. For example, some participants could be proficient in IL but challenged by technology. In this case there is bound to be a difference in their level of engagement and success in participating in the study. Conversely, some participants could be the so-called 'digital natives' and they can be challenged by typical IL issues such as seeking or evaluating information, as well as having issues of focus, following instructions, and being critical [16]. In consequence, these participants would have a different kind of engagement. Furthermore, both kinds of participants may be challenged by NL.

Regarding learning, two main theories have informed this research. Firstly, the three dimensions of learning [5], where learning is viewed as a three dimensional process that may occur at an individual and collective level as well as in many different environments, including affinity spaces. The dimensions considered in this perspective are: (a) cognitive, which includes knowledge and skills; (b) social, involving socialization, participation, communication, and co-operation; and (c) the emotional dimension, which entails feelings and motivations of the learner. Although arguably simple, this perspective is useful for analyzing the learning taking place in a technologically mediated learning experience, especially with social technologies (SM). The other learning theory used was that of affinity spaces, which are "… a place or set of places where people can affiliate with others based primarily on shared activities, interests, and goals (…) have an affinity for a common interest or endeavor" [6]. This theory accounts for content, interactions, and allows thinking about teaching and learning mediated by technologies. The concept of affinity spaces provides a useful alternative to the theory of communities of practice in a case such as the present, where the value of membership is difficult to determine in the participants of the study. Both these theories provided useful analytical lenses for analyzing and discussing the data gathered.

Learning, literacies, and SM were conceived as elements that mutually shape one another. This corresponds to a mutual shaping perspective that is opposed to the idea of 'technological determinism' [1, 2]. This particular perspective of mutual shaping arguably allows for a better understanding about the influence of technology over the practices of its

users and at the same time assess how user practices can affect the ways technology is used, developed, or implemented into learning contexts. For example, SM can drive the way a learning experience is planned and, furthermore, the characteristics of a learning experience may determine to a certain extent how the educator plans this experience or uses this particular technology. The framework 'issues of SM' were used in order to analyze challenges and nuances in the use of SM from a Library and Information Science (LIS) perspective. This framework comes from the researcher's past investigations [17] and builds upon available literature [18]. This framework is a categorization of the issues that these technologies may bring from an information behavior perspective, which consists of the following issues: trust, decision making, users' satisfaction, information overload, quality control, permanence, repackaging, crowdsourcing, privacy, and 'the clash with the real world'.

## 3 Methodology

This research was qualitative and the research method used was Participatory Action Research (PAR) [7–9]. It aimed at determining significant issues, challenges, and opportunities that emerge when SM are integrated into learning environments in higher education. Considering the stated aim, the research project was guided by the main research question: What significant issues and challenges emerge when SM are integrated into learning environments in higher education? Sub-questions to this study were:

- How do students' experience learning when they are engaged in a learning activity that integrates SM?
- In what ways is students' engagement dependent upon their literacies?
- In what ways do learning, literacies and SM mutually shape each other?

### 3.1 Data Collection

This study used a two-stage research design; the stages are referred to as 'first round of data collection' and 'second round of data collection'. PAR was the methodological approach used in both rounds. While the first round was originally conceived as a pilot study, its results emerged into useful research and therefore it was decided to use it as part of the main study. This is also justified by the cyclical nature of PAR [9].

The first round contained the following five stages: (a) Assignment, (b) Lecture, (c) Online discussion, (d) Lecture 2, and (e) Wrap up. The learning strategies that integrated the learning interventions planned and executed with the participants of this round included: two lectures, class discussions, an assignment where the students had to set up a SM site, group presentations about the assignment, and online discussions using the university Learning Management System (LMS). The participants of this round were 18 master's students from an LIS program; all of them participated from the beginning to the end of the study and formed four groups to in order work together in the assignment. Data collection methods used in this round included the students' reports that they

wrote to summarize their experiences from doing the assignment, questionnaires, and semi-structured interviews with the four group leaders. The amount of instruments analyzed were four student reports, 18 questionnaires, and four interviews.

The second round of data collection was an expansion of the first, with more assignments and strategies that were developed and grouped under the DORIS research and methodological framework. DORIS also contained five stages but they were not named after the main activities conducted as in round one, instead, they were more clearly defined and its main stages were named after the core IL skills: access, use, and evaluation [11]. Introductory and concluding stages were added at the beginning and at the end. Hence, DORIS' five stages were: (a) Introduction, (b) Access, (c) Use, (d) Evaluation, and (e) Wrap up. The learning strategies that integrated the learning interventions planned and executed with the participants of this round, included: lectures, complementary readings, a blog used as a content hub and a space for online forums and interactions among participants and the researcher, and three assignments. The three assignments included (a) an individual reflection on the participants' use of SM; (b) the development of a SM site; and (c) the evaluation of an established SM site. Due to space limitations, a further explanation of DORIS is not provided here; however, interested readers and researchers can find complete accounts and details of this framework in other articles [19] and in the doctoral dissertation [20]. The participants of this second round were 11 bachelor's students enrolled in different programs but who were together in an IL course where this round of data collection was inserted as an alternative module. Only five of these students participated from the beginning to the end of the study and most of them found group mates from other courses to work on the second and third assignments that had to be done in groups. The data collection methods used in this round included the students' reports that they wrote to summarize their experiences from doing the assignments; diagnostic and final questionnaires that were completed, at the beginning and end of the study; and semi-structured interviews. The amount of instruments analyzed were six students' reports from the first assignment, five students' reports from the second assignment, five students' reports from the third assignment, 11 diagnostic questionnaires, 5 final questionnaires, and four interviews.

### 3.2 Data Analysis

Data were analyzed by relying on the technique of content analysis in a way to explain participants' shared meanings and assumptions [21]. Furthermore, this study borrowed several values from grounded theory research. The first of these was the use of the technique of constant comparative analysis for the coding and analysis of the data, in order to compare data from both rounds and develop stronger conceptualizations and relations [21]. Thus, the procedure of analysis was to use open coding with the data from the first round, which allowed refining the methodology in order to adjust, plan, and conduct the second round of data collection. After the second round data were analyzed, there was a return to the data of the first round in order to better define categories, so similar data were grouped. The same was made with the second round. At such stage, constant comparative analysis was applied between the categorized data from the first and the second rounds and, in the end, the data from the second round were very useful

for developing more exact categories for the data from both studies. Ultimately, through stages of axial and selective coding, it was possible to arrive at properties, dimensions, and relationships among the categories of data analyzed. This allowed arriving at the integration of the theory resulting from this research. The other value taken from grounded theory was the concept of theoretical saturation [22]. This concept was adopted because the low number of participants, especially for the second round of data collection, was a concern. However, using and analyzing the data from both rounds of data collection allowed the achievement of a moment of theoretical saturation, meaning that after the two rounds no new knowledge emerged and, hence, it was decided not to conduct a third round.

## 4 Conclusion

The following section provides a summary to the conclusions to the research questions of this study regarding topics such as issues and challenges of using SM for learning; participants learning experiences in such a technologically mediated environment, their engagement and the mutual shaping of SM, learning experiences, and literacies. The final part of this conclusion advances some directions for further research and provides a brief indication of the contributions of this study to IL research, practice, and for the development of IL programs.

### 4.1 Conclusions to the Research Questions: A Summary

**What Significant Issues and Challenges Emerge when SM are Integrated into Learning Environments in Higher Education?** The framework of issues of SM [17] proved to be a most useful framework to study the use of social technologies in learning environments. Actually, it was surprising that, despite very few exceptions, such a holistic approach is not common in the literature. Instead, some studies commonly concentrate on only one issue or a few at a time, such as privacy, trust, identity, and information overload, which seem to be the most common in studies of this kind.

From the issues of the framework, the most important issues according to the participants were trust, privacy, and quality control. Students were very concerned with these aspects to the point that in both rounds of data collection they discussed amongst each other and with the researcher the privacy statement handed over to them under the light of these three elements. This was, in the end, productive in that it provided the students with an opportunity talk about those issues more in depth under the light of the study at hand.

In order to integrate SM into higher education learning environments, the teacher must ensure that all their students actually want to use social technologies as an additional affinity space for their learning experiences. As this study showed, not all students would want to do it. Furthermore, a learning environment using SM must create a climate of trust between students and teachers about what is shared, when, and for what purpose. Otherwise, the focus might be easily lost due to the distractions of these technologies. Moreover, there should be quality control standards set in place regarding the content that is consumed and produced in a SM learning experience. Then, it should be decided

if public types of SM platforms are the best to use when having privacy concerns in mind or if, conversely, they should use SM that allow to keep aliases between participants. Many students would not like to have their private profile associated to their academic life.

The most challenging element surprisingly was IL and not DL nor NL. This must have been due to the fact that most students that participated in the study were young and many of them did not really dominate their IL skills, especially regarding the skill for information evaluation. Because the literature is critical in pointing out that students' perceptions of their literacy skills may differ from their actual skills, further research should be complemented with objective instruments such as SAILS or iSkills that can help determine if DL or NL were not also part of the students' challenges.

**How do Students Experience Learning when They are Engaged in a Learning Activity that Integrates SM?** It was interesting to see that, although some students were hesitant or even reluctant toward the use of SM for their learning, some students claimed to have very positive emotions toward what was done. This is likely because learning with technologies generally can be very ludic. Furthermore, it was surprising that, although most of the students were avid users of SM, very few of them actually created pages or groups so they could get a deeper appreciation of these tools they use so much every day.

Finally, it is fascinating to see that, despite working with these technologies, the students claimed that lectures and class discussions are still important. This result underlines their willingness to continue having physical contact in the classroom with their colleagues and lecturers. Even so, it was interesting to see that others sought different learning spaces that were not necessarily technological.

**In What Ways is Students' Engagement Dependent upon Their Literacies?** In learning environments, every individual might have their own idea of their goals or purposes. Individuals control their own level of participation and engagement, but engagement could be a matter of choice or personality. Because SM may provide a kind of provocation that compels engagement, they can provide attractive spaces to foster engagement in order for students to find further motivation to participate in their learning spaces and activities. In order to use SM for learning, students must have discipline and develop skills for being critical participants. This is important because limited engagement will not extend their current knowledge. Certainly, students' literacies played a role in their engagement, because IL provided them the tools to select the best information for completing the activities. While DL and NL provided the means for them to use SM at varied levels, the extent of their learning was still dependent on the development of their skills. However, students indicated that NL and DL did not pose challenges. Still, it was possible to see that this was mostly due to the fact that while some students might know how to use these types of tools for general purposes, they did not consider their use for education, and not precisely because they do not know how to use them in general. This response is subjective since their familiarity with these technologies might be influenced by generational differences and access to technology.

**In What Ways do Learning, Literacies and SM Mutually Shape Each Other?** It was confirmed that these elements mutually shape one another and do not support the

idea of technological determinism. The learning purpose can drive our use of SM and it may compel designers to enhance and design their features for learning. The use of SM brings many implications for learning that call for good planning behind their use. SM open many new ways to interact and learn with technologies. These ways are associated to the development of literacies. Still, if a person does not have necessary literacy skills, they may not be successful in these new technological spaces.

### 4.2 Implications for Further Research and Research Contributions

The methodology proposed, especially that of the second round of data collection can be applied to a larger and more heterogeneous group of participants, in order to see how further results compare. Hence, this methodology could be established as a reference for studying the roles of literacies in a learning experience mediated by technology. Most of the issues covered in this study can surely be further studied and more educational and sound refinements can be built upon the basis of the methodology used. It would be especially interesting to find quantitative values to the issues discussed on this work and design and implement an objective instrument to evaluate IL, DL and NL skills. This further study could be used to check if actual skills developed and students' perceptions of their skills can match. There are some established commercial instruments that can be used to achieve this, such as SAILS and iSkills.

DORIS was proposed as a powerful and effective way to organize PAR based on constructivist, blended (physical and online), and problem based learning interventions through the structure of information skills. This model was grounded on research-based and inquiry learning pedagogies as well as in PAR and constructivist learning, which can be set up as a blended learning intervention. Practitioners, researchers, librarians, or educators can adapt this model to develop learning interventions for learning and researching about and with SM or other technology mediated learning environments. DORIS can be adapted for teaching IL programs or other topics, by going through the aspects of access, use and evaluation of the information, as it is available and related to such topics, and by changing the themes discussed in the different stages. This could result in a powerful framework for scaffolding learning and for teaching different topics with an information skills structure, as they are needed to research and manage the information, resources or devices relative to different disciplines.

The above ideas and this research in general may offer different contributions to IL research, practice, and for the development of IL programs. Researchers, librarians, teachers, and related professionals can use its elements to enrich their social investigations, IL programs, and their pedagogies. IL programs can benefit from the grounding of IL activities on PAR, the theories used in this study, as well as its epistemologies, the mutual shaping perspective, its methods and results. DORIS can be used to organize learning interventions with a structure driven by IL skills. As such, it can be used for teaching, learning, and researching technologically mediated learning environments. It could also be adapted for facilitating IL programs or teaching different subjects from an information skills framework. The three dimensions of learning and the concept of affinity spaces are theories that might be worth considering by practitioners, because they can be powerful analytical lenses for assessing learning and interactions in learning experiences that are technologically mediated.

## References


1. Beard, C.: Time, technology, and the creative spirit in political science. Am. Polit. Sci. Rev. **21**(1), 1–11 (1927)
2. Kunz, W.: Culture Conglomerates: Consolidation in the Motion Picture and Television Industries. Rowman & Littlefield, Lantham (2007)
3. Vygotsky, L.S.: Mind in Society: The Development of Higher Mental Processes. Harvard University Press, Cambridge (1978)
4. Hepworth, M., Walton, G.: Teaching Information Literacy for Inquiry-Based Learning. Chandos Publishing, Oxford (2009)
5. Illeris, K.: Towards a contemporary and comprehensive theory of learning. Int. J. Lifelong Educ. **22**(4), 396–406 (2003)
6. Gee, J.: Situated Language and Learning: A Critique of Traditional Schooling. Routledge, New York (2004)
7. Whitehead, J., McNiff, J.: Action Research: Living Theory. Sage, London (2006)
8. Herr, K., Anderson, G.: The Action Research Dissertation: A Guide for Students and Faculty. Sage, Thousand Oaks (2015)
9. McIntyre, A.: Participatory Action Research. Sage, Thousand Oaks (2008)
10. Tuominen, K., Savolainen, R., Talja, S.: Information literacy as a sociotechnical practice. Libr. Q. **75**(3), 329–345 (2005)
11. Lau, J.: Guidelines on Information Literacy for Lifelong Learning. IFLA, Veracruz (2006)
12. Shapiro, J., Hughes, S.: Information technology as a liberal art: enlightenment proposals for a new curriculum. Educom Rev. **31**(2), 31–35 (1996)
13. Lankshear, C., Knobel, M.: Digital literacy and digital literacies: policy, pedagogy and research considerations for education. Nordic J. Digital Literacy **1**(1), 12–24 (2006)
14. Gee, J.: New Times and New Literacies: Themes for a Changing World. In: 8th International Literacy & Education Research Network Conference on Learning, pp. 3–20. Spetses, Greece (2001)
15. Lankshear, C., Knobel, M.: New Literacies: Everyday Practices and Social Learning. Open University Press/McGraw-Hill, Maidenhead & New York (2011)
16. Machin-Mastromatteo, J.: Thinking outside of literacy: moving beyond traditional information literacy activities. Inf. Develop. **30**(3), 288–290 (2014)
17. Machin-Mastromatteo, J.: Exploring Users' Information Behavior in Social Networks: A Contribution to the Understanding of the Use of Social Networks. Lambert Academic Publishing, Saarbrücken (2011)
18. Bawden, D., Robinson, L.: The dark side of information: overload, anxiety and other Paradoxes and Pathologies. J. Inf. Sci. **35**(2), 180–191 (2009)
19. Machin-Mastromatteo, J.: Participatory action research in the age of social media: literacies, affinity spaces and learning. New Libr. World **113**(11), 571–585 (2012)
20. Machin-Mastromatteo, J.: The Mutual Shaping of Social Media, Learning Experiences, and Literacies (PhD Thesis). Tallinn University, Tallinn (2015)
21. Pickard, A.: Research Methods in Information, 2nd edn. Neal-Schuman, Chicago (2013)
22. Lewis-Beck, M., Bryman, A., Liao, T.: Encyclopedia of Social Science Research Methods. Sage, Thousand Oaks (2004)

# Information Literacy, Games and Gamification

# How Can Video Games Facilitate Information Literacy?

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**Abstract.** The goal of this paper is to provide a systematic review of the literature on the adoption of video games by educational institutions and libraries in order to facilitate learning and literacy including information literacy among adolescents and young adults. Relevant documents published in a variety of databases between 2003 and 2015 were identified and analyzed. The literature review was organized around five emerging areas: video game literacy, video games in education, game design benefits, video games for reading and writing, and video games and public libraries. These categories are further discussed in this paper. The paper also summarizes the main problems and challenges libraries and educational institutions face in the adoption of video games. Suggestions how public libraries can use video games to attract more users are provided.

**Keywords:** Video games · Public libraries · Adolescents · Young adults · Literacy · Information literacy · Game literacy · Education · Literature review · Game design benefits · Reading and writing

## 1 Introduction

In our paper we examine the literature on how video games can change the way we learn. Earlier studies have mainly concentrated on the negative effects of video gaming. Anderson and Bushman's [1, p. 353] meta-analytic review of the scientific literature proposes that "exposure to violent video games increases physiological arousal and aggression-related thoughts and feelings … decreases prosocial behavior" and, therefore, poses a public-health threat to children and youths, including college-age individuals. On the other hand, evidence from the literature suggests that "playing computer games is linked to a range of perceptual, cognitive, behavioural, affective, and motivational impacts and outcomes" [2, p. 661]. Video games can be used as educational tools at school both in formal and non-formal environments. The aim of the current paper is the provision of a literature review on the adoption of video games by educational institutions and libraries aiming to facilitate learning and literacy including information


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literacy (IL) among adolescents and young adults. Additionally, we aim to identify policies utilized by public libraries in using video games as a mean of attracting more users [3, 4].

According to Squire [5], the term, 'video games,' is used as an umbrella term covering a wide range of digital-gaming media, computer-based games, CDs and DVDs, free online games, handheld electronic games, and console-based video games. Literacy, on the other hand, is the ability to understand, exchange, and create meaning through text, speech, and other forms of language [6]. Nowadays, researchers use the term, 'gaming literacy,' and discuss the educational value of video gaming. Gee [7] confirms that video games do not just offer amusement to players but they also demand engagement, deep thinking, and complex problem solving.

## 2 Methodology

In our literature review we followed the methods of a systematic review as set by Hemingway and Brereton [8]. They defined a systematic review as the "attempt to bring the same level of rigour to reviewing research evidence as should be used in producing that research evidence in the first place." The construction of a systematic review follows a specific protocol, a process that entails five specific steps: defining the objectives of review; collecting the relevant literature; assessing individual studies; combing the results; and, placing the findings in context [8, p. 1]. We ran key concepts such as "video games and public libraries," "video games and education," "literacy and video games," and "MMOGs and literacy" on different Library and Information Science and other databases/information services (ERIC, JSTOR, ProQuest, PsycINFO IEEE Xplore, ScienceDirect, Willey Online Library, CiteSeerX, Emerald Insight & Google scholar), dissertations, and conference proceedings. At the same time, when a relevant study was identified, we also examined its references to identify further relevant documents. This cross referencing aided in reaching literature saturation. We conducted the search process between December 2014 and February 2015. The identified literature covered publications published between 2004 and 2015. The review covered literature written in English and focused on video games in public libraries. We created a list with publication dates, titles, and aims.

## 3 The Emerging Themes

We organized the literature review into five emerging themes: video game literacy, video games in education, game design benefits, video games for reading and writing, and video games and public libraries. We further discuss these categories in the following sub-sections.

### 3.1 Video Game Literacy

A new form of literacy has emerged in the past few years. Several researchers have tried to define this new form of literacy and its benefits. While video games have been accused

of amplifying the aggressiveness of gamers, researchers as well as adolescents and young adults have also indicated that video games have a positive impact on gamers' with respect to literacy skills and their everyday lives [5–7, 9–14].

Gee [5] identifies the benefits of video games in learning and literacy. The author notes that good video games equip gamers with learning principles like collaboration and motivation. Williamson et al. [9] argue that video games are cultural and social worlds that help people learn by social interaction integrating thinking with the help of technology and most importantly doing something that they really like and are interested in. Steinkuehler, Black & Clinton [10] describe 'literacy' as a tool, a place, and a way of being in relationship to other users around these spaces. Literacy as a place addresses the use of literacy skills in-game and out-of-game concerning Massively Multiplayer Online Games (MMOGs) as players engage in in-game chat, lore and quests, as well as out-of-game forum discussions, wiki creation, and even face-to-face conversations. Shaffer [11] provides examples of specific video games and how they can help children to become creative thinkers and prepare themselves to succeed in a changing world. Sanford and Madill [12] indicate that literacy skills that improve through video games are beneficial for adolescents aged 11–16 as they are improved in a fun way. Squire [5] examines video games as artefacts, as a social practice, and explores their implications for education and literacy. On the other hand, Zimmerman [6] identifies game literacy as a component of design, play and systems, and explains how game literacy influences the 21st century learners. Moline [13] observed eight students aged 12–18 playing a recreational video game of their choice in their homes and concludes that learners maximize their understanding during challenging, self-regulated, situated learning activities. Gumulak and Webber [14] aim to identify what motivates adolescents and young adults to play video games and if video games facilitate IL. They find that entertainment and challenge are the main reasons for playing video games in education.

### 3.2 Video Games in Education

Research into the use of video games in education as a tool for promoting literacy including IL is relatively new. One of the key issues is the examination of how video games can become educational tools [9, 15–32]. Squire [15] highlights the role of games in the American culture and their educational potential. De Aguilera and Mendiz [16] also argue that video games can become part of the educational system, give advantages and could be used as an alternative educational tool. Williamson et al. [9] describe the procedures through which video games can influence the way we think and how educational games can become part of a new educational model. Squire [20] suggests that video games can be used as learning tools and highlights the need for media experts and educational technologists to design games for educational purposes.

Researchers report empirical evidence about the use of video games in education. Squire [17] conducted a mini comparative case study using the game Civilization III as a tool to teach world history and found out that, for those students that faced problems with the formal educational system, video games playing had a positive motivational impact in understanding and knowledge acquisition. Additionally, De Freitas [33] also find found video games' use in educational settings beneficial. The immediate impact

for the learners is was their increased motivation. Ritterfeld and Weber [19] explained why video games combine entertainment with education and learning. Squire and Durga [23, p. 215] used the game Civilization III as a tool to teach history. Research participants developed identities through "semi-structured" tasks during historical simulations. The authors suggested that a community trying these new forms of gaming "is the key for building robust learning environments". Kebritchi et al. [25] conducted an empirical research among 193 high school students and ten teachers in the United States and found that mathematics video games had a positive effect on students' mathematic achievement. Ke [21] also examined the effectiveness of video games in the promotion of learning by] comparing the traditional way of learning of mathematics with learning through video games. The data show that even if the motivation of the adolescents was higher with the use of video games the math tests has no significant difference. Moreover, Papastergiou [22] studied the effectiveness of a computer game for learning computer memory concepts. A sample of 88 adolescents aged 16–17 participated in the research. The data show that games can really become motivational learning environments for students without any gender differences.

On the other hand, Bourgonjon et al. [26] presented 858 secondary students perspectives on the use of video games in the classroom. Additionally, Featherstone et al's. [29] review of presents new approaches in educational use of video games in the classroom, the educational impacts, and implications for teachers. Young et al. [28] explored the relationship between video games and academic achievement in K-12 classes concerning language learning, history, mathematics, and physical education. Similarly, Yang [27] researched 44 students (15–16 years old) and the results showed that digital game based learning can be an effective tool to support learning in the classroom. Turner [30] found that adolescents who play videogames more often have more possibilities to choose a STEM (science, technology, engineering, and mathematics) field in college that those who do not play. Additionally, Beavis [31] described how video games can be part of formal education by providing examples of Australian secondary schools. Ochsner et al. [32] clarified the game theories along with the new trends in educational games and explained how video games are designed and used in education. In summary, research evidence suggests that video gaming offers multiple benefits for educational use. However, educators still experience difficulties in incorporating it in their teaching. Connolly et al. [2, p. 672] note that "it is essential to develop a better understanding of the tasks, activities, skills and operations that different kinds of games can offer and examine how these might match desired learning outcomes". In addition, educators and librarians must acknowledge that new generations enjoy playing video games, and consider their educational potential to promote literacy including IL.

### 3.3 Game Design Benefits

Nowadays, adolescents and young adults spend a lot of time playing video games. There are some studies acknowledging the participation of adolescents and children in video games design as evaluators during the development stage [34–36].

Peppler and Kafai [34] explain how the participation in game design can influence learning and literacy. Urban adolescents aged 10–18 participated in a game making

program and the researchers concluded that participation in game design was beneficial for collaboration and engagement. Most importantly was the way that students learned to produce technologies and not just use them. Additionally, Felini [36] used the software inventagiochi to examine what Italian adolescents aged 13–17 will learn by making an action game. He confirmed that adolescents learned how to collaborate and develop critical thinking skills and understanding. Finally, in Buckingham and Burn's [35] research, adolescents from UK schools participated in creating a video game where basic hardware and software skills were needed. Their results showed the value of combining social semiotic approaches and creative work for the production of knowledge. It is evident from the literature review that most of the studies focus on the use of video games rather than their production for the advancement of the literacy or IL of adolescents. We conclude that additional research must be undertaken to determine if game design is beneficial or not for adolescents and young adults' learning. Fabricatore [37, p. 15] adds that "the contents that we want to teach can be naturally embedded with some contextual relevance in terms of the game playing … and learning tasks must be contextual to the game in the sense that they must be perceived by the player as a true element of the game-play."

### 3.4 Video Games, Reading and Writing

In recent years, new technologies have acquired an important role in adolescents' and young adults' lives [38]. According to McKenna et al. [39, p. ix], "the effects of technology on literate activity have been both sweeping and subtle, marked by an increasing variety that is difficult to evaluate and project …, the impact of technology is irreversible. While specific changes may come and go, literacy and technology seem inextricably linked." Most people believe that the entrance of computers in adolescents and young adults' lives keep them away from reading and influences school performance [40]. New technologies can be used to change reading habits if we accept that the nature of reading has changed [41–49]. Kambouri et al. [41] used a video game called Runner to identify its educational potential among young adults aged 18–30 years old. The results showed that the video game play had a positive impact on participants' literacy, information and communication technology (ICT) and collaboration skills. Harushimana's [42] study linked the narratives of urban adolescents with video games and found a positive impact on their writing skills. According to Lenhart et al. [43], more than one third of gamers read texts related to the game such as strategy websites, forums, or game reviews. In massively multiplayer online games (MMGOs), 59 % of gamers engage in reading related to the game. Beavis et al. [44] identified the influence the creations of paratexts for video games from 331 adolescents of English schools had in their learning creatively. The results showed that students were able to communicate their knowledge.

During an eight-month research study, Martin and Steinkuehler [45] explored the forms of IL in commercial video games. They collected data from adolescents ages 12–18 years old and concluded that the information exchanged was collaborative and collective as gamers sought and disseminated information. Additionally, Steinkuehler [47] compared the school texts reading level of an adolescent with his reading level of a game manual and found no difference at his level. However, when the boy chose to

read about a game he was interested in, his reading level was four levels above. Steinkuehler, Compton-Lilly and King [46] presented four studies conducted to examine what texts are a regular part of video game play, along with their nature and the adolescents' reading performance. Participants in the research were 21 novices and 25 experts in the video game, World of Warcraft. The results indicated that informational texts are used mostly for game play. The performance of the adolescents in reading was no different than on school texts but when readers chose their topic they performed 7 to 8 levels above. Similarly, Steinkuehler [48] used the game World of Warcraft to investigate the reading habits of adolescents and young adults. The results were impressive. The participants were able to read texts eight grades above their level compared to school or academic texts. Finally, Rasmusson and Åberg-Bengtsson [49] found that the digital reading skills of 15 years old adolescents in Sweden who played computer games were improved. The results showed that boys, who spend more time in playing, performed better than girls. The majority of the studies have suggested that video games can influence students' reading and writing skills. These findings can be used by teachers, educators and librarians who promote reading and writing and also IL. Unfortunately, there is only one study focusing in young adults. Therefore, further research is needed in this area.

### 3.5 Video Games and Public Libraries

During the last few years, librarians have come to recognize the educational, cultural and the entertainment benefits of video games and they have started using them in their library programs or services [50]. Lately, some articles about practical implications and guidelines of video games' use in libraries have been published. Unfortunately, the majority of them are conceptual papers and only a few discuss empirical research [3, 4, 50–61]. Branston [52] supports the idea that librarians should add interesting gaming programs in public libraries as a medium of promoting IL. Additionally, Adams [4] presents how video games can be used as a tool to promote educational, recreational, and democratizing goals in libraries. Nicholson [3] examined the use of video games in public libraries in the United States and found that even though the majority of the libraries support game play, only a few have adopted gaming programs. Neiburger [57] provides guidelines for librarians on how to gain familiarity with the gaming culture, software, and hardware in order to organize video gaming events in the library. Another study aimed to explore the pedagogical content of the video game, Portal. The researcher suggested that methods used to analyze this game can be used by librarians to educate adolescents in literacy [54]. Sanford [53] provides specific game examples like Civilization and Sim city and how each one can influence learning discussing simultaneously the role of the libraries. Hallam [55] provides guidelines for librarians by enumerating the benefits of using video games for public libraries. Furthermore, Gallaway [56] published a practical guide for librarians assisting them with game basics, selection of games, and the creation of gaming policies.

Different types of video games can be successfully added in a public library's collection aiming to promote literacy including IL. Nicholson's [50] article presents two surveys conducted in 400 public libraries to pulse the role of gaming. Video games were

highly used in public libraries either for circulation purposes or for in-library use. The research also presents the results of 2006 gaming programs in different types of libraries where a, the majority of the respondents worked in public libraries. The most common gaming programs included video games; the goals of these services were to provide entertainment to users, to meet new patrons, and to increase the role of the library in the community. Nicholson [51] suggests that role playing games are the best games for librarians who want to make the connection of gaming with reading and to promote literacy. Buchanan and Vanden-Elzen [58] analyzed September 12th and Beyond Good & Evil games and explained what video games have to offer to players and provided specific guidelines for why public libraries should integrate them into their collections Cole [59] provides a list of epistemic games and games that encourage physical activity that can be used by public libraries along with resources of game making programs, websites, and blogs. Likewise, in their case study, Brown and Kasper [60] examined what the participants of a game program learn. Their results revealed that gaming programs in a library have a positive impact for the gamers, the library staff, and, of course, for the library itself. Finally, Kirsch [61] in his essay collection discusses innovative ideas of how public and school libraries can incorporate video games in their collection focusing on the importance of game design process. There is a need for libraries to meet their 21st century patrons' demands. Nowadays, most of the adolescents and young adults are not interested in reading a book and spending time in a library. Therefore, if librarians wish to follow their patron's interests, serve their needs, and ultimately promote literacy and IL in more enjoyable ways they should examine and illustrate conditions involved for adopting videogames in their environments [62].

## 4 Conclusion, Recommendations and Future Research

Adolescents and young adults enjoy playing video games. This may be the key to creating more literate and information literate people. Literature evidence shows that video games can become an excellent educational tool for promoting reading and writing. Video games are virtual worlds that help people to socialize, to collaborate and to produce knowledge. Learning through video games can become a tool assisting adolescents to learn in a more enjoyable way and to engage them with knowledge.

The literature review showed that we know little about gamming and adolescents. Some educators have begun using video games to facilitate learning whereas others are not fully familiar with their educational potential and fear their negative impact. There is a gap of the use of gaming in public libraries between United States and Europe. United States, have created video games programs to meet their patrons' interests and needs; on the other hand European libraries, still hesitate to include video games in their educational programs. Also there is a lack of research on young people and their involvement in creating games, and lack of research on involving adults in gaming in libraries. Further research is needed to investigate the use and benefits of video games in public libraries. Video games can support a new form of literacy including IL. Digital writing and reading can be used as a means of assisting adolescents and young adults to become lifelong learners. According to Squire [17], video games offer an entire world

of exploration for gamers. Furthermore, they offer an entire world of exploration for researchers. However, most of the studies focus on video games' educational benefits for the adolescents. Further research should be carried out for addressing video games' potential for adult education. Although video games are used by some educators to facilitate learning for decades others due to their unfamiliarity fear their negative impacts such as promotion of violence, aggression and addiction and avoid using them in the class. There is a need for further research on broader understanding of these aspects. Teachers and educators require training in video games' use in order to inspire and motivate their students. Additionally, further research is needed for identifying literacy skills' benefits for gamers and reading and writing promotion. From a majority part of the research already focuses on gamers' literacy skills but not on how video games can increase gamers' literacy.

Finally, some of the studies have indicated that participation in game design can be beneficial. However, the majority of the research explores the use of specific games but fails to examine video games' creation by adolescents or young adults.

## References

1. Anderson, C.A., Bushman, B.J.: Effects of violent video games on aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior: a meta-analytic review of the scientific literature. Psych. Scien. **12**(5), 353–359 (2001)
2. Connolly, T.M., Boyle, E.A., MacArthur, E., Hainey, T., Boyle, J.M.: A systematic literature review of empirical evidence on computer games and serious games. Comp. Educ. **59**(2), 661–686 (2012)
3. Nicholson, S.: The Role of Gaming in Libraries: Taking the Pulse. White paper (2007). http://boardgameswithscott.com/pulse2007.pdf
4. Adams, S.S.: The case for video games in libraries. Libr. Rev. **58**(3), 196–202 (2007)
5. Squire, K.: Video games literacy: a literacy of expertise. In: Handbook of Research on New Media Literacies, pp. 639–676. MacMillan, New York (2008)
6. Zimmerman, E.: gaming literacy: gaming design as a model for literacy in the twenty-first century. In: The Video Game Theory Reader 2, p. 23–31. Taylor & Francis, Oxford (2008)
7. Gee, J.P.: What video games have to teach us about learning and literacy. Palgrave Macmillan, New York (2003)
8. Hemingway, P., Brereton, N.: What is a Systematic Review? (2009). http://www.medicine.ox.ac.uk/bandolier/painres/download/whatis/syst-review.pdf
9. Williamson, D., Squire, K., Halverson, R., Gee, J.P.: Video games and the future of learning. Phi Delta Kappan **87**(2), 104–111 (2005)
10. Steinkuehler, C., Black, R., Clinton, K.: Researching literacy as tool, place, and way of being. Read. Res. Quart. **40**(1), 95–100 (2005)
11. Shaffer, D.W.: How Computer Games Help Children Learn. Palgrave Macmillan, New York (2007)
12. Sanford, K., Madill, L.: Critical literacy learning through videogames: adolescent boys' perspectives. e-Learn. **4**, 285–295 (2007)
13. Moline, T.: Video games as digital learning resources: implications for teacher-librarians and researches. Sch. Libr. Worldw. **16**(2), 1–15 (2010)
14. Gumulak, S., Webber, S.: Playing video games: learning and information literacy. In: Asbil proceedings, New Information Perspectives, 63(2/3), 241–255 (2011)

15. Squire, K.: Video games in education. Intern. J. Intell. Gam. Simul. **2**, 49–62 (2003)
16. De Aguilera, M., Mendiz, A.: Video games and education: education in the face of a "Parallel School". ACM Comp. Educ. **1**(1), 1–14 (2003)
17. Squire, K.: Changing the game: what happens when video games enter the classroom? J. of Online Educ. 1(6) (2005)
18. De Freitas, S.I.: Using games and simulations for supporting learning. Learn. Media Tech. **31**(4), 343–358 (2006)
19. Ritterfeld, U., Weber, R.: Video games for entertainment and education. In: Playing Video Games. Motives, Responses, and Consequences, pp. 399–413. Lawrence Erlbaum Associates, Mahwah (2006)
20. Squire, K.D.: Games, learning and society, building a Field. Educ. Tech., pp. 51–54, September/October 2007
21. Ke, F.: Computer games application within alternative classroom goal structures: cognitive, metacognitive, and affective evaluation. Educ. Tech. Res. Devel. **56**(5/6), 539–556 (2008)
22. Papastergiou, M.: Digital game-based learning in high school computer science education: impact on educational effectiveness and student motivation. Comp. Educ. **52**, 1–12 (2009)
23. Squire, K., Durga, S.: Productive gaming: the case for historiographic play. In: Handbook of Research on Effective Electronic Gaming in Education 1, pp. 200–218. Information Science Reference, Hershey (2009)
24. Annetta, L.A., Minogue, J., Holmes, S.Y., Cheng, M.T.: Investigating the impact of video games on high school students' engagement and learning about genetics. Comp. Educ. **53**(1), 74–85 (2009)
25. Kebritchi, M., Hirumi, H., Bai, H.: The effects of modern mathematics computer games on mathematics achievement and class motivation. Comp. Educ. **55**, 427–443 (2010)
26. Bourgonjon, J., Valcke, M., Soetaert, R., Schellens, T.: Students' perceptions about the use of video games in the classroom. Comp. Educ. **54**(4), 1145–1156 (2010)
27. Yang, Y.T.C.: Building virtual cities, inspiring intelligent citizens: digital games for developing students' problem solving and learning motivation. Comp. Educ. **59**(2), 365–377 (2012)
28. Young, M.F., et al.: Our princess is in another castle a review of trends in serious gaming for education. Rev. Educ. Res. **82**(1), 61–89 (2012)
29. Featherstone, G., Aston, H., Houghton, E.: Game-Based Learning: Latest Evidence and Future Directions. NFER, Slough (2013)
30. Turner, A.J.: Play to pay?: adolescent video game play & stem choice. Commun. Inf. Technol. Annual (Studies in Media and Communications, Volume 8) **8**, 55–71 (2014)
31. Beavis, C.: Games as text, games as action. J. Adol. Ad. Lit. **57**(6), 433–439 (2014)
32. Ochsner, A., Ramirez, D., Steinkuehler, C.: Educational games and outcomes. Intern. Encyclop. Dig. Commun. Soc. **1**, 1–8 (2015)
33. De Freitas, S.I.: Using games and simulations for supporting learning. Lear. Media Tech. **31**(4), 343–358 (2006)
34. Peppler, K.A., Kafai, Y.B.: What videogame making can teach us about literacy and learning: alternative pathways into participatory culture. In: Baba, A. (ed.) Situated Play, Proceedings of the Third International Conference of the Digital Games Research Association (DiGRA), pp. 369-376. The University of Tokyo, Tokyo, Japan (2007)
35. Buckingham, D., Burn, A.: Game literacy in theory and practice. J. Educ. Mult. Hyper. **16**(3), 323–349 (2007)
36. Felini, D.: Media education and video games: an action-research project with adolescents in an out-of-school educational context. In: Youth, Learning and the Media International Conference, pp. 1–14. Zhejiang University, People's Republic of China, Hangzhou, China (2008)

37. Fabricatore, C.: Learning and videogames: an unexploited synergy. In: The International Conference of the Association for Educational Communications and Technology. http://www.learndev.org/dl/FabricatoreAECT2000.PDF
38. Subrahmanyam, K., Greenfield, P., Kraut, R., Gross, E.: The impact of computer use on children's and adolescents' development. J. Appl. Develop. Psych. **22**(1), 7–30 (2001)
39. McKenna, M.C., Labbo, L.D., Kieffer, R.D., Reinking, D. (ed.) International Handbook of Literacy and Technology, vol. 2. Lawrence Erlbaum Associates Inc., Mahwhaw (2006)
40. Gentile, D.A., Lynch, P.J., Linder, J.R., Walsh, D.A.: The effects of violent video game habits on adolescent hostility, aggressive behaviors, and school performance. J. Adol. **1**, 5–22 (2004)
41. Kambouri, M., Thomas, S., Mellar, H.: Playing the literacy game: a case study in adult education. Learn., Media Techn. **31**(4), 395–410 (2006)
42. Harushimana, I.: Literacy through gaming: the influence of videogames on the writings of High School Freshman Males. J. Lit. Tech. **9**(2), 35–56 (2008)
43. Lenhart, A., Kahne, J., Middaugh, E., Macgill, A., Evans, C., Vitak, J.: Teens, Video Games, and Civics. Pew Internet and American Life Project, Washington DC (2008)
44. Beavis, C., et al.: Literacy in the digital age: learning from computer games. Engl. Educ. **43**(2), 162–175 (2009)
45. Martin, C., Steinkuehler, C.: Collective information literacy in massively information multiplayer online games. E-Learn. Digit. Media **7**(4), 355–365 (2010)
46. Steinkuehler, C., Compton-Lilly, C., King, E.: Reading in the context of online games. In: Gomez, K., Lyons, L., Radinsky, J. (eds.), Learning in the disciplines, Proceedings of the 9th International Conference of the Learning Sciences, pp. 222–229. International Society of the Learning Sciences, Chicago (2010)
47. Steinkuehler, C.: Video games and digital literacies. J. Adolesc. Ad. Lit. **54**(1), 61–63 (2010)
48. Steinkuehler, C.: The Mismeasure of Boys: Reading and Online Video Games. (WCER Working Paper No. 3). In: University of Wisconsin–Madison, Wisconsin Center for Education (2011). http://www.wcer.wisc.edu/publications/workingPapers/papers.php
49. Rasmusson, M., Åberg-Bengtsson, L: Does performance in digital reading relate to computer game playing? a study of factor structure and gender patterns in 15-Year-Olds' reading literacy performance. Scand. J. of Educ. Res. 1–19 (2014)
50. Nicholson, S.: Go back to start: gathering baseline data about gaming in libraries. Libr. Rev. (2009). http://librarygamelab.org/backtostart.pdf
51. Nicholson, S.: gaming and literacy: exploring the connections. Digit. Biblioth. **2**(4), 42 (2010)
52. Branston, C.: From game studies to bibliographic gaming: libraries tap into the video game culture. Bul. Amer. Soc. Inform. Sci. Tech. **32**(4), 24–29 (2006)
53. Sanford, K.: Videogames in the library? what is the world coming to? Sch. Libr. Worldw. **14**(2), 83–88 (2008)
54. Schiller, N.: A portal to student learning: what instruction librarians can learn from video game design. Refer. Serv. Rev. **36**(4), 351–365 (2008)
55. Hallam, B.: Video Games in Public Libraries: Game On. University of the Fraser Valley, Vancouver (2009)
56. Gallaway, B.: Game On!: gaming at the library. Neal-Schuman Publishers, New York (2009)
57. Neiburger, E.: Gamers in the Library?: The Why, What, and How of Videogame Tournaments for All Ages. American Library Association, Chicago (2007)
58. Buchanan, K., Vanden-Elzen, A.M.: Beyond a fad: why video games should be part of 21st century libraries. Ed. Libr. **35**(1/2), 15–33 (2012)
59. Cole, M.: Play your way to the top: gaming in libraries. YA Hotline **94**, 23–32 (2012)
60. Brown, R.T., Kasper, T.: The fusion of literacy and games: a case study in assessing the goals of a library video game program. Libr. Trends **61**(4), 755–778 (2013)

61. Kirsch, B.A. (ed.) Games in Libraries: Essays on Using Play to Connect and Instruct. McFarland (2014)
62. Shaffer, D.W., Gee, J.P.: The right kind of gate. In: Marayath, M.C., et al. (eds.) Technology-Based Assessments for 21st Century Skills: Theoretical and Practical Implications from Modern Research, pp. 211–228. IAP, Charlotte (2012)

# Meaningful Implementation of Gamification in Information Literacy Instruction

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**Abstract.** Today's information society has brought up a new generation of learners that demands more dynamic and interactive teaching approaches and has to be equipped with new types of skills. Especially in education, gamification has been an emerging trend in the last few years. Game elements and patterns are used to engage students in certain actions and shape their behavior. However, there is a distinction between purely reward-based and meaningful gamification, which can result in high quality learning. The aim of this study is to illustrate the positive effect that meaningful implementation of game elements and patterns can have on behavioral outcomes. Looking at the results of a comprehensive evaluation of The Legend of Zyren reveals that a clever way of implementing the content into the gaming context has a strong influence on both personal engagement and content mastery. The results illustrate that students who were more engaged in the game also had significantly better results in the final exam on information literacy.

**Keywords:** Information literacy · Gamification · Higher education · Motivational affordances

## 1 Introduction

With the emergence of information and communication technology, today's society has to cope with new structures and regularities. Company structures and organizations have shifted their focus onto more decentralized, knowledge-intensive and technology-based business processes with an emphasis on collaboration and teamwork [1]. The 21st century also gave rise to a new generation of learners that grew up under the influence of technology and has to be equipped with skills like information literacy to be able to survive in this new environment [2]. The development of these crucial skills requires new forms of learning environments shifting the focus from the traditional didactic approach towards more dynamic, interactive and constructivist methods [3, 4]. As not only this new skill set requires a different teaching approach, but also the generation of digital natives demands different didactic methods, lack of motivation is one of the major problems of today's higher education [5].Therefore, the resulting question is which types of methods and impulses for motivation have to be implemented and which type of


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learning environment is adequate for more motivation and engagement in modern higher education? A possible answer to this question is given by the game industry "where motivation itself is the expertise" [6]. After having been banned from the classroom for a long time, stigmatized as senseless, time-wasting extracurricular activity without educational worth, games have slowly begun "to invade the real world" [5] and researchers have started to recognize the worth of games for non-gaming purposes. Especially in education, gamification has become very popular and more researchers, teachers and lecturers around the globe have begun to turn their classrooms into an exciting and gameful adventure. *The Multiplayer Classroom* of the Indiana University [7], *Quest to Learn* at the Institute of Play of a New York public school [8] or *Reading Battle,* initiated by The University of Hong Kong [9], all make use of game elements and game patterns to improve education. However, this paper will focus on *The Legend of Zyren,* a project that has been developed and implemented at the Heinrich-Heine-University of Düsseldorf in 2013 to use gamification to improve information literacy instruction in higher education. The evaluation of the prototype of the project in 2013 already illustrated a positive effect of game elements on the behavior and performance of the students [10]. Nevertheless, the concept of gamification can also result in the exact opposite and an overuse of extrinsic rewards, such as points or badges, can lead to demotivation and decreasing intrinsic motivation – the so called overjustification effect [11–13]. Therefore, a distinction can be made between purely reward-based ("pointsification") and meaningful gamification [14], which aims at identification with and integration of external regulations, influences and goals, enabled through clever implementation of content and an optimal conflation of gaming and non-gaming context [15]. This paper focuses on the importance of meaningful implementation of game elements into non-gaming contexts and thus the positive effect that gamification has on the improvement of information literacy. A comprehensive evaluation of *The Legend of Zyren* based on several motivational and educational theories with a special regard to the connection of gaming and non-gaming context proves the success of meaningful implementation of game elements in higher education and demonstrates that top-scorers in the game will also be top-achievers in the final exam.

## 2 Theories of Motivation and Educational Models for Gamification

Playing has always been an essential part of human life. Especially in early childhood education, playing has long since become an established part of the children's curriculum, as it promotes cognitive development and drives motivation to learn. Games increase the student's commitment and enthusiasm which can be transferred onto learning. The attitude players show when they are playing a game, is exactly what would lead to successful learning: "interested, competitive, cooperative, result-oriented, actively seeking information and solutions" [6].

It is important to understand what motivation actually is, to understand the motivating effect that game elements and patterns have on human psyche. Generally, "to be motivated means to be moved to something" [16]. Nicholson [14, 15] as well as Garris et al. [17] regard Ryan and Deci's [16, 18] taxonomy of intrinsic and extrinsic motivation and

the attached theories of Self Determination and Organismic Integration as the most fitting framework to analyze and describe an increasing motivation due to gamification. Self Determination Theory distinguishes between intrinsic motivation, which refers to doing something because it is interesting or enjoyable, and extrinsic motivation, which targets a separable outcome [16]. They define three basic psychological needs – self-efficacy, autonomy, and relatedness – and add aspects such as novelty, challenge, enjoyment or aesthetic value as psychological factors that are said to enhance motivation [16, 18]. Even though, Ryan and Deci underline the importance of intrinsic motivation for education, they claim additionally that extrinsic motivation has been incorrectly disregarded by most studies so far [16]. As some educational activities are not inherently interesting, an external regulation is needed to drive students to engage in those activities. Whereas intrinsic motivation is inherently autonomous and always considered as a volitional act, extrinsic motivation can be of different types [19] and can vary in the degree to which it is autonomous [16]. Therefore, "a central question concerns how to motivate students to value and self-regulate such activities" [16]. The targeted concept is the process of internalization, which means the transformation of regulations into an individual's own so that it will originate from an individual's sense of self. Ryan and Deci illustrate that motivation can range from amotivation over passive compliance to active personal engagement [16]. This theory of describing and differentiating different forms of extrinsic motivation and the contextual factors that facilitate or deter internalization and integration of regulations for promoted behavior is referred to as Organismic Integration Theory [18]. However, identification with or integration of external regulations requires a full understanding of meaning and worth of an action [20].

"The "holy grail" for training professionals is to harness the motivational properties of computer games to enhance learning and accomplish instructional objectives" [17]. The most popular theories related to game-based learning and gamification are behaviorism, constructivism, humanism, and cognitivism [21]. In addition to classical behaviorist techniques, cognitive, constructivist and humanist assumption seem to be equally valid with regard to the complexity of actions that players perform while playing and a combination of various educational styles is more and more probable [22]. Besides this, the structural complexity of games is very suitable for cyclic educational models, as they are said to have a cyclic upward movement of difficulty. Learning content that is acquired at one stage has to be applied to accomplish the next one. The content is therefore bound to an interactive context that enables the students to "regard themselves as capable of meaningfully applying disciplinary content" [23]. This cyclic implementation and the constant upward movement of the difficulty levels of a game results in a so-called cycle of expertise, and supports content mastery and knowledge acquisition, application, and consolidation [24]. Embedding learning content into a gamified context connects learning and thinking to real experiences, which enhances content mastery [25]. Garris et al. [17] describe a tacit model for instructional games that focuses on embedding learning content, which should incorporate features or characteristics of a game that trigger a processing cycle. This cycle includes user reactions, user behavior and system feedback, and ideally results in "self-motivated game play" [17]. This engagement then enhances learning outcomes and enables or facilitates desired training objectives. The game cycle is further related to iterative reaction-behavior-feedback loops, similar to

Bereiter & Scardamalia's cycle of expertise [24]. Feedback loops additionally provide scaffolding, which means the support of individuals by other instances, such as teachers, peers or systems, that enables the learners to enhance their level of accomplishment.

## 3 The Legend of Zyren – Gamification in Higher Education

By definition, "gamification means the use of game elements in non-game contexts" [26] to engage users in certain actions and shape their behavior in a targeted way [27, 28, 29]. Deterding et al. further define the context and outline various design levels by describing their type of conceptual definition as ranging from concrete to abstract forms of implementation. The most concrete forms are game elements that have a visual representation on the interface itself like leaderboards, achievements or progress bars. More abstract forms are defined as game patterns and mechanics, game design principles and heuristics, like clear goals for instance, game models such as feedback cycles and game methods such as user-centered design [26] Generally, game elements are defined as the most concrete and traceable form. The most common elements are story, quests, avatars, points, levels, achievements, and leaderboards. In contrast to this, game patterns are more abstract properties of games and gamification. Collaboration, competition, flexibility, feedback, and reward are common patterns that occur in gamified settings and are said to have a positive influence especially in educational contexts [26, 27]. All outlined elements and patterns were used to realize the project *The Legend of Zyren,* which was initiated in 2013 with the aim of gamifying a course in Information Literacy instruction for Bachelor students of Information Science at the University of Düsseldorf. The project is organized in three parts that are coordinated regarding the learning contents. The essential contents are conveyed in a classic lecture, supplemented with a tutorial in which the students have to form groups, the so-called guilds, and solve quests together under the supervision of tutors and an interactive e-learning platform on which the actual game is situated, *The Legend of Zyren*, an epic fantasy text-based adventure. The students choose their avatar from four possible races – orc, elf, goblin, or human – and embark on a mission through the realm of Zyren to find the mysterious book of knowledge and fight against a dark force. They have to face challenges in the form of quests, which again, contain the learning content, and collect points to reach a higher level, compare themselves to their fellows with the help of a leaderboard, and ultimately pass the course. Certain extra accomplishments are rewarded with achievements in the form of visual badges. Special forms of achievements are the so called *Epic Rewards,* which enable students at a certain threshold value of experience points to earn a bonus on their grade in the final exam. After the success of the prototype in 2013 [10], the project was revised and improved according to the results of the final evaluation. The improved version, called "Questlab" was realized in 2014.

## 4 Methodology – A Score Card for Gamification in Higher Education

The core assumption of those implementations of game elements into non-game contexts was always supposed to engage users in certain actions and influence their behavior, regardless of the actual context in which it was implemented [30]. To delimit the problem

of how to measure the effect of gamification, Hamari et al. [30] came up with a comprehensive literature review including the most important empirical studies on gamification. The core concepts of all the studies reveal a conceptualized model that all experiments on gamification share, which illustrates motivational affordances, psychological outcomes, and behavioral outcomes as three dimensions underlying the concept of gamification [30]. In this study, the concept of faceting is used to structure the evaluation model and organize different aspects as facets and foci on each of the outlined dimensions, to increase the expressional power of the model and make it easier to construct items for the survey that cover the complex interrelations (Fig. 1). Each facet and the corresponding foci are derived from the findings on gamification outlined in the theoretical part of this study.

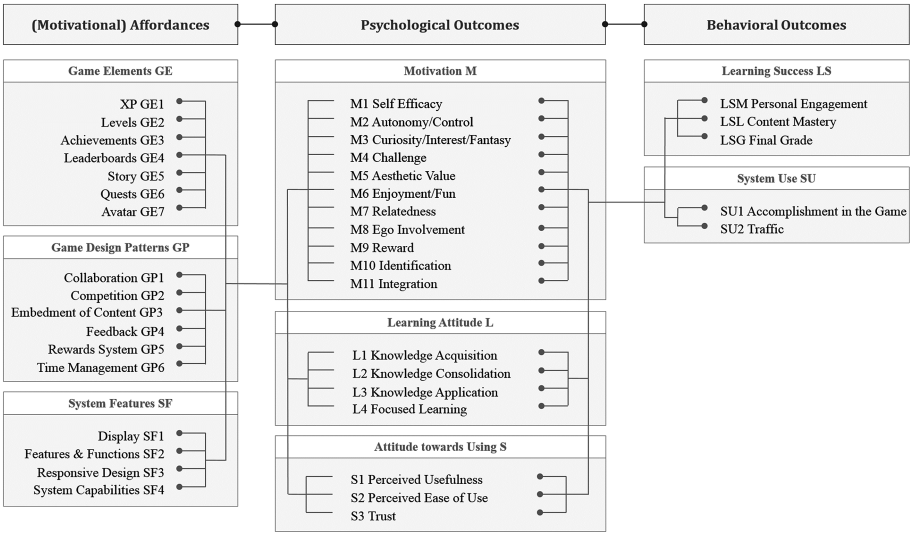


**Fig. 1.** Facetted evaluation model for gamified systems

## 5 Evaluation – Results and Interpretation

The survey was conducted at the end of the semester in the form of an online survey. Ninety-six students (n = 96) participated in the survey which included items that covered all facets of the proposed model. The following section will present a short outline of the evaluation with a special regard to the connection of gaming and the educational context.

Embedded into the narrative framework of the story and containing the actual learning content, the quests are the game elements that contribute the most to the connection between the gaming and non-gaming context. GE6-M1(a), which measures the quests' effect on the students' perception of *Self Efficacy* was rated positively by 86 %, out of which even 26 % opted for the most positive answer. 80 % of the participants enjoyed acquiring, applying and consolidating their knowledge in forms of quests and

had fun doing it (GE6-M6), and 85 % internalized successfully solving quests as their personal goal (GE6-M10/M11/L4) (Fig. 2).

The focus *Embedment of Learning Content* (GP3) directly measures the effectiveness of the embedded content in terms of motivation and learning outcome and therefore provides insight into whether the connection of gaming and non-gaming context has a positive influence on students' motivation and learning attitude (Figs. 3 and 4). Eighty-nine percent of the participants perceived a positive effect on *Knowledge Acquisition* and *Focused Learning* (GP3-L1/L4), as they had to deal with the content more intensively in order to solve the quests. Another 89 % perceived an enhancement of *Knowledge Application,* and 89 % also confirmed that *Knowledge Application* was helpful to additionally consolidate the knowledge, and provided a better way of understanding the content (GP3-L2(b)/L3(c)). Eighty-six percent confirmed that they purposefully had to search for solutions to solve a quest (GP3-L4(a)) and 86 % of the participants claimed to work in a more concentrated manner on a certain topic, because of the arrangement of the learning content in the quests (GP3-L4), out of which 20 % totally agreed and 40 % agreed. Equally positively rated was item GP3-L1(d)/M6(b) (*Knowledge Acquisition, Enjoyment*), which received a total of 84 % positive votes, with 34 % opting for the highest possible answer and 35 % voting for "I agree".

Figure 5 illustrates the comparison of all foci of the first dimension using the arithmetic average. Excluding the facet SF (System), the highest results on an inter-facet level were achieved by *Reward* (GP5 which focuses on the epic reward for special accomplishment regarding the learning content) and *Flexible Time Management* (GP6). Also *Embedment of Learning Content (GP3)* and *Quests* (GE6) were able to achieve good results. The weakest focus of the facet *Game Elements* is *Achievements*, game elements which were pure rewards and in no way connected to the learning content. As part of the dimension *Behavioral Outcomes*, the students were directly asked whether they perceived an improvement of their *Personal Engagement* (LSM) and *Content Mastery* (LSL). Subsequently, a correlation analysis using Spearman-Rho was performed to investigate which affordances have the strongest positive influence on these behavioral outcomes. Regarding *Personal Engagement* the strongest significant correlations exist in connection with *Competition* ($r_s = 0.606$; $p < 0.001$), *Embedment of Learning Content* ($r_s = 0.552$, $p < 0.001$) and *Collaboration* ($r_s = 0.541$; $p < 0.001$).

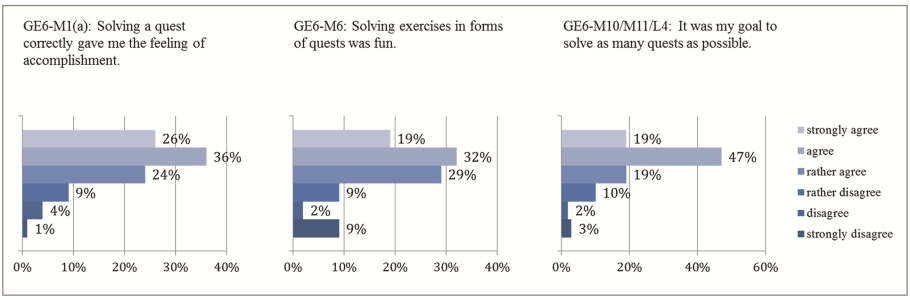


**Fig. 2.** Evaluation results of *Quests* (GE6) (n = 96)

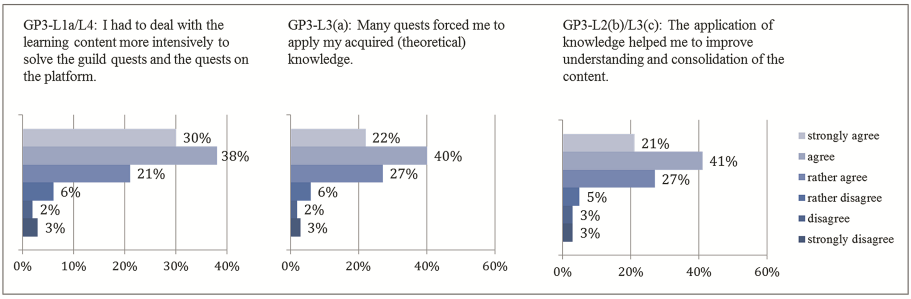


**Fig. 3.** Evaluation results of *Embedment of Learning Content* (GP3) (n = 96) – a.

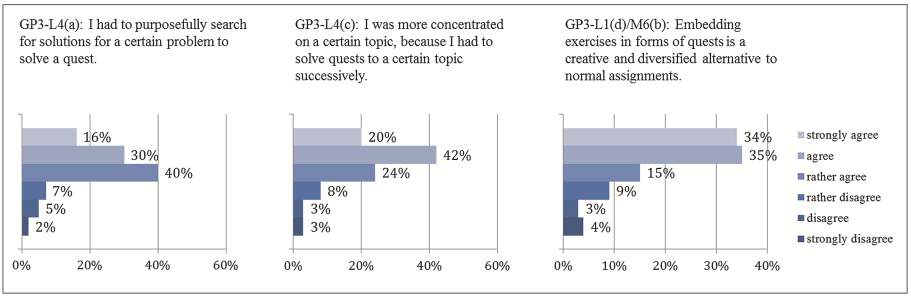


**Fig. 4.** Evaluation results of *Embedment of Learning Content* (GP3) (n = 96) – b.

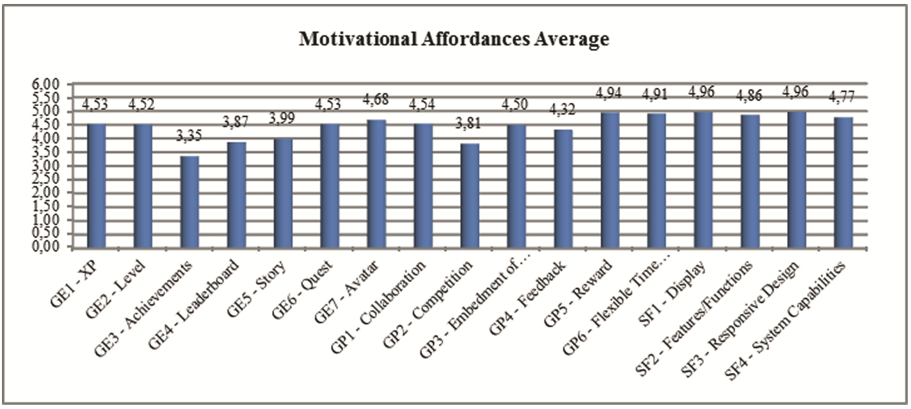


**Fig. 5.** Comparison of (motivational) affordances - average

However, also the analysis of the influence of *Leaderboard, Levels, Reward, XP, Avatars* and *Achievements* on *Personal Engagement* reveals (weak) significant correlations.

Regarding Content Mastery, similar correlations could be detected. All affordances feature a significant correlation with *Content Mastery*. However, the strongest effect

persists between *Embedment of Learning Content* and *Content Mastery* ($r_s = 0.603$; $p < 0.001$), which indicates the relevance of meaningful implementation of learning content into the gaming context for the students' improvement of content mastery. An analysis of the relationship between *Personal Engagement* and *Content Mastery* proves ($r_s = 0.660$; $p < 0.001$) a strong significant correlation between the two behavioral outcomes.

The analysis of learning success in terms of the grades in the final exam in 2014 reveals that the students were very successful in comparison to the exam results of students in former terms. Seventy-nine students signed up for the final exam and the grades were measured both with epic reward (0.3–1.0 improvement of the grade) and without the epic reward. Comparing the grades in the final exam of the terms in 2012 (old non-gamified concept), 2013 (prototype of the gamified concept) and 2014 ("Questlab") reveals that the concept of applying gamification to higher education seems to improve the overall learning success of the students. Already the prototype of "The Legend of Zyren" in 2013 was able to prove the enhancement. The average grade (2.92) improved by 0.62 grade points with reward, and with an average grade of 3.38 without reward by 0.16 grade points. The passing rate increased by 13.2 %, and the amount of "very good" and "good" grades by 26.2 %. Comparing the non-gamified concept and "Questlab" in 2014 with each other shows an even stronger improvement. The average grade with reward (2.37) increased by 1.17 grade points, while the average grade without reward (2.99) increased by 0.55 grade points. The passing rate with reward improved by 33.9 % and the amount of "very good" and "good" grades by 30.9 %. The passing rate without reward was raised by 28.8 % and the amount of "very good" and "good" grades by 8.2 %.

To test whether the grade in the final exam was determined by the amount of XP, the data was separated into two groups to analyze the difference between the results of top-performers and students who were not similarly active in the game. A non-parametric Mann-Whitney U-test was used to test whether the top-performers in the game were also able to attain the better results in the final exam. As a similar hypothesis was tested during the evaluation of the prototype in 2013 and did not show any differences in the results of the players with regard to demographic criteria, this data was not taken into account during the test. The results illustrate that the top group was able to achieve significantly better results than the bottom group. Regarding the grade with epic reward ($p < 0.001$) and the grade without epic reward ($p < 0.05$), the top group was significantly better than the bottom group, which proves that students who were more engaged in the game also had better results in the final exam.

## 6 Discussion

Meaningful gamification will result in longer-term and deeper engagement between participants, non-game activities and supporting organizations" [15, p. 6]. This study illustrates that meaningful and clever implementation of the learning content into the gamified setting can lead to an introjection of regulations, engage users in certain actions, and improve the ultimate learning outcome. It is obvious that *Embedment of Learning*

*Content* has a strong influence on *Personal Engagement* and *Content Mastery*. As the students rated the quests and the realization of the learning content very positively in terms of their effect on increased motivation and enhanced learning outcome, it is not a surprise that students who were engaged in the game were also able to achieve significantly better results in the final exam. Especially in comparison to the terms before, The Legend of Zyren in 2014 ("Questlab") was able to further improve the performance of the students. However, there are also limitations of this study. No control group could be used to make the results more reliable, as none of the students were willing to participate in a non-gamified version of the course. Additionally, some other tests to measure the students' information literacy, despite the grading system, could be introduced in further studies on this topic.

## References

1. Dunning, J.H.: Regions, globalization, and the knowledge economy: issues stated. In: Dunning, J.H. (ed.) Regions, Globalization, and the Knowledge-Based Economy, pp. 7–41. Oxford University Press, Oxford (2000)
2. Black, R.W.: English-language learners, fan communities, and 21st-century skills. J. Adolesc. Adult Lit. **52**, 688–697 (2009)
3. Trilling, B., Fadel, C.: 21st Century Skills: Learning for Life in our Times. Jossey-Bass, San-Francisco (2009)
4. Chu, S.K.W., Tavares, N., Chu, D., Yee, H.S., Chow, K., Siu, F., Wong, M.: Developing upper primary students' 21st century skills: inquiry learning through collaborative teaching and web 2.0 technologies. Centre for Information Technology in Education, Faculty of Education, The University of Hong Kong, Hong Kong (2012)
5. Lee, J.J., Hammer, J.: Gamification in education: what, how, why bother? Acad. Exch. Q. **15**, 1–5 (2011)
6. Prensky, M.: Digital game-based learning. Comput. Entertain. **1**, 1–4 (2003)
7. Sheldon, L.: The Multiplayer Classroom: Designing Coursework as a Game. Cengage Learning, Boston (2012)
8. Salen, K., Torres, R., Wolozin, L., Rufo-Tepper, R., Shapiro, A.: Quest to Learn – Developing the School for Digital Kids. MIT Press, Cambridge (2011)
9. Wu, W.W.Y., Chu, S.K.W., Chan, H., Wong, J., Tse, S.K., Tavares, N., Mok, S.W.S.: Strengthening students' reading comprehension ability (both Chinese and English) through developing children's literature e-quiz bank on the cloud. In: 19th International Education & Technology Conference (2014)
10. Knautz, K., Göretz, J., Wintermeyer, A.: Gotta catch 'Em All' - game design patterns for guild quests in higher education. In: iConference 2014 Proceedings, pp. 690–699. iSchools, Illinois (2014)
11. Deci, E.L.: Effects of externally mediated rewards on intrinsic motivation. J. Pers. Soc. Psychol. **18**, 105–115 (1971)
12. Deci, E.L., Koestner, R., Ryan, R.M.: Extrinsic rewards and intrinsic motivation in education: reconsidered once again. Rev. Educ. Res. **71**, 1–27 (2001)
13. Deci, E.L., Ryan, R.M.: The empirical exploration of intrinsic motivational processes. In: Berkowitz, L. (ed.) Advances in Experimental Social Psychology, vol. 13, pp. 39–80. Academic Press, New York (1980)

14. Nicholson, S.: Two paths to motivation through game design elements: reward-based gamification and meaningful gamification. In: iConference 2013 Proceedings, pp. 671–672. iSchools, Illinois (2013)
15. Nicholson, S.: A user-centered theoretical framework for meaningful gamification. In: Games, Learning, Society, pp. 1–7. ETC Press, Pittsburgh (2012)
16. Ryan, R., Deci, E.: Intrinsic and extrinsic motivations: classic definitions and new directions. Contemp. Educ. Psychol. **25**, 54–67 (2000)
17. Garris, R., Ahlers, R., Driskell, J.E.: Games, motivation, and learning: a research and practice model. Simul. Gaming **33**, 441–467 (2002)
18. Ryan, R.M., Deci, E.L.: Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. Am. Psychol. **55**, 68–78 (2000)
19. Gagne, M., Deci, E.L.: Self-determination theory and work motivation. J. Organ. Behav. **26**, 331–362 (2005)
20. Grolnick, W.S., Ryan, R.M.: Autonomy in children's learning: an experimental and individual difference investigation. J. Pers. Soc. Psychol. **52**, 890–898 (1987)
21. Leonard, D.C.: Learning Theories A to Z. Greenwood Press, Westport (2002)
22. Scardamalia, M., Bereiter, C.: Knowledge building: theory, pedagogy, and technology. In: Sawyer, R.K. (ed.) The Cambridge Handbook of the Learning Sciences, pp. 97–115. Cambridge University Press, New York (2006)
23. Barab, S., Pettyjohn, P., Gresalfi, M., Volk, C., Solomou, M.: Game-based curriculum and transformational play: designing to meaningfully positioning person, content, and context. Comput. Educ. **58**, 518–533 (2012)
24. Bereiter, C., Scardamalia, M.: Surpassing Ourselves: An Inquiry into the Nature and Implications of Expertise. Open Court, Chicago (1993)
25. Gee, J.P.: Learning and games. In: Salen, K. (ed.) The Ecology of Games: Connecting Youth, Games, and Learning, pp. 21–40. MIT Press, Cambridge (2008)
26. Deterding, S., Dixon, D., Khaled, R., Nacke, L.: From game design elements to gamefulness: defining "Gamification". In: MindTrek 2011, pp. 1–7. ACM New York (2011)
27. Zichermann, G., Cunningham, C.: Gamification by Design. O'Reilly Media Inc., Sebastopol (2011)
28. Muntean, C.I.: Raising engagement in e-learning through gamification. In: The 6th International Conference on Virtual Learning ICVL, pp. 323–329. Bucharest University Press, Bucharest (2011)

# Massively Multiplayer Online Role Playing Games and Digital Information Literacy

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**Abstract.** A contemporary trend in video games are the Massively Multiplayer Online Role Playing Games (MMORPGs). This paper presents a literature review on the literacy skills that can be developed by playing MMORPGs. The literature review is divided into four sections according to the topics that emerged: (a) definitions and various views of researchers about a digital literate person; (b) the impact of MMORPGs on online learning; (c) the potential of MMORPGs to improve digital information literacy and social skills; and, (d) the influence of MMORPGs on students' language skills. The current paper contributes to the understanding of the use of MMORPGs to facilitate digital information literacy among adolescents. We also present the main problems and challenges libraries and educational institutions face when adopting MMORPGs.

**Keywords:** MMORPGs · Literacy · Language skills · Social skills · Information literacy · Online learning · Young adults · Adolescents · Literature review

## 1 Introduction

Video games influence our daily lives and educational practice in innovative ways and also promote literacy. Evidence from the literature suggests that video games could have a positive impact on children's and adolescents' literacy skills [1–9]. Nowadays, computer games are part of the leisure time of adolescents and adults. Massively Multiplayer Online Role Playing Games (MMORPGs) can become a powerful tool for learning and developing different types of skills such as social literacy and collaboration skills. MMORPGs are complex learning systems that can be used by teachers and individuals in order to assist adolescents to develop their literacy skills in a more enjoyable way.

MMORPGs are the new virtual worlds that have progressively gained ground among video games users. Thousands of users learn and develop digital literacy (DL) without realizing it. A whole industry has been developed around MMORPGs. Users join


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communities, exchange ideas, support each other and, most importantly, learn. Consequently, many studies have been conducted to understand and determine their educational benefits and assess players' perceptions to assist educators in establishing best practices and guidelines.

The goal of our paper is to provide a review of the literature on the use of MMORPGs by adolescents and young adults as a tool for empowering their DL.

We divided this paper into the following sections: initially, we describe the methodological approach, then present the categories emerged from the literature and finally, we make conclusions and recommendations for further research.

## 2 Methodology

In the literature review we followed the methods of systematic review of Hemingway and Brereton [10]. They [10, p. 1] defined the systematic review as the "attempt to bring the same level of rigour to reviewing research evidence as should be used in producing that research evidence in the first place." The construction of a systematic review follows a specific protocol, a process that entails five specific steps: defining the objectives of review; collecting the relevant literature; assessing individual studies; combing the results; and placing the findings in context. We conducted the search in various Library and Information Science Databases (ERIC, JSTOR, ProQuest, PsycINFO, IEEE Xplore, ScienceDirect, Willey Online Library, CiteSeerX, Emerald Insight and Google scholar), dissertations, and conference proceedings. We also examined references of relevant studies to identify further documents. We conducted the searches process between May and July 2014. The identified literature covered publications published between 2003 and 2014. We focused review on the literature written in English.

## 3 Categorization

Five main themes emerged from the reviewed literature: who is digital literate?; MMORPGs and online learning; MMORPGs and digital literacy skills; MMORPGs and social skills; and MMORPGs and language skills. We will discuss these themes here in detail.

### 3.1 Who is Digital Literate?

There is a plethora of definitions for DL. In the 21st century there is an increasingly urgent need for adolescents and young adults to acquire DL. The variety of definitions can be summarized under Martin's [11, p. 135] umbrella definition: "Digital Literacy is the awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process." Another definition given by the British Futurelab's Handbook on Digital Literacy across the Curriculum [12, p. 2] notes: "To be digitally literate is

to have access to a broad range of practices and cultural resources that you are able to apply to digital tools. It is the ability to make and share meaning in different modes and formats; to create, collaborate and communicate effectively and to understand how and when digital technologies can best be used to support these processes."

Several authors have attempted to define DL and identify the required information skills needed to outline the profile of a digital literate person [13–27]. Eshet-Alkalai [28, 29] presents a conceptual framework for DL and Andretta [30] presents the national perspectives of information literacy in many European countries. Tyner [31] analyzes DL and its impact to education. Dobson and Willinsky [24] also define DL and present an overview of definitions and skills for the last three decades.

Several authors suggest that video games can improve DL and can facilitate learning combining learning with enjoyment [1, 2]. MMORPGs allow players to learn at their own pace and they can be tailored based on the players' preferences.

### 3.2 MMORPGs and Online Learning

MMORPGs can promote a plethora of skills such as social skills, writing, reading, and collaboration to foster online learning. The Federation of American Scientists' Summit on Educational Games suggests that "educational institutions need to transform their organizational systems and instructional practices to take greater advantage of new technology, including educational games" [32, p. 46].

According to educational theorists, well designed games are beneficial as they support the learning processes [1, 32–35]. Childress and Braswell [36] discuss how MMORPGs can foster online learning though Second Life, suggest implications for educators and explaining how the activities of MMORPGs promote cooperation. The benefits of Second Life have also been examined by other researchers [37–40]. According to Dickey [41], the structure of these games can promote interactive learning and foster the intrinsic motivation due to their narrative and character structure. Similarly, Papargyris and Poulymenakou [42] explore how socialization tools of anonymous and multicultural environments of MMORPGs promote learning through participation, reification, and negotiation.

Several researchers explore and discuss the pedagogical potential of MMORPGs [43–48]. Yee [49, p. 309] explains what makes MMORPGs so appealing to diverse users revealing "a five factor model of user motivation, namely, Achievement, Relationship, Immersion, Escapism, and Manipulation." Kim et al. [50] use MMORPG Gersang to investigate how meta-cognitive strategies of an online game can influence academic achievement. Oliver and Carr [51] explore how people learn in virtual environments such as the MMORPG World of Warcraft (WoW). Voulgari et al. [52] investigate the perceptions of gamers towards the educational potential of MMORPGs. However, they do not identify any actual learning outcomes.

Thus, MMORPGs can foster online learning and a plethora of skills that are required from the players to enhance knowledge. In the next section we present the DL skills being promoted by playing MMORPGs.

### 3.3 MMORPGs and Digital Literacy Skills

Video games and especially MMORPGs can become a motivational tool for learning and for the development of skills and practice [1, 2]. Researchers have attempted to identify what kind of skills can be developed by playing MMORPGs. Video games like WoW can develop the new set of digital literacies required to navigate in the digital world [53]. Sarsar [54] explores what boys in Abu Dabi learned by playing WoW. The study reveals that boys learned in a more enjoyable way, improved their English, cooperated, and built online relationships; some, however, claim negative effects on academic achievement.

**MMORPGs and Social Skills.** MMORPGs embed communication and interaction tools and therefore players must have or must acquire social skills. The development of social skills through MMORPGs has been examined by several researchers during the last decades. Recently researchers have demonstrated that video games, especially MMORPGs, can become a tool for adolescents and young adults to train their social skills as they require some degree of teamwork [55–71].

Ducheneaut and Moore [73] argue that MMORPGs are complex social worlds that allow users to interact and help players to practice or to learn social skills. Jakobsson and Taylor [55] examine the MMORPG, EverQuest, and highlight the importance of social interaction among players. Pena and Hancock [59, p. 92] collect messages from 65 players of the game Jedi Knight II in order to examine the socio-emotional content of their messages and find that participants produced significantly more socio-emotional than task content. From his month long study, Williams [60], found that, although the social levels of some players improved, some players became more antisocial. Yee [49], in the online survey that included 3,000 MMORPGs' players, suggests that both males and females interacted and acquired real-life social skills. Yee [61] proposes an empirical motivation model that consisted of three components and subcomponents including achievement, social, and an immersion component. Steinkeuhler and Williams [58] argue that playing video games could increase the sociability of the players because they view the world from different perspectives through the game. Similarly, Chen et al. [57, p. 262] find that "engaged gamers experience optimal enjoyment more frequently and value the importance of social interactions more than non-engaged gamers… and social interaction is the key factor that determines the level of engagement of gamers."

Chen and Duh [57] study WoW and suggest that different forms of social interaction and factors seem to influence the social skills of gamers. Visser et al. [71] also examine the impact of WoW on 790 high school students' social skills. The students who play more often increase their social competencies and loneliness decreases. Similarly, the study of Benassi et al. [70] investigate WoW in the classroom and how it influences the social skills of Italian students; the students involved in the game interact and cooperate more.

Cole and Griffiths [65] explore the social interactions that take place in the MMORPGs. Nine hundred twelve (912) participants from 45 countries participated in the study and the researchers found that role playing games can be highly social environments. According to Smyth [63], young adults who play MMORPGs become more social in their ordinary lives compared to the sample that play different kind of games like console or arcade games. Martins [66] investigates in his PhD research if adults

who play MMORPG develop their social skills. Using observations and online surveys he concludes that the social skills can be used, developed, learned, and practiced through MMORPG games. Chen [69, p. 47] also finds that players of the game WoW develop social skills like collaboration and interaction. Bennerstedt and Linderoth [67] study the collaborative practices that take place in WoW and find that gamers, through collaboration, adopt various social ideals. Whippey [72] interviews gamers of WoW and finds that the digital environment of the game is ideal for the fulfillment of their social and emotional needs.

Ducheneaut and Moore [73] study Star War Galaxies and its impact to social interaction. Players do not seem to expect to socialize for specific reasons like getting healed or purchasing services. The Ang and Zaphiris [68], who analyzed the guilds of WoW, have similar results and find that only core gamers participate actively. The rest of the players join the virtual community only for services.

On the other hand, some studies propose that MMORPGs are associated with negative social behaviour [74–78]. Kolo and Baur [74] comment that the players of the game Ultima Online are lead to isolation. Lo et al. [75] examine 174 college students and conclude that the virtual world increases the anxiety and has negative results on interpersonal relationships. Kim [76] studies the behaviour of 1471 users of MMORPGs and finds that loneliness, aggression, and addiction were promoted through the game play. Further, Shen and Williams [77] argue that virtual worlds influenced negatively the social life of the gamers when they were offline. Finally, in a recent study, Kowert and Oldmeadow [78] find that online video games can be really beneficial for players with pre-existing social difficulties but, on the other hand, they can lower the social skills of players with a healthy social life.

Research addressing the matter of social skills' development of the gamers seems to be inconclusive; therefore, further exploration is needed to answer the question if the players' social skills are expanded or shirked when they interact online in MMORPGs.

**MMORPGs and Language Skills.** MMORPGs offer a more enjoyable way to enhance the language skills of learners, therefore, a number of studies attempted to measure the language skills' improvement through MMORPGs [53, 79–98].

Rankin et al. [79] propose that MMORPGs serve as a catalyst for fostering students' language proficiency as students interact in a foreign language while playing the game. Waters [81] proposes WoW as an interactive virtual world for learning English as a second language. Zheng [80] analyzes chat logs of two Chinese students collaborating with two American students in Quest Atlantis and reports improvement on language skills (grammar, vocabulary, usage). Steinkuehler [53] also discusses the literacy potential of MMORPGs, arguing that online gaming enhances literacy as virtual worlds improve reading and writing of adolescents in an informal context.

Rankin [82] evaluates MMORPGs as pedagogical tools for second language acquisition and concludes that game social interactions facilitate collaborative behaviors and improves language acquisition, reading comprehension, and conversational fluency. Ballou [87, pp. 68–69] explores the learning experiences of two young Japanese adults while playing MMORPG. Participants' experiences demonstrate positive characteristics such as collaboration enhancement, "exposure to new vocabulary" and "opportunities

for recycling vocabulary" and "grammatical structures" and enjoyment along with negative aspects such as use of jargon and use of "game-specific or archaic language." Reinders [86, p. 57] explains how writing skills can be improved through role playing games providing educators with some practical ideas. Zhao and Lai [88] discuss the potential of MMORPGs for foreign language learning focusing especially on design issues. Ranalli [83] uses the MMORPG Sims to find that nonnative English speakers can improve their language skills by playing. Thorne [84] proves that WoW can become an informal tool for second language development. Zheng et al. [85] has similar results exploring the use of the game Quest Atlantis.

Peterson [90] argues that MMORPGs have great potential to become effective language learning tools as far as educators maintaining a supportive role. Kongmee et al. [91] presents how young students of the Thai University improve their second language. Kongmee et al. [92] suggests that MMORPGs seem to be safe and enjoyable spaces where students improve their English language skills that assist the students' confidence, and provide "better understanding of the culture and use of language in different contexts". Peterson's [90] study suggests similar results as he found the games' communication environments beneficial for practicing foreign languages and being exposed to the new vocabulary. Finally, Peterson [93] studied MMORPG players' perceptions on language education and concludes that online games provide an effective and beneficial environment. However, Peterson [93] comments on the importance of the educators' supporting role and on the need for large-scale longitudinal studies to investigate issues such as tasks, training, proficiency level, and affective variables.

Owston et al. [99] conducted a study to examined the improvement of four different factors associated with literacy, namely the basic literacy skills, new DL skills, students' engagement, and teacher classroom implementation among fourth grade students. Their results suggest that computer games can be used as an activity to motivate and engage students with literacy activities: they were found to improve content retention, information comparison, and encourage the use of digital resources and editing skills.

Sundqvist and Sylvén [95] also find gaming to facilitate second language vocabulary acquisition isolating gender, age and type of gaming as factors that affect language acquisition. Kongmee et al. [94] observe the influence of MMORPGs on language learning and showed language improvement in a fun, informal manner. Furthermore, Rama et al. [96] study how the Spanish version of WoW helped nonnative speaker players to improve language skills and how MMORPGs can be used for language teaching suggesting positive effects on students' language development and socialization. Milton et al. [100] focuse on Second Life and vocabulary development. Students aged 20–25 improved the speed of language interaction, fluency and vocabulary. Lee and Pass [98] observed a 21-year-old male player of WoW from South Korea for one year and found that he improved his English expressions and language use simultaneously. Finally, Balcikanli [97, p. 141] studied Second Life MMORPG played by both American and Turkish college students. Data show that the game fosters second language learning of both groups as "a less threatened learning experience" and provided "opportunities for students to practice the target language as frequently as they wish" and acted as "a good bridge for cultural competence."

## 4 Conclusions, Recommendations and Future Research

MMORPGs bring together people from around the world and assist adolescents and young adults to develop the necessary qualifications and skills to become digital literate. MMORPGs can become a vehicle for the adolescents to help them find, evaluate, and use information. Combining text, audio, and video MMORPGs can be extra beneficial for adults with low literacy skills. People enjoy learning in fun and stimulating environments so the use of online video games should not take place only in formal educational systems but they can be incorporated in public libraries.

Most of the studies focus on how MMORPGs can be used for the improvement of the English as a second language. But these games can also be used as educational tools from native speakers in order to level up their writing, reading and speaking skills.

Literature review findings suggest that the majority of the studies use the game WoW to collect data. Therefore, further research is needed to evaluate data from different MMPRPGs' use. Moreover, additional research is needed to evaluate MMORPGs' use in non-formal educational settings like libraries, lifelong learning organizations, and other bodies that aim to promote literacy. This kind of education allows adolescents and young adults to move out of the educational environment and enter a virtual world where entertainment takes place.

## References

1. Gee, J.P.: What Video Games Have to Teach Us About Learning and Literacy. Palgrave Macmillan, New York (2003)
2. Shaffer, D.W., Halverson, R., Squire, K.R., Gee, J.P.: Video games and the future of learning. Phi Delta Kappan **87**(2), 105–111 (2005)
3. Steinkuehler, C., Black, R., Clinton, K.: Researching literacy as tool, place, and way of being. Read. Res. Quart. **40**(1), 95–100 (2005)
4. Shaffer, D.W.: How Computer Games Help Children Learn. Palgrave Macmillan, New York (2007)
5. Sanford, K., Madill, L.: Critical literacy learning through videogames: adolescent boys' perspectives. E-learning **4**, 285–295 (2007)
6. Squire, K.: Video games literacy: a literacy of expertise. In: Coiro, J., Knobel, M., Leu, D., Lankshear, C. (eds.) Handbook of Research on New Media Literacies, pp. 639–676. MacMillan, New York (2008)
7. Zimmerman, E.: Gaming literacy: gaming design as a model for literacy in the twenty-first century. In: Perron, B., Wolf, M.J.P. (eds.) The Video Game Theory Reader 2, pp. 23–31. Taylor & Francis, Oxford (2008)
8. Moline, T.: Video games as digital learning resources: implications for teacher-librarians and researches. Sch. Libr. Worldw. **16**(2), 1–15 (2010)
9. Gumulak, S., Webber, S.: Playing video games: learning and information literacy. Asbil Proc. New Inf. Perspect. **63**(2/3), 241–255 (2011)
10. Hemingway, P., Brereton, N.: What Is a Systematic Review? (2009). http://www.medicine.ox.ac.uk/bandolier/painres/download/whatis/syst-review.pdf
11. Martin, A.: DigEuLit – a European framework for digital literacy: a progress report. J. ELiter. **2**, 130–136 (2005)
12. Hague, C., Payton, S.: Digital Literacy Across the Curriculum. Futurelab, UK (2010)

13. Bundy, A.: One essential direction: information literacy, information technology fluency. J. eLiter. **1**(1), 7–22 (2004)
14. Tornero, J.M.P.: Promoting digital literacy: understanding digital literacy. Universidad Autonóma de Barcelona (2004)
15. Johnston, B., Webber, S.: As we may think: information literacy as a discipline for the information age. Res. Strat. **20**(3), 108–121 (2005)
16. Armstrong, C., Boden, D., Town, S., Woolley, M., Webber, S., Abell, A.: Defining information literacy for the UK. Libr. Inf. Upd. **4**(1–2), 22–25 (2005)
17. Aviram, A., Eshet-Alkalai, Y.: Towards a theory of digital literacy: three scenarios for the next steps. Eur. J. Open Dist. E-Learn. **1**, 1–11 (2006)
18. Lloyd, A.: Information literacy landscapes: an emerging picture. J. Doc. **62**(5), 570–583 (2006)
19. Lankshear, C., Knobel, M.: Digital literacy and digital literacies. Nord. J. Dig. Lit. **1**(1), 12–24 (2006)
20. Ward, D.: Revisioning information literacy for lifelong meaning. J. Acad. Librarian. **32**(4), 396–402 (2006)
21. Martin, A.: Literacies for the digital age. In: Martin, A., Madigan, D. (eds.) Digital Literacies for Learning, pp. 3–25. Facet, London (2006)
22. Pietrass, M.: Digital literacy research from an international and comparative point of view. Res. Compar. Int. Educ. **2**(1), 1–12 (2007)
23. Bawden, D.: Origins and concepts of digital literacy. In: Lankshear, C., Knobel, M. (eds.) Digital Literacies: Concepts, Policies and Practices, pp. 17–32. Lang Publishing, New York (2008)
24. Dobson, T., Willinsky, J.: Digital literacy. In: Olson, D., Torrance, N. (eds.) The Cambridge Handbook of Literacy, pp. 286–312. Cambridge University Press, Cambridge (2009)
25. Hobbs, R.: Digital and Media Literacy: A Plan of Action. The Aspen Institute, Washington (2010)
26. Koltay, T.: The media and the literacies: media literacy, information literacy, digital literacy. Media Cult. Soc. **33**(2), 211–221 (2011)
27. Belshaw, D.: What is 'Digital Literacy'? A Pragmatic Investigation. Doctoral Dissertation, Durham University, Durham (2012)
28. Eshet-Alkalai, Y.: Digital literacy: a conceptual framework for survival skills in the digital era. J. Educ. Multim. Hyperm. **13**(1), 93–106 (2004)
29. Eshet-Alkalai, Y.: Thinking in the digital era: a revised model for digital literacy. Inf. Sci. Inf. Technol. **9**(2), 267–276 (2012)
30. Andretta, S.: Information Literacy: A Practitioner's Guide. Chandos Publishing, Oxford (2005)
31. Tyner, K.: Literacy in a Digital World: Teaching and Learning in the Age of Information. Routledge, New York (2014)
32. Federation of American Scientists: Summit on Educational Games: Harnessing the Power of Video Games for Learning. FAS, Washington (2006). http://informalscience.org/images/research/Summit_on_Educational_Games.pdf
33. Mitchell, A., Savill-Smith, C.: The Use of Computer and Video Games for Learning. A review of the Literature (2004). http://www.m-learning.org/docs/The%20use%20of%20computer%20and%20video%20games%20for%20learning.pdf
34. Prensky, M.: Don't Bother Me Mom. I'm Learning. Paragon House, St. Paul (2006)
35. Anderson, B.: MMORPGs in support of learning: current trends and future uses. In: Van Eck, R. (ed.) Gaming and Cognition: Theories and Practice from the Learning Sciences, pp. 55–81. Information Science Reference, Hersey (2010)

36. Childress, M.D., Braswell, R.: Using massively multiplayer online role-playing games for online learning. Dist. Educ. **27**(2), 187–196 (2006)
37. Cheal, C.: Second life: hype or hyperlearning? On Horiz. **15**(4), 204–210 (2007)
38. Holmberg, K., Huvila, I.: Learning together apart: distance education in a virtual world. First Monday **13**(10) (2008)
39. Jeffery, A., Collins, M.: Immersive learning and role plays in second life. In: Society for Information Technology & Teacher Education International Conference, pp. 2628–2632. AACE, Chesapeake (2008)
40. Bell, D.: Learning from second life. Br. J. Educ. Technol. **40**(3), 515–525 (2009)
41. Dickey, M.D.: Game design and learning: a conjectural analysis of how massively multiple online role-playing games (MMORPGs) foster intrinsic motivation. Educ. Technol. Res. Dev. **55**(3), 253–273 (2007)
42. Papargyris, A., Poulymenakou, A.: Learning to fly in persistent digital worlds: the case of massively multiplayer online role playing games. ACM SIGGROUP Bull. **25**(1), 41–49 (2005)
43. Riegle, R.P., Matejka, W.A.: The learning guild: MMORPGs as educational environments. In: 22nd Annual Conference on Distance Teaching & Learning (2006). http://www.f3program.org/sites/all/files/eg/20082009/mmorpg/Research%20%20MMORPGs%20as%20Learning%20Environments.pdf
44. Carter, B., Click, A.: Imagine the real in the virtual: experience your second life. In: 22nd Annual Conference on Distance Teaching and Learning, Madison, Wisconsin (2006)
45. Yu, T.W.: Learning in the virtual world: the pedagogical potentials of massively multiplayer online role playing games. Int. Educ. Stud. **2**(1), 32 (2009)
46. De Freitas, S., Griffiths, M.: Massively multiplayer online role-play games for learning. In: Ferdig, R.E. (ed.) Handbook of Research on Effective Electronic Gaming in Education, vol. 1, pp. 779–793. IGI Global, Hershey (2009)
47. Susaeta, H., et al.: From MMORPG to a classroom multiplayer presential role playing game. Educ. Technol. Soc. **13**(3), 257–269 (2010)
48. Paraskeva, F., Mysirlaki, S., Papagianni, A.: Multiplayer online games as educational tools: facing new challenges in learning. Comput. Educ. **54**(2), 498–505 (2010)
49. Yee, N.: The demographics, motivations, and derived experiences of users of massively-multi-user online graphical environments. Teleoperat. Virt. Environ. **15**(3), 309–329 (2006)
50. Kim, B., Park, H., Baek, Y.: Not just fun, but serious strategies: using meta-cognitive strategies in game-based learning. Comput. Educ. **52**(4), 800–810 (2009)
51. Oliver, M., Carr, D.: Learning in virtual worlds: using communities of practice to explain how people learn from play. Br. J. Educ. Technol. **40**(3), 444–457 (2009)
52. Voulgari, I., Komis, V., Sampson, D.G.: Learning outcomes and processes in massively multiplayer online games: exploring the perceptions of players. Educ. Technol. Res. Dev. **62**(2), 245–270 (2014)
53. Steinkuehler, C.: Massively multiplayer online gaming as a constellation of literacy practices. E-Learn. **4**(3), 297–318 (2007)
54. Sarsar, N.M.: What children can learn from MMORPGs. Online Submission (2008). http://files.eric.ed.gov/fulltext/ED501741.pdf
55. Jakobsson, M., Taylor, T.L.: The sopranos meets EverQuest: social networking in massively multiplayer online games. In: 2003 Digital Arts and Culture (DAC) Conference, Melbourne, Australia, pp. 90–91 (2003)
56. Ducheneaut, N., Moore, R.J.: More than just 'XP': learning social skills in massively multiplayer online games. Interact. Technol. Smart Educ. **2**, 89–100 (2005)

57. Chen, V.H.-H., Duh, H.B.-L., Phuah, P.S.K., Lam, D.Z.Y.: Enjoyment or engagement? Role of social interaction in playing massively mulitplayer online role-playing games (MMORPGS). In: Harper, R., Rauterberg, M., Combetto, M. (eds.) ICEC 2006. LNCS, vol. 4161, pp. 262–267. Springer, Heidelberg (2006)
58. Steinkuehler, C., Williams, D.: Where everybody knows your (screen) name: online games as ''Third Places''. J. Comput. Mediat. Commun. **11**(4), 885–909 (2006)
59. Pena, J., Hancock, J.T.: An analysis of socioemotional and task communication in online multi-player video games. Commun. Res. **33**(1), 92–109 (2006)
60. Williams, D.: Groups and goblins: the social and civic impact of online games. J. Broadcast. Electr. Med. **50**(4), 651–681 (2006)
61. Yee, N.: Motivations for play in online games. CyberPsych. Behav. **9**(6), 772–775 (2006)
62. Li, C.: More than just a game: communication and community in MMORPGs (2006). http://wps.ablongman.com/wps/media/objects/4116/4215151/Student%20Papers/ch%2013%20Li.pdf
63. Smyth, J.M.: Beyond self-selection in video game play: an experimental examination of the consequences of massively multiplayer online role-playing game play. CyberPsychol. Behav. **10**(5), 717–721 (2007)
64. Chen, V.H.H., Duh, H.B.L.: Understanding social interaction in world of warcraft. In: Proceedings of the International Conference on Advances in Computer Entertainment Technology, pp. 21–24. ACM, New York (2007)
65. Cole, H., Griffiths, M.D.: Social interactions in massively multiplayer online role-playing games. Cyberpsych. Behav. **10**(4), 575–583 (2007)
66. Martin, B.D.: A qualitative study of social skill learning opportunities in massively multiplayer online role-playing games. Doctoral Dissertation. University of La Verne, California (2008). http://search.proquest.com/docview/304375717
67. Bennerstedt, U., Linderoth, J.: The spellbound ones: illuminating everyday collaborative gaming practices in a MMORPG. In: Proceedings of the 9th International Conference on Computer Supported Collaborative Learning, vol. 1, pp. 404–413. International Society of the Learning Sciences, (s.l.) (2009)
68. Ang, C.S., Zaphiris, P.: Social roles of players in MMORPG guilds: a social network analytic perspective. Inf. Comun. Soc. **13**(4), 592–614 (2010)
69. Chen, M.: Communication, coordination, and camaraderie in world of warcraft. Games Cult. **4**(1), 47–73 (2009)
70. Benassi, A., et al.: World of warcraft in the classroom: a research study on social interaction empowerment in secondary schools. In: European Conference on Game Based Learning, pp. 35–45. Academic Publishing Limited, UK (2011)
71. Visser, M., Antheunis, M.L., Schouten, A.P.: Online communication and social well-being: how playing world of warcraft affects players' social competence and loneliness. J. Appl. Soc. Psych. **43**(7), 1508–1517 (2013)
72. Whippey, C.: Community in world of warcraft: the fulfilment of social needs. Totem: Univers. West. Ontar. J. Anthrop. **18**(1), 15 (2011)
73. Ducheneaut, N., Moore, R.J.: The social side of gaming: a study of interaction patterns in a massively multiplayer online game. In: Proceedings of the 2004 ACM Conference on Computer Supported Cooperative Work, pp. 360–369. ACM, New York (2004)
74. Kolo, C., Baur, T.: Living a virtual life: social dynamics of online gaming. Int. J. Comp. Game Res. **4**(1) (2004)
75. Lo, S.K., Wang, C.C., Wenchang, F.: Physical interpersonal relationships and social anxiety among online game players. Cyberpsychol. Behav. **8**(1), 15–20 (2005)

76. Kim, E.J.: The relationship between online game addiction and aggression, self-control and narcissistic personality traits. Europ. Psych. **23**, 212–218 (2008)
77. Shen, C., Williams, D.: Unpacking time online: connecting internet and massively multiplayer online game use with psychosocial well-being. Commun. Res. **38**(1), 123–149 (2010)
78. Kowert, R., Oldmeadow, J.A.: Playing for social comfort: online video game play as a social accommodator for the insecurely attached. Comput. Hum. Behav. **53**, 556–566 (2014)
79. Rankin, Y., Gold, R., Gooch, B.: Evaluating interactive gaming as a language learning tool. In: Proceedings for ACM SIGGRAPH Conference (2006). http://www.langwidge.com/studies/a44-rankin.pdf
80. Zheng, D.: Affordances of three-dimensional virtual environments for english language learning: an ecological psychological analysis. Dissertation Abs. Int. Sect. A: Humanit. Soc. Sci. **67**(6-A), 2057 (2006)
81. Waters, J.K.: Online role-playing games, which take players on explorations of medieval fantasy worlds, are showing the potential to be a powerful tool for ESL learning. THE J. **34**(10) (2007)
82. Rankin, Y.A.: Design and evaluation of massive multiplayer online role playing games that facilitate second language acquisition. Doctoral Dissertation. Northwestern University, Evanston, Illinois (20009)
83. Ranalli, J.: Learning english with the sims: exploiting authentic computer simulation games for L2 learning. Comp. Assist. Lang. Learn. **21**, 441–455 (2008)
84. Thorne, S.L.: Transcultural communication in open internet environments and massively multiplayer online games. In: Magnan, S. (ed.) Mediating Discourse Online, pp. 305–327. John Benjamins, Amsterdam (2008)
85. Zheng, D., Young, M.F., Wagner, M.M., Brewer, R.A.: Negotiation for action: english language learning in game-based virtual worlds. Mod. Lang. J. **93**, 489–511 (2009)
86. Reinders, H.: Game on! using computer games to teach writing. Engl. Teach. Profes. **63**, 56–58 (2009)
87. Ballou, K.: Language learner experiences in an online virtual world. Jalt Call J. **5**(2), 61–70 (2009)
88. Zhao, Y., Lai, C.: MMORPGs and foreign language education. In: Handbook of Research on Effective Electronic Gaming in Education, pp. 402–421 (2009). http://www.igi-global.com/chapter/mmorpgs-foreign-language-education/20099
89. Peterson, M.: Digital gaming and second language development: japanese learners interactions in a MMORPG. Digit. Cult. Educ. **3**(1), 56–73 (2010)
90. Peterson, M.: Computerized games and simulations in computer-assisted language learning: a meta-analysis of research. Simulat. Gam. **41**(1), 72–93 (2010)
91. Kongmee, I., et al.: Using massively multiplayer online role playing games (MMORPGs) to support second language learning: action research in the real and virtual world. In: 2nd Annual IVERG Conference: Immersive Technologies for Learning: Virtual Implementation, Real Outcomes, Middlesborough, UK (2011)
92. Kongmee, I., Strachan, R., Pickard, A., Montgomery, C.: Moving between virtual and real worlds: second language learning through massively multiplayer online role playing games (MMORPGs). In: 3rd Computer Science and Electronic Engineering Conference, pp. 13–18. IEEE (2011)
93. Peterson, M.: Learner interaction in a massively multiplayer online role playing game (MMORPG): a sociocultural discourse analysis. ReCALL **24**(3), 361–380 (2012)

94. Kongmee, I., Pickard, A., Strachan, R., Montgomery, C.: A case study of using online communities and virtual environment in massively multiplayer role playing games (MMORPGs) as a learning and teaching tool for second language learners. Int. J. Virt. Pers. Learn. Environ. **3**(4), 1–15 (2012)
95. Sundqvist, P., Sylvén, L.K.: World of VocCraft: computer games and swedish learners L2 english vocabulary. In: Reinders, H. (ed.) Digital Games in Language Learning and Teaching, pp. 189–208. MacMillan, New York (2012)
96. Rama, P.S., Black, R.W., van Es, E., Warschauer, M.: Affordances for second language learning in world of warcraft. ReCALL **24**(3), 322–338 (2012)
97. Balcikanli, C.: Language learning in second life: american and turkish students' experiences. Turk. Onl. J. Dist. Educ. **13**(2), 131–146 (2012)
98. Lee, J.Y., Pass, C.: Massively multiplayer online gaming and english language learning. In: Gerber, H.R., Abrams, S.A. (eds.) Bridging Literacies with Videogames, pp. 91–101. Sense Publishers, Rotterdam (2013)
99. Owston, R., Wideman, H., Sinitskaya Ronda, N., Brown, C.: Computer game development as a literacy activity. Comput. Educ. **53**, 977–989 (2009)
100. Milton, J., Jonsen, S., Hirst, S., Lindenburn, S.: Foreign language vocabulary development through activities in an online 3D environment. Lang. Learn. J. **40**(1), 99–112 (2012)

# Information Need, Information Behaviour and Use

# Field-Specific Information Needs of Doctoral Students in Psychology. A Comparative Study

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**Abstract.** The purpose of this exploratory study (to be held between February 2015 and June 2016) is to investigate the information needs of doctoral students in the field of psychology. The research will seek to identify the main information challenges and problems of doctoral students in their research process. There are three researched institutions: University of Warsaw, University of Lille 3, and University of California, Berkeley. The study will build upon information literacy (IL), the concept of methodological literacy as well as information behavior, and use of social media in science. The study involves comparisons of how Ph.D. candidates handle their retrieved information, obstacles they meet, and choices they make while searching for information. In 2015, the author conducted a pilot study among Polish and French doctoral students. This paper summarizes the findings at this stage of research.

**Keywords:** Information literacy · Information behavior · Information needs · Doctoral students in psychology · Comparative study

## 1 Introduction and Problem Statement

While conducting systematic research, writing literature reviews and developing their dissertations, doctoral students need advanced information skills.

The purpose of this exploratory study is to investigate the information behavior of a group of doctoral students in the field of psychology. The research aims to collect data and to understand Ph.D. candidates' information needs in order to draw conclusions for improving library services in the domain of information literacy (IL). The study investigates the doctoral candidates' preparation for research and readiness to participate in professional communities. The research seeks to identify main information challenges and problems of doctoral students and thus, basing on information practices of doctoral students in the field of psychology, provide aids in their research process.

This research was inspired by the international doctoral research conducted between 2009 and 2013 in France and Poland [1]. The latter helped identify areas for future investigation; one of them was an in-depth study of complex relationships between scientific disciplines and information needs. Scientific domains differ in their theoretical views, paradigms, and epistemological assumptions, as well as in their general relevance criteria. Moreover, within one discipline we identify sub-groups, therefore the analysis of the field must be specified further [2, 3]. The study conducted by Steinerovà [4] also


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confirmed differences in information handling in various disciplines and hence the need to pay more attention to methodological training of doctoral students. Results also showed differences in disciplines regarding their methodological literacy.

More precisely, this research investigates the types of information resources doctoral students use for their research; the way students proceed when they need to access relevant documents; students' attitudes towards scientific information, digital resources and library services; the role people assume in their information seeking behavior; the way Ph.D. candidates perceive their research process and their competence with relation to library research and information skills.

The research focuses on information literacy and methodological literacy. For the purpose of the theoretical framework of this study the definitions of three concepts were chosen from several in existing literature of the field. These are as follows:

**Information literacy**, according to the Chartered Institute of Library and Information Professionals (CILIP), is knowing when and why you need information, where to find it, and how to evaluate, use and communicate it in an ethical manner [5].

**Methodological literacy**, according to Steinerovà [4], is knowledge of a problem statement, project management, analysis, synthesis, interpretation, knowledge of main methodological paradigms, and methods of research, as well as abilities to apply this knowledge into research projects and publishing. The Steinerovà's model covers the main information seeking and use strategies, intellectual information processing, project management and publishing.

**Information behavior**, according to Wilson [6], are those activities a person may engage in when identifying their own need for information, searching for information and using or transferring that information.

## 2 Literature Review

As Streatfield, Allen and Wilson [7] wrote, although higher education libraries have given increasing attention to IL, the IL requirements of researchers have been relatively neglected. Doctoral candidates may be included into *researchers* group, as in fact they are novice researchers; in France this group is even literally named *young researchers* (Fr. *jeunes chercheurs*).

In literature there are studies focused on IL and scholarly communication of postgraduates [4, 8–10]. Some of them are more general [1, 11, 12]; other covers more specific issues, like preparation for research and professional communities [7, 13], knowledge sharing and communities of practice [14]. Vezzosi investigated the information behavior of doctoral students in the field of biology [8].

## 3 Methodology

Data were collected at each university during the four-month period between March and June 2015. The 32-question online survey was designed to conduct the first phase of the study. It contained questions in four areas: information searching and retrieval, management of information, dissemination of information and fluency in

the terms of information skills (see Fig. 1 for details). The online survey was hosted on Google Forms platform and the link was distributed to students by email via doctoral studies administration office. There were two language versions of the survey (French and Polish) and they were separately administered to students in Lille and in Warsaw. The survey included 28 topic questions and five demographic questions. A combination of rating, open-ended, and yes/no questions were employed.

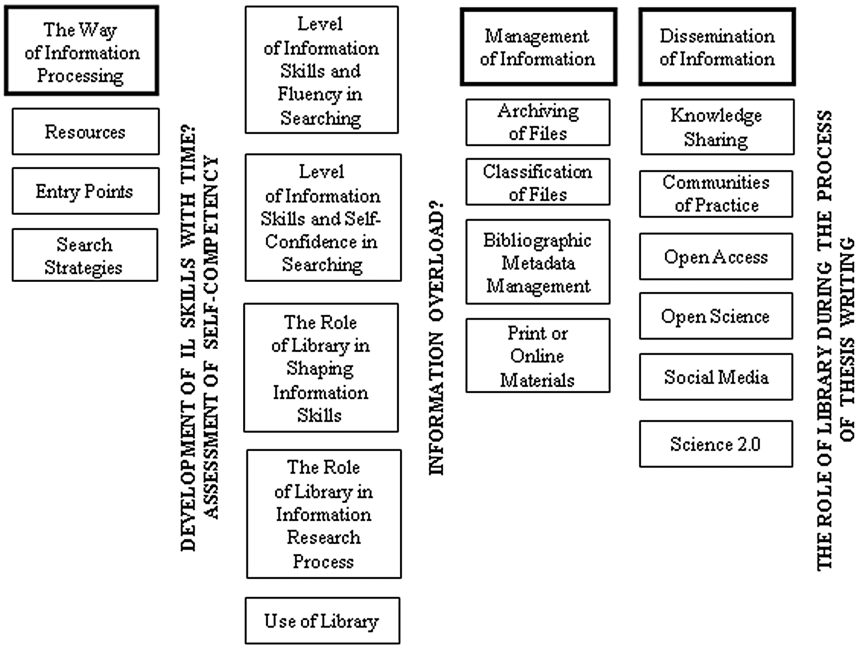


**Fig. 1.** Conceptual framework for a study of information needs of doctoral students in psychology

The online survey was delivered to provisionally identify gaps in students' knowledge and to allow students a self-assessment of their IL skills and competencies. In the second phase of the study, the respondents who had agreed on their questionnaire were interviewed. Data were collected through semi-structured, in-depth interviews, each lasting approximately 30 min. Participants were asked to share their experience with information searching, retrieval, and management as well as with knowledge sharing.

Figure 1 presents the conceptual framework of the study, labeling bins that contain discrete phenomena explored in this study. According to Miles and Huberman [15], conceptual frameworks are best done graphically, rather than in text.

The response rate was low. In Poland the number of online survey respondents were 12 out of 66, five of whom agreed to take part in the interview. In France there were nine respondents (out of 64) of online survey and five agreed to take part in the second phase of the study. Thus, having a total of ten respondents, the equal number ($n = 5$) from each country, the researcher decided to treat this study as a pilot one, opening the path for extended, in-depth research to take place in 2016.

**Comparative research** plays an important role in the humanities and social sciences. It helps identify best practices and best solutions across different countries. It can be also a first inductive step towards the development of theories [16].

The comparative empirical study opens up the horizon for the analysis of the role of IL in doctoral research support. The data will be presented across countries with explanations of respective context, i.e. data analysis will be preceded by a review of doctoral education system in each country and in each institution participating in the study.

The comparative approach is seen as one of the most fruitful in higher education studies, since it allows researchers to broaden their observation base and to achieve a more extensive and reliable understanding of the phenomena observed [17].

## 4 Data Analysis and Discussion

The data analysis started after completing the phase of interviews. The questionnaire responses and the records were examined and divided into categories which were then coded and clustered. Both in France and in Poland, the majority of respondents were in their first or second year of doctoral studies.

In both countries the main entry points to information searching were: key-words, references of previously read publications, and author's name. One respondent from France and one from Poland declared use of alerts and newsletters offered by database suppliers. In order to find publications, respondents searched via Google Scholar, Google, discovery tools and the list of e-journals offered at the University in Lille and in Warsaw, networking websites such as Academia.edu or Research Gate; or they searched directly in databases. The databases named most often by surveyed doctoral students in the field of psychology were either aggregate databases published by: Ebsco, Elsevier (incl. Science Direct, recognized by all respondents), Proquest, or more specialized ones such as PsychLIT, Medline, PubMed, Cochrane Library, CAIRN, PsycInfo. Both in France and in Poland respondents were complaining that there are not enough databases with collections from their field available at the university. Respondents from Warsaw seemed to manage this obstacle in accessing information better. They used the libraries of another universities: The Medical University in Warsaw and Kozminski University. The respondents from Lille did not indicate this kind of solution. Polish respondents also indicated another obstacle: many journals impose at least six-month embargo on their most recent papers; and they were too costly to purchase them earlier on one's own.

In both countries, the respondents declared that they mainly searched for e-journals and not books (in printed or online format) since the latter were too general for this level of studies. The respondents declared minimal printing of downloaded retrieved publications- they printed either key-papers for their field of study or some more complex publications that needed an in-depth reading. Thus, it seemed interesting to investigate how they archived and classified the files. One respondent from France used a reference management tool (Mendeley) to store and classify the files. The others archived files on their computer only or they applied some kind of "back-up combination": computer and mailbox, computer and Dropbox, computer and an external disc, computer and an

external disc and mailbox. Eight respondents tried to classify the archived files; either by concepts/subject or by making the notes on the basis of abstracts or by creating the metadata catalog in shared Excel file, accessible for peers.

The study showed little awareness of existing tools useful in the process of information search and retrieval (such as: bibliography manager, alerts and newsletters offered by several databases providers). Three respondents used the reference manager. The respondents often admitted '*I had no idea that such a tool exists, I learnt about it when responding to your survey*'.[1] Hence, the study helped doctoral candidates better understand their needs and identify their gaps in IL. It also encouraged them to reflect on their research process and inspired them to undertake some activities in order to proceed more efficiently ('*I will certainly install Mendeley, it sounds like a great tool*').

Thus, a level of self-efficacy in the terms of information skills, declared in an online questionnaire has often been revised and questioned during interview. Face-to-face interaction appeared not only an appropriate research method, but also an opportunity for students to develop their knowledge on tools and information search and management methods. The main motivation to develop IL skills was the advantage of saving time; when information skills are fully developed, research moves faster and more efficiently. The respondents in general admitted that they had made much progress in terms of information retrieval skills since their years in bachelor or master studies. As for the indicators of this progress they listed: use of clearer defined terminology, fluency in databases searching, faceted narrowing of results, and use of key-words combinations. One of respondents said that '*doctoral studies open a new horizon for information skills development*'.

Also, knowledge sharing and communities of practice (CoP) accelerate the doctoral research [see for ex. 18]. The respondents underlined the importance of team working and sharing knowledge within the CoP. It is also connected with peer-learning, cooperation, interest in others' work and progress in research. The role of their thesis supervisor who recommends or sends interesting publications also appeared crucial. Very often knowledge sharing and CoP are associated with good relationships between the student and the supervisor and a student and colleagues from the laboratory. Novice doctoral students are welcomed and integrated into the research team by more experienced members. Team and collaboration skills are important and help becoming active in a broader scientific community. Two respondents highlighted the importance of conferences where networking is one of the most important parts of the event. Also, word-of-mouth was indicated by four respondents as informal though efficient mean of knowledge sharing.

Social media may also play a role in knowledge sharing. French students are more likely to use Twitter (no one indicated Facebook), while Polish students use their Facebook accounts for sharing or searching for information (no one indicated Twitter). Besides, both French and Polish students read scientific blogs (and one respondent from Poland is an active blogger); French respondents used networking websites mentioned earlier: Academia.edu and Research Gate which is not the case of Polish students.

[1] All interview quotations were originally in French and Polish and have been translated into English by the author of this paper.

Finally, students' attitudes towards Open Access (OA) and, more general, Open Science were investigated. Both the French and Polish respondents underlined the importance of publishing in journals with a high Impact Factor, and those available in OA are rather rare, if not unique, in the field of psychology. Therefore, the respondents admitted that Open Science is a noble initiative, worth considering; publishing in Open Access is *pro publico* bono, as the visibility of research grows, research findings are widely disseminated and might be evaluated faster; however for now it cannot be a priority for them ('*To make a scientific career you must proceed pragmatically*'). One respondent was considering OA as the place for publishing popular science papers rather than the research ones. Another obstacle related to OA was the cost of publishing. The respondents were aware that good OA journals have their pricing policies and the cost of publication should be included for example into the research project budget, which is not always possible both in the case of France and Poland. None of the respondents had heard about the Creative Commons licenses that can be perceived as one of the components of Open Science. One French respondent publishes the abstracts regularly in HAL, a French open archive platform for researchers.[2]

## 5 Conclusion

The results presented in this paper are preliminary. As noted earlier, due to the low response rate, the author decided to treat this study as a pilot study, opening the path for extended, in-depth research to take place in 2016. However, even on the basis of 10 questionnaires and interviews, some conclusions of this stage of the study may be drawn and reviewed before undertaking further research.

First of all, this kind of study allowed doctoral candidates an opportunity for considering their own information seeking practice. Second, it suggested action areas for libraries in order to strengthen IL support and meet the needs of doctoral candidates.

This pilot study seems to reveal similar needs in France and in Poland and it coincided with the findings of the study conducted in 2010 [9]. Its results showed that, in general, libraries concentrated their training interventions on traditional 'library topics' such as information seeking, citing sources and introducing researchers to the library services rather than on issues in managing research information, such as evaluating the information obtained, management of information by the researchers, or issues underpinning researcher use of information, such as copyright and Open Access.

In the case of this pilot study, both French and Polish respondents were underlining the need of a structured, specialized instruction for doctoral candidates, conducted on-site or online (e-learning). One of the respondents called this kind of instruction "a Ph.D. candidate tool kit" and suggested the need of follow-up activities, which could be realized for example by individual, face-to-face consultations with librarian. Fostering, under the aegis of library, the learning community of doctoral students from more than one field of study would help share information and knowledge. It would also help those doctoral candidates who already teach bachelor

[2] http://hal.archives-ouvertes.fr.

and master students develop their pedagogical skills. One respondent suggested better promotion of library instruction among bachelor and master students so that they can shape their information skills earlier and save time later (as the aspect of time saving was discussed often and mentioned already earlier in this paper).

Also, the need of permanent collaboration between the library and the department was raised since both in France in Poland it does not exist. Doctoral students noticed that even experienced researchers often do not have sufficient information skills, so this kind of cooperation would be beneficial not only for young researchers, in issues related to IL, copyright, or OA for example.

This pilot study also allowed respondents to review their opinion on tools useful while conducting research. The respondents have not invested effort in learning to use new tools since they thought they were not useful. The interviews helped them to change this attitude.

## References


1. Wiorogórska, Z.: Information literacy and doctoral students in France and Poland: a comparative study - ZIN. Inf. Stud. **52**(1), 52–66 (2014)
2. Collins, E., Jubb, M.: How do researchers in the humanities use information resources? LIBER Q. **21**(2), 176–187 (2012)
3. Talja, S., Maula, H.: Reasons for the use and non-use of electronic journals and databases. J. Doc. **59**(6), 673–691 (2003)
4. Steinerová, J.: Methodological literacy of doctoral students – an emerging model. In: Kurbanoğlu, S., Grassian, E., Mizrachi, D., Catts, R., Špiranec, S. (eds.) ECIL 2013. CCIS, vol. 397, pp. 148–154. Springer, Heidelberg (2013)
5. Chartered Institute of Library and Information Professionals. Information literacy – Definition (2014). http://www.cilip.org.uk/cilip/advocacy-campaigns-awards/advocacy-campaigns/information-literacy/information-literacy
6. Wilson, T.D.: Models in information behaviour research. J. Doc. **55**(3), 249–270 (1999)
7. Streatfield, D., Allen, D., Wilson, T.: Information literacy training for postgraduate and postdoctoral researchers: a national survey and its implications. Libri **60**, 230–240 (2010)
8. Vezzosi, M.: Doctoral students' information behaviour: an exploratory study at the University of Parma (Italy). New Libr. World **110**(1/2), 65–80 (2009)
9. Drachen, T.M., Larsen, A.V., Gullbekk, E., Westbye, H., Lach, K.: Information Behaviour and Practices of Ph.D. Students. Research Support Services, Copenhagen University and Information Services. University of Oslo Library. Vienna University Library (2011). http://hprints.org/docs/00/59/90/34/PDF/Information_behaviour_and_practices_of_PhD_students_appendices.pdf
10. Steinerová, J., Hrčková, A.: Information support of research information interactions of Ph.D. students in Slovakia. Grey J. **10**(2), 79–85 (2014)
11. Macauley, P., Green, R.: Can our relationships be reconceptualized? Librarians, information literacy, and doctoral learners. J. Educ. Inf. Sci. **50**(2), 68–78 (2009)
12. Kumar, S., Ochoa, M., Edwards, M.: Considering information literacy skills and needs: designing library instruction for the online learner. Commun. Inf. Lit. **6**(1), 91–106 (2012)
13. Tuñón, J., Ramirez, L.: ABD or EdD? a model of library training for distance doctoral students. J. Libr. Admin. **50**, 989–996 (2010)

14. Green, R.: Fostering a community of doctoral learners. J. Libr. Admin. **45**(1/2), 169–183 (2006)
15. Miles, M.B., Huberman, A.M.: Qualitative Data Analysis: An Expanded Sourcebook. SAGE Publications, Thousand Oaks (1994)
16. Teichler, U.: Opportunities and problems of comparative higher education research: the daily life of research. High. Educ. **67**(4), 393–408 (2014)
17. Reale, E.: Challenges in higher education research: the use of quantitative tools in comparative analyses. High. Educ. **67**(4), 409–422 (2014)
18. Wiorogorska, Z., Rehman, S.U.: When librarians became researchers: the creation of international culture of knowledge sharing beyond the boarders. Pak. Libr. Inf. Sci. J. **43**(2), 22–33 (2012)

# The Participatory Medicine Attitudes of General Practitioners in Greece: An Information Behaviour Perspective

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**Abstract.** General Practitioners (GPs) need to keep up with a wide range of medical conditions and at the same time closely interact with their patients to provide preventive care and health education. This requires effectively sourcing, utilizing, and sharing quality information with their patients as well as creating participatory and shared decision-making health environments. This paper explores the information seeking behaviour of GPs and their attitudes towards participatory medicine (PM). A questionnaire based survey with GPs in Greece, registered with the Hellenic Society of General Practitioners (HSGP) was conducted and included an exploration of three different information seeking dimensions (information needs, sources and barriers) that were associated with GPs' perceptions of PM. The survey results demonstrate an interplay of demographic and contextual factors in the choice of information sources and the barriers encountered and conclude that the effective utilization of online information sources is an essential condition for PM practices.

**Keywords:** Information seeking · Information needs · Participatory medicine · General practitioners · Survey · Greece

## 1 Introduction

GPs in Greece, similar to other European countries, are specialist doctors, who are not limited to any particular branch of medicine or type of disease and have responsibility for the provision of comprehensive medical care to individual patients who require prevention and treatment of acute or chronic diseases. Central to GPs' relationship with their patients is the sense of community and trust created within their local communities where GPs act as their first port of call within the health system. GPs also offer multiple consultations and have a good understanding of individual patients' medical histories that enable them to offer advice which they feel is clinically necessary for their


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patients. On the basis of this knowledge they refer their patients to other specialist health services or/and provide health education, helping them to consult other external credible health information sources. GPs are expected to be familiar with more than 400 distinct clinical conditions (acute or chronic) [1] and to provide a complete spectrum of care within their local communities; however, it is very difficult, if not impossible, for them to be up-to-date in all medical specialties. It is, therefore, paramount that GPs assume full responsibility for continuously updating their knowledge that will allow them to retain the principles that are the foundation for providing effective and safe healthcare to their patients. In order to update this knowledge, satisfy their diverse information needs, and accomplish specific work tasks, GPs engage in information seeking [1], a dynamic and contextual process that relates to the complex nature of their work roles, the time they have available, the effort they are prepared to invest in retrieving information, and the availability of online and offline specific information sources on a subject [3]. Effective information seeking also relies on their own awareness of quality information sources and best practices followed in information retrieval, using different communication technologies and the ability to critically evaluate and share information, known as "digital literacy" [4].

A significant amount of research literature has been devoted to the study of information seeking preferences and information needs of doctors [5–7]. However, the role of effective information seeking practices in participatory medicine (PM) has received little attention. PM has been predominantly examined with an emphasis on patients' healthcare decisions. Very few studies focused on GPs' attitudes. Therefore, in this paper we examine the relationship between GPs' information needs, the information sources they use, digital literacy, and other barriers they experience and their perceptions for PM. Furthermore, a study of GPs in the context of Greece is both timely and important considering the ongoing changes in the general practice health services. In Greece, general practice has only been recognised by the National Health System (E.S.Y.) as a specialty in its own right with requirements for particular training since the end of the 1980s. However, with only 2500 specialist GPs currently in Greece, the nation-wide general practice population coverage is one of the lowest within the Eurozone and accessibility to primary health care services is seriously compromised. This has been further affected by the austerity measures that were introduced since 2010 by the Greek government to address the ongoing financial crisis [8]. In addition, it has only been in the last few years that specialist GPs have been replacing the earlier, non-specialist and newly qualified doctors, and there is still a general lack of trust and confusion by the general population in relation to the advanced level of health services available by GPs.

## 2 Theoretical Background

This study we used a well-established general model of information behaviour developed by Wilson [9–11]. Wilson advocates a person centered approach focusing on the information needs and the context, i.e. the situation in which information needs arise, and the barriers that may influence information seeking behaviour. According to Wilson's macro model of information behaviour, information seeking is viewed as an

effort to satisfy a set of task related information needs. Although Wilson's model is not praticularly focused on health, recent research on the information seeking behaviour of physicians, and GPs in particular, demonstrates the relevance of the model within that context.

GPs are exposed to a wide array of clinical circumstances when compared to other medical specialties [12]. For GPs, information seeking towards the satisfaction of needs is rather subjective and contextual [13], not necessary implying an exhaustive information seeking strategy [3]. On the contrary, the satisfaction of information needs is viewed as a dynamic process during which doctors assess the medical condition of a patient, determine their information seeking goals and needs, utilize different online and offline information sources, and gradually arrive to an accepted (or compromised) level of information needs satisfaction [14, 15]. GPs balance the potential benefits from further information seeking with the related costs in time and effort that should be invested based on the environmental and personal barriers to information seeking they encounter in their own contexts. Indeed, the decision of whether or not extra effort on information seeking is worthwhile is related to the potential benefits from that extra information and knowledge that is available [16]. Information satisfaction is therefore linked to the subjective feeling of having the sufficient amount of information for providing clinical services and making clinical decisions for a specific patient based on his/hers specialized medical condition and views on what is best for them. In addition, although the primary motivation for information seeking is related to reducing uncertainty in a clinical problem [17], in some occasions GPs are motivated to seek information in order to legitimize the information gathered by patients [18, 19]. Effective information exchange and information sharing empowers a consultation style that is curious, supportive, non-judgmental, and based on patient participation in clinical decision making [2]. Although the actual clinical consultation may take longer, the additional time spent engaging the patient in the decision improves the clinical decision quality [20].

## 3 Survey Details

We conducted this research by means of a questionnaire survey that was informed by Wilson's macro model of information behaviour [16, 19, 21]. The first section included questions about demographic characteristics of GPs (e.g. age, healthcare unit, workplace, and specialization). The following sections measured the importance of work related information needs (8 items), the frequency of different information resources utilization (13 items) and the importance of barriers that GPs face when seeking information (8 items). The last part of the survey questionnaire was concerned with the perceptions of the GPs for practicing participatory medicine and was informed by the work of Coulter and Collins [2] for shared decision-making in the National Health System (NHS) in the U.K. It measured the importance of doctor-patient relations on the basis of the following areas: "development of understanding and trust", "deciding in common the agenda and priorities", "sharing information", "communication for reducing patient anxiety", "supportive actions" and "explaining evidence-based alternatives" (6 items).

We distributed the questionnaire via email, fax, or regular post to a total of 664 GPs in Greece registered to the Hellenic Society of General Practitioners (HSGP). It was distributed mainly via email, fax and regular post, according to the registered GPs' correspondence details. One hundred and seventy six GPs returned the questionnaire, achieving a 26 % response rate. Prior to its distribution, the questionnaire was qualitatively pilot tested by a group of experts (medical doctors with extended research background and academics) for validity and was approved by the HSGP scientific committee. The survey was advertised on the HSGP webpage and took place during the period of February to March 2014. We used a 5-point Likert scale to rate the frequency of information needs, the frequency of utilization of specific information sources, the importance of specific obstacles during information seeking, and the GPs' attitudes towards PM practices. The values assigned to the five item Likert scale ranged from 1 = "not at all" to 5 = "a lot." The 35-item questionnaire scale exhibited a good internal consistency with an overall Cronbach alpha of 0.824 and no variable influencing the scale mean and the overall Cronbach alpha, if it was to be removed from the model. Furthermore, the reliability of each subscale was found to be as follows: "the importance of information motives/needs" = 0.737; "the frequency of information sources employed" = 0.789; "the importance of the barriers involved in seeking information" = 0.790; "the importance towards participatory medicine" = 0.792. The subscales were adequate [22] in terms of their internal consistency with no problematic variables in terms of Cronbach alpha reliability coefficient as judged by item-total statistics. We performed statistical analysis using SPSS and based on descriptive and nonparametric inferential statistics (Mann-Whitney-U and Kruskal-Wallis-H for the group categories) and associations (Spearman's rho test) of different categories of information needs, sources, and barriers, and the doctors' perceptions for PM.

We conducted the survey within a specific socioeconomic environment. Thus, the results should be generalized with caution as they may not be directly applicable in other settings and countries. One of the limitations of the study was also the low response rate and the demographic sample synthesis that consisted of younger GPs. This could be due to the way in which the questionnaire was distributed (predominantly through email) as younger doctors may be prone to using email for communication with other professionals and friends on a more regular basis than older doctors. However, the analysis provides a useful insight into the information needs, information sources preferences and barriers experienced by GPs in relation to their PM perceptions and may be useful for follow up research studies that aim to further explore these issues in other settings.

## 4 Survey Results

### 4.1 Descriptive Statistics

One hundred and seventy six GPS initially returned the questionnaire since two participants had to be excluded from the study due to inadequate completion, bringing the final sample to 174 GPs. The majority of the sample comprised of relatively young doctors (less than 40 years old –64.4 % of the sample). Most of the doctors had

completed their specialization (62.1 % of the sample) and, at the time of the survey, were working at a public hospital outpatient clinic or at a healthcare centre. Table 1 summarizes the sample profile.

**Table 1.** Sample profile

| Demographic characteristics | Frequency | Percentage |
|---|---|---|
| **Age** | | |
| Less than 40 years old | 112 | 64.4 |
| 41–55 years old | 56 | 32.2 |
| More than 55 years old | 6 | 3.4 |
| **Workplace** | | |
| Hospital outpatient department | 46 | 27.4 |
| Healthcare centre | 60 | 35.7 |
| Health insurance medical centre | 5 | 3.0 |
| Private GP | 15 | 8.9 |
| **Specialization** | | |
| Yes | 108 | 62.1 |
| No | 66 | 37.9 |

Table 2 shows the responses given with regard to their information needs/motives. The GPs reported that their most frequently information needs were centred on diagnosis, treatment, knowledge updating, and drugs.

**Table 2.** Survey results of GPs' information needs/motives

| Information motives/needs | Level of importance (the value 1 in the scale indicates low importance and the value 5 high importance) | | | | |
|---|---|---|---|---|---|
| | Low (1 & 2) % | Medium (3) % | High (4 & 5) % | Median | Valid N |
| Diagnosis | 7.5 | 3.4 | 89.1 | 5.0 | 174 |
| Treatment | 3.4 | 5.8 | 90.8 | 5.0 | 173 |
| Knowledge updating | 3.4 | 6.9 | 89.7 | 5.0 | 174 |
| Drugs | 1.7 | 14.3 | 84.0 | 5.0 | 175 |
| Patient material | 14.5 | 25.7 | 59.8 | 4.0 | 167 |
| Epidemiology | 19.6 | 31.2 | 49.2 | 3.0 | 173 |
| Research | 20.8 | 20.2 | 59.0 | 4.0 | 173 |
| Teaching | 25.5 | 16.6 | 57.9 | 4.0 | 169 |

Table 3 presents the survey results for the information sources utilized by the GPs. The most frequently used information source was Internet general search engines, followed by guidelines, scholar databases, and the doctors' personal libraries.

**Table 3.** Survey results of the information sources utilization

| Information sources | Level of untilization (the value 1 in the scale indicates low utilization and the value 5 high utilization) | | | | |
|---|---|---|---|---|---|
| | Low (1 & 2) % | Medium (3) % | High (4 & 5) % | Median | Valid N |
| Personal library | 11.0 | 14.5 | 74.5 | 4.0 | 173 |
| Colleagues | 16.4 | 25.7 | 57.9 | 4.0 | 171 |
| Hospital library | 67.9 | 8.9 | 23.2 | 1.0 | 168 |
| Scholar databases | 12.7 | 12.1 | 75.2 | 5.0 | 173 |
| General search engines | 5.80 | 11.6 | 82.6 | 5.0 | 172 |
| Medical websites | 18.6 | 13.4 | 68.0 | 4.0 | 172 |
| Updating services | 19.2 | 18.6 | 62.2 | 4.0 | 172 |
| Guidelines | 5.70 | 17.0 | 77.3 | 4.0 | 171 |
| Electronic medical journals | 32.7 | 19.6 | 47.7 | 3.0 | 168 |
| Printed medical journals | 43.8 | 26.6 | 29.6 | 3.0 | 169 |
| Medical conferences/seminars | 14.4 | 25.3 | 60.3 | 4.0 | 174 |
| Pharmaceutical representatives | 44.8 | 27.3 | 27.9 | 3.0 | 172 |
| Mass media | 78.6 | 8.3 | 13.1 | 2.0 | 168 |

Table 4 presents the survey results in terms of the barriers GPs encounter when seeking information. Notably, lack of time was the most significant obstacle encountered, followed by cost and the abundance of information that may be perceived as GPs experiencing information overload issues.

**Table 4.** Survey results of GPs' obstacles when seeking information

| Obstacles when seeking information | Level of importance (the value 1 in the scale indicates low importance and the value 5 high importance) | | | | |
|---|---|---|---|---|---|
| | Low (1 & 2) % | Medium (3) % | High (4 & 5) % | Median | Valid N |
| Lack of time | 12.9 | 21.8 | 65.3 | 4.0 | 170 |
| Cost | 21.3 | 19.5 | 59.2 | 4.0 | 169 |
| Lack of libraries | 49.1 | 21.9 | 29.0 | 3.0 | 169 |
| Lack of digital literacy skills | 65.9 | 12.9 | 21.2 | 2.0 | 170 |
| Lack of computer skills | 70.3 | 10.7 | 19.0 | 1.0 | 169 |
| Lack of trust in online information | 65.2 | 12.6 | 22.2 | 2.0 | 167 |
| Abundance of information | 34.1 | 25.9 | 40.0 | 3.0 | 170 |
| Information in foreign language | 58.3 | 12.9 | 28.8 | 2.0 | 170 |

Table 5 presents the survey results in relation to GPs' perceptions of participatory medicine. In accordance with the theoretical framework chosen [2], the most highly valued aspects of participatory medicine was the development of understanding and

**Table 5.** Survey results of GPs' perception of participatory medicine

| Participatory medicine issues | Level of importance (the value 1 in the scale indicates low importance and the value 5 high importance) | | | | |
|---|---|---|---|---|---|
| | Low (1 & 2) % | Medium (3) % | High (4 & 5) % | Median | Valid N |
| Development of understanding and trust | 3.6 | 8.3 | 88.1 | 5.0 | 168 |
| Common agenda and priorities | 7.8 | 24.6 | 67.6 | 4.0 | 167 |
| Sharing information | 12.2 | 18.9 | 68.9 | 4.0 | 164 |
| Communication for reducing patient anxiety | 10.2 | 18.9 | 68.9 | 4.0 | 166 |
| Supportive actions | 11.0 | 23.8 | 65.2 | 4.0 | 164 |
| Explaining evidence-based alternatives | 9.5 | 14.8 | 75.7 | 5.0 | 169 |

trust between GPs and their patients, followed by its value for explaining evidence-based alternatives, sharing information, and communicating with patients to reduce their levels of anxiety.

### 4.2 Correlations Between Information Needs, Sources, Barriers and Participatory Medicine Dimensions

We performed a number of correlations between three main dimensions (information needs, sources and barriers), the demographic characteristics presented in Table 1, and the dimensions of participatory medicine (Table 4). In relation to the different levels of information needs presented in Table 1, the Mann-Whitney (U) test did not reveal any significant differences on the basis of a specific area of expertise (specialisation) or between different levels of information motives/needs and the different age groups of GPs. However, using the Kruskal-Wallis test we identified significant differences ($H(4) = 14.204$; $p = 0.007$) between GPs working in different working contexts and the frequency of information seeking for research purposes. In particular, GPs working in hospital outpatient departments (mean rank = 81.17), healthcare centres (mean rank = 87.12), and health insurance medical centres (mean rank = 90.80) searched more frequently for research based purposes than those who were working in private GP services (mean rank = 43.57).

We found a number of additional interesting associations in relation to the group demographics and the utilization of information sources. The Mann-Whitney U test identified ($U = 2766.00$, $p = 0.037$) that the group of physicians without a specialization (mean rank 95.28) employ "colleagues" as an information source more often than those with a specialization (mean rank 79.59). In addition, the Kruskal-Wallis test identified significant differences among GPs within different age group categories in terms of the frequency of using "updating services" as information sources ($H(2) = 6.05$, $p = 0.049$) with mean rank values 106.17 for GPs in the age group above 55 years old, 91.11 in those between 41 to 55 years old, and 73.57 in those who were younger than 40 years old. Finally, the Kruskal-Wallis test found statistical significant differences among GPs who turn to "colleagues" for information within different workplace environments ($H(4) = 10.547$; $p = 0.032$). Specifically, hospital outpatient

departments had a mean rank of 96.91, healthcare centres had a mean rank of 81.87, health insurance medical centres had a mean rank of 101.20 and private GP services had a mean rank of 59.8

The Mann-Whitney U test identified (U = 2435,5, p = 0.001) that the group of physicians with a specialization (mean rank 95.28) perceive the "lack of digital literacy skills" as a more significant barrier than those without specialization (mean rank 76.20). In addition, we found significant correlations between a number of barriers experienced by GPs and their different workplace contexts: the "lack of digital literacy skills" (H(4) = 10,526, p = 0.032); the "lack of computer skills" (H(4) = 14,006, p = 0.007); and the "lack of trust in online information" (H(4) = 9,480, p = 0.050). The mean ranks of these barriers for GPs working within hospital outpatient departments were 96.93, 89.51 and 87.89 respectively. The mean ranks of these barriers for GPs working within health insurance medical centres were 88.30, 73.70 and 65.20 in relation to the three barriers, while for those who worked within healthcare centres the mean rank values were 85.71, 75.61 and 71.02 respectively. The lowest scores to these barriers were assigned by those working in private GP services with a mean rank of 57.97, 50.50 and 61.67 in the three different areas of barriers.

We identified statistical significant differences via the Kruskal-Wallis test among GPs who belong to different age groups and the value they place on participatory medicine as a means for "explaining evidence-based alternatives" (H(2) = 6,941, p = 0.031). Participants below 40 years old had a mean rank of 89.37, those between 41 to 55 years old had a mean rank of 80.38, and those above 55 had a mean rank of 38.80. However, we identified additional significant associations between the three information seeking behaviour dimensions (information needs, information sources and barriers) and GPs' perceptions of the different levels of value of participatory medicine using Spearman's rank non-parametric correlation coefficient. In relation to the different layers of information motives/needs we explored, the Spearman's correlations indicate that those who assigned value to PM as a means for setting a "common agenda and priorities" had information needs based on "diagnosis" (rs = 0.193, $p < 0.05$) and "patient material" (rs = 0.194, $p < 0.05$). In addition the value of PM for "sharing information" was positively associated with information needs based on "knowledge update" (rs = 0.270, $p < 0.005$) and "drugs" (rs = 0.189, $p < 0.05$). The value of PM as a means for enabling "communication for reducing patient anxiety" was correlated with information needs for "therapy" (rs = 0.179, $p < 0.05$). Finally, the significance of PM for "explaining evidence-based alternatives" was associated with "diagnosis" (rs = 0.226, $p < 0.005$).

In terms of the information sources utilized, "scholar databases" were positively associated with the value GPs assigned to PM for the "development of understanding and trust" (rs = 0.165, $p < 0.05$) and for "information sharing" (rs = 0.196, $p < 0.05$). "Scholar databases" were also associated with PM as a means for setting a "common agenda and priorities" (rs = 0.195, $p < 0.05$). The use of "medical websites" was associated with PM as a valuable means for developing a "common agenda and priorities" (rs = 0.160, $p < 0.05$) and was perceived valuable on the basis of "communication for reducing patient anxiety" (rs = 0.173, $p < 0.05$). The use of "general search engines" was significantly associated with the value assigned to PM in "supportive actions" (rs = 0.171, $p < 0.05$), in "guidelines" (rs = 0.325, $p < 0.005$). The value of PM on the basis of "communication for reducing patient anxiety" was positively correlated with a number of different

information sources, "medical websites" ($rs = 0.173$, $p < 0.05$), "updating services" ($rs = 0.158$, $p < 0.05$), "guidelines" ($rs = 0.160$, $p < 0.05$), and "electronic medical journals" ($rs = 0.209$, $p < 0.005$). Finally, it should be noted that we found a negative association between the frequency of using "updating services" as information sources and the value of PM in the "development of understanding and trust" ($rs = -0.198$, $p < 0.05$). In relation to the intervening variables, we found an additional negative correlation between the "lack of digital literacy skills" barrier and the value of PM in setting a "common agenda and priorities" ($rs = -0.166$, $p < 0.05$). In addition, the barrier based on "lack of trust in online information" was similarly negatively correlated with the value assigned to PM as a means for "information sharing" ($rs = -0.172$, $p < 0.05$). Thus those participants who experienced these barriers were less likely to perceive the value of the above PM dimensions.

## 5 Discussion of Results

Our study results are in line with other similar studies of GPs that found that they mostly seek information in relation to 'treatment', 'diagnosis', and 'drugs' [23, 24]. We also found that Internet information sources play a catalytic role in GPs' daily activities. Therefore, in correspondence with previous research [25], our survey suggests that Internet information sources (particularly Internet general search engines and scholar databases) are key sources. However, we also found that other more traditional sources such as guidelines and GPs' personal libraries are also still prevalent. Thus, GPs prefer to use a combination of online and traditional information sources. In relation to PM, overall, GPs expressed a quite positive attitude, especially for the "development of understanding and trust" and for "explaining evidence-based alternatives" practices. We found a number of positive associations on the basis of the different PM dimensions with the frequent use of Internet sources including scholar databases, medical websites, general search engines, updating services, and electronic medical journals. This demonstrated how the Internet can play a pivotal role in establishing successful PM practices based on principles of understanding and trust, information sharing, developing a common agenda and priorities together with patients, enabling communication with the purposes of reducing patient anxiety, and taking supportive actions. The use of additional, information technologies, including telemedicine applications over the Internet could play an important role in establishing better communication and, therefore, delivering more effective primary healthcare within patients' communities. However, as more and more patients utilize Internet information sources and networks in order to seek information on health issues and/or share experiences within complex social information networks, it is important for GPs to not overlook all those who are still reluctant to use modern information technologies to access and exchange information. GPs will need to have developed an advanced level of digital literacy skills through practical and theoretical training [26] that will enable them to efficiently use them. GPs will need to become familiar with online information seeking practices and embed various online information sources as part of their clinical decisions (e.g. evidence-based medicine, guidelines) as well as within their participatory medical practices. For the later, they should also be in a position to

educate and consult their patients on the basis of using specific information sources developed by trustworthy organizations and associations for specific health conditions.

## 6 Conclusions

GPs play a rather crucial role in the chain of primary care services provision. On a more theoretical basis, we proposed the adoption of a popular information seeking macro-model developed by Wilson for the purposes of studying the GPs' information seeking behaviour. The survey results indicate the importance of information seeking preferences in satisfying GPs' knowledge intensive daily practices, which involves an extensive array of medical conditions from different medical specialties. Overall, the utilization of a range of information resources is positively associated with the values assigned to participatory medical practices. Our survey results also indicate that there is an association of PM practices with the utilization of online information sources and with the need for diminishing obstacles (contextual and personal) that GPs face when searching for information online. The use of a combination of information sources allow GPs to update their knowledge and support their personal development goals and therefore offer effective evidence based medical practices that are at the core of their role in promoting and supporting the development of healthy communities. Consequently, digital literacy programs are essential for GPs for providing them with the necessary skills for identifying their work related information needs, for efficiently searching for information on different online information sources, for critically evaluating the online information they retrieve and the sources they use and for efficiently managing and using health information in an ethical manner to present, communicate, and share information with their patients in evidence based PM practices. Thus information and digital know-how should be integrated in GPs' education and continuing professional development as a core set of skills. This becomes increasingly important as GPs assume novel roles on the basis of guiding their patients and their medical concerns in the digital age.

## References

1. Andrews, J., Pearce, K., Ireson, C., Love, M.: Information-seeking behaviors of practitioners in a primary care practice-based research network (PBRN). J. Med. Libr. Assoc. **93**(2), 206–212 (2005)
2. Coulter, A., Collins, A.: Making Shared Decision-Making a Reality. No Decision About Me, without Me. NHS Report, The King's Fund, UK (2011)
3. Prabha, C.: What is enough: satisfying information needs. J. Doc. **1**, 74–89 (2007)
4. ALA Connect: Digital Literacy Definition (2011). http://connect.ala.org/node/181197
5. Coumou, H., Meijman, F.: How do primary care physicians seek answers to clinical questions? a literature review. J. Med. Libr. Assoc. **94**(1), 55–60 (2006)
6. Davies, K.: The information-seeking behavior of doctors: a review of the evidence. Health Inf. Libr. J. **24**, 78–94 (2007)
7. Younger, P.: Internet-based information-seeking behavior amongst doctors and nurses: a short review of the literature. Health Inf. Libr. J. **27**, 2–10 (2010)

8. Symvoulakis, E.K., Anyfantakis, D., Markaki, A.: Time to deliver patient centred care. In: From Patient Centred Generalists to GPs with Special Interests: 'You Only Live Twice' or… Maybe Once?, BMJ, 350 (2015). http://www.bmj.com/content/350/bmj.h530/rr-4
9. Wilson, T.D.: Models in information behaviour research. J. Doc. **55**(3), 249–270 (1999)
10. Wilson, T.D.: Human information behaviour. informing. Science **3**(2), 49–56 (2000)
11. Wilson, T.D.: Revisiting user studies and information needs. J. Doc. **62**(6), 680–684 (2006)
12. Gorman, P.N., Helfand, M.: Information seeking in primary care: how physicians choose which clinical questions to pursue and which to leave unanswered. Med. Decis. Making **15** (2), 113–119 (1995)
13. D'Alessandro, D.M., Kreiter, C.D., Peterson, M.W.: An evaluation of information-seeking behaviors of general pediatricians. Pediatrics **113**, 64–69 (2004)
14. Bennett, N., Casebeer, L., Kristofco, R., Strasser, S.: Physicians' internet information-seeking behaviours. J. Continuing Educ. Health Prof. **24**, 31–38 (2004)
15. Boissin, F., Dosci, U., Bernard, C.: Information-seeking behaviour and use of the internet by French general practitioners: a qualitative study. Health Inf. Libr. J. **22**, 173–181 (2005)
16. Kostagiolas, P., Korfiatis, N., Kourouthanasis, P., Alexias, G.: Work-related factors infl uencing doctors search behaviors and trust toward medical information resources. Int. J. Inf. Manage. **34**(2), 80–88 (2014)
17. O'Connor, A.M., Bennett, C.L., Stacey, D., et al.: Decision aids for people facing health treatment or screening decisions. Cochrane Database Syst. Rev. **3**, CD001431 (2009)
18. Coulter, A., Ellins, J.: Effectiveness of strategies for informing, educating and involving patients. Br. Med. J. **335**(7609), 24–27 (2007)
19. Kostagiolas, P., Martzoukou, K., Georgantzi, G., Niakas, D.: Information seeking behaviour of parents of paediatric patients for clinical decision making: the central role of information literacy in a participatory setting. Inf. Res. 18(3) (2013)
20. Zanini, C., Rubinelli, S.: Using argumentation theory to identify the challenges of shared decisionmaking, when the doctor and the patient have a difference of opinion. J. Publ. Health Res. **1**, e26 (2012)
21. Kostagiolas, P.A., Samioti, F., Alexias, G., et al.: Examining patterns of information behaviour among healthcare professionals: a case study on health psychologists. New Rev. Inf. Netw. **17**(2), 108–119 (2012)
22. Nunnally, J.C., Bernstein, I.H.: Psychometric Theory, 3rd edn. McGraw-Hill, New York (1994)
23. Bryant, S.: The information needs and information seeking behaviour of family doctors. Health Inf. Libr. J. **21**, 84–93 (2004)
24. Clarke, M.A., Belden, J.L., Koopman, R.J., et al.: Information needs and information-seeking behaviour analysis of primary care physicians and nurses: a literature review. Health Inf. Libr. J. **30**(3), 178–190 (2013)
25. Davies, K.: Information needs and barriers to accessing electronic information: hospital-based physicians compared to primary care physicians. J. Hosp. Libr. **11**(3), 249–260 (2011)
26. Yong, J.Y.: Health literacy and health information behavior of florida public library users: a mixed methods study. J. Libr. Inf. Sci. **47**(1), 17–29 (2005)

# Supporting the Process: Adapting Search Systems to Search Stages

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**Abstract.** Search engines have become indispensable tools for the information related tasks performed by a wide variety of searchers across the globe, and the information literacy of these search engine users varies widely. The more complex tasks performed using search engines, involving learning and construction, may consist of multiple stages, potentially affecting searchers' feelings, thoughts and actions. However, despite recent advances in personalization and contextualization, current search engines do not necessarily support these stages. This conceptual paper discusses the potential impact of search stages on the desired functionality of search systems. First, it looks at process models in the context of information literacy, followed by the support of current search engines for the stages described in these models. Finally, the paper reconciles the information literacy and system perspectives by discussing novel stage-aware search systems.

**Keywords:** Information seeking · Information literacy · Search stages · Search systems

## 1 Introduction

Online search engines have become indispensable tools for the information-related tasks performed by a wide variety of searchers across the globe. The information literacy of these search engine users varies widely, and has been defined as the "ability to recognize when information is needed", and the "ability to locate, evaluate and use effectively the needed information" [1]. Moreover, the complexity of tasks performed with search engines spans a continuum between simple tasks, such as lookup tasks, and complex tasks, involving learning and construction. The more complex tasks in this spectrum may consist of multiple *stages*. As Kuhlthau [2] has indicated, each stage in the evolving task process can affect searchers' feelings, thoughts and actions. Kuhlthau's model has similarities with information literacy process models, which provide guidance to learners and indicate required steps for successful problem solving [3]. Kuhlthau's process approach has had a "considerable impact" on Library and Information Science, but "little impact" on the design of actual information retrieval systems [2]. Even the current, highly advanced online search engines do not necessarily provide support for


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the stages described in the models. In previous work, we looked at ways to bridge *macro-level* information seeking models and *micro-level* search system features [4], and at ways to 'shake-up' the shallow information seeking process of novice searchers [5]. In this paper, we take the perspective of information literacy, and explore how search systems can support the stages described by two common IL process models. We look at information seeking behavior, the "variety of methods people employ to discover, and gain access to information resources" and the subset of information searching behavior, focusing on the interactions between information user and system [6].

Section 2 of this paper takes the perspective of information literacy, while Sect. 3 takes a system perspective. Subsequently, Sect. 4 suggests ways to reconcile the two perspectives, followed by the general discussion and conclusion.

## 2 The Information Literacy Perspective: Process Models and the Conceptual Implications for Search Support

In this section, we discuss the implications of IL process models for the search support of research-based tasks performed by non-expert searchers. Here, we define non-expert searchers as searchers with limited domain knowledge, procedural knowledge and/or IR system knowledge.

### 2.1 Information Literacy

Since the concept emerged in 1974, a large body of literature has been written about the concept of information literacy [7], the full review of which is beyond the scope of this paper, and which can be found elsewhere (for example: [7, 8]). In 1994, Doyle [9] has defined information literacy as "the ability to assess, evaluate and use information from a variety of sources." Over the years, as Lloyd [10] suggests, two distinct views on the concept have emerged. On the one hand, information literacy is viewed as a 'skills-based literacy' and information literacy is equated with abilities and information skills related to the information seeking process. On the other hand, information literacy is defined as a "complex phenomenon, which acts as a catalyst for learning" (p. 36). In this view, IL is embedded in the learning process, and as Kuhlthau [2, p. 163] has indicated, solely focusing on information skills would neglect the essential stages of "reflecting, constructing, and internalizing to learn and understand for one's self".

Various standards for IL have emerged over the years [7, 8]. The Association of College and Research Libraries (ACRL) introduced the Information Literacy Competency Standards for Higher Education in 2000, which has been one of the most cited standards ever since [1]. In subsequent years, reflecting the evolving views on information literacy, and a rapidly changing higher education and information environment, the standards were further reworked, resulting in the ACRL Framework for IL [11]. It consists of six interconnected concepts, which can be flexibly implemented by institutions. *Threshold concepts* have a central place in the framework, which are "passageways or portals to enlarged understanding or ways of thinking and practicing within that discipline" [11].

### 2.2 Process Models

In addition to the various standards and frameworks, different models describe stages involved in information literacy. We describe two concrete examples, Kuhlthau's ISP model and the Big6 model. Kuhlthau's ISP model [2] was based on in-depth research and describes the information seeking process. In its turn, it has inspired many IL process models that followed after. The Big6 model [12] describes skills for information problem-solving. Despite the numerous developments in information access since their conception, Kuhlthau's model can still be used to describe information seeking [13], and the Big6 model for problem solving in the age of the Web [14]. For this reason, and due to the potential applicability in different kinds of research-based tasks, we chose to focus on these two models.

**Kuhlthau.** Based on a number of empirical studies, Kuhlthau constructed the Information Search Process (ISP) model. Kuhlthau's model describes the stages that searchers go through during information seeking in the context of complex and information-intensive tasks [2]. Table 1 highlights the various stages defined in Kuhlthau's model. Her studies of the information seeking process have revealed "the importance of forming a focused perspective from information gathered to gain a deep understanding of an issue or question" (p. 95). Hence, formulating a focus is an essential element of the information seeking process in the context of learning tasks. One of the novel aspects of this model was that it considered the affective states of searchers: users' feelings, thoughts and actions evolve during the process. The uncertainty gradually changes, leading to episodes of increased uncertainty, and a generally diminishing uncertainty during the process. Kuhlthau's model has been quite influential and important for the development of the research agenda within the information literacy field [10].

The effects of the stages defined in the ISP model on the interaction with search systems are for instance reflected in a gradual evolution of information sought (from general to pertinent) [2]. Vakkari [15], using an adaptation of Kuhlthau's model, also observed concrete changes in the perceived *relevance* of information items: in the beginning, domain novices have a low ability to differentiate between relevant and less

**Table 1.** Stages in Kuhlthau's ISP model (adapted from [2])

| Stage | Description |
|---|---|
| 1. Initiation | Becoming aware of a lack of knowledge or understanding |
| 2. Selection | Identifying and selecting a general area, topic or problem |
| 3. Exploration | Exploring and seeking information on the general topic |
| 4. Formulation | A focused perspective is formed, uncertainty is reducing |
| 5. Collection | Gathering information pertinent to the focused topic |
| 6. Presentation | Completing the search, reporting and using results |

relevant items, but this ability increases during the process. Furthermore, the searchers' abilities to express their information needs may increase (including different search tactics, terms and operators).

**Big6**. As its authors indicate, the Big6 model is one of the most frequently used information literacy process models in education and practice. Eisenberg and Berkowitz [12] describe it as a "general approach to information problem-solving consisting of six logical steps or stages" (p. 5). Hence, it can be applied in the context of student learners, but also to professional or personal contexts. Each stage of the model is "necessary for the successful resolution of an information problem", but the stages are not necessarily linear [3]. Depending on context, experience and personal styles, the order of the involved steps can be different, as well as the time spent in each stage. Table 2 shows the various stages included in the model. The stages are "a unified set of information and technology skills" [3], which, according to Eisenberg, are essential for a student to master. The main focus, as opposed to traditional library instruction, lies on the broad problem-solving context, not just the specific skills associated with a certain tool; in other words, the "instructions in specifics comes after instruction in the overall information problem-solving process" (p. 7). The Big6 model supports metacognition, meaning that it aims to create an awareness of learner's mental states and processes [3]. The practical nature of the Big6 model also means that it can be relatively easy to integrate in an educational context [3].

**Table 2.** Stages in the Big6 model (adapted from [11])

| Stage | Description |
|---|---|
| 1. Task definition | Define the problem and information requirements |
| 2. Inf. seeking strategies | Determine the range of sources and evaluate sources |
| 3. Location & access | Locate sources and find information within sources |
| 4. Use of information | Engage and extract information from a source |
| 5. Synthesis | Organize and present information from multiple sources |
| 6. Evaluation | Judge product (effectiveness) and process (efficiency) |

Summarizing, both models describe information seeking from a *macro* perspective. Kuhlthau's model describes higher-level aspects of information seeking, while the conceptual part of Eisenberg's model describes the broad problem-solving context. While having a different focus, both models have many similarities and look at the *process*, i.e. the idea that information skills are not "isolated incidents", but "connected activities" [3]. Providing support at appropriate moments in the information seeking process, but also a reflexive understanding of one's own process as indicated in the models may be beneficial to the outcomes of learning tasks performed by non-expert searchers. In classroom and library settings, this support may be provided by instructors

and mediators. Considering the pivotal role of online search, though, it would also be desirable if information retrieval systems support learners during the different information seeking and problem-solving stages. The question is, however, to what extent this support is actually available in current IR systems.

## 3 The System Perspective: Search Support for Stages of Complex Tasks

This section takes the perspective of the IR system. We provide a brief overview of the developments of search support, and highlight current limitations in search support for complex tasks.

### 3.1 Developments in Search Support

Early command-line information retrieval systems in the 1970s were inspired by the dialogues occurring between (library) intermediary and user [16]. These dialogue-based systems would ask a user questions, similar to a reference interview performed by a librarian, and based on the users' answers would ideally retrieve a focused set of results, usually in the form of a number of references. As Ingwersen has argued [17], various systems in the 1980s and early 1990s also explicitly supported "all stages of task performance" (p. 137): these "intelligent intermediary systems" were "to act as an intermediary between an end user and the IR mechanism - and perform similar functions as human expert intermediaries used to perform" (p. 162). However, research on these intermediary systems gave way to other approaches. Later IR systems became increasingly streamlined, focusing on query formulation and results list inspection, and left it to the user to perform the task itself. This can still be observed in current search engines, even though drastic changes occurred in the information environment.

Results in modern online search engines such as Google and Bing are increasingly personalized. Personalization, in the context of Web search, has been described as "tailoring search results to an individual's interests" [18]. Personalization can be based on explicit preferences of a user, or based on implicit preferences (such as those detected by the system). Search results may for example be personalized towards a user's context (for instance location and language), or based on previous interactions with a search engine (for example frequently searched topics).

Various authors have expressed the need to extend the support for open-ended tasks in modern information retrieval systems [19]. *Exploratory search* has been defined as "an information-seeking problem context that is open-ended, persistent, and multi-faceted" [19]. For these open-ended tasks, it is not enough to provide just lookup functionality, but also learning and investigation are important [20]. Exploratory search tasks have some similarities with the initial stages of Kuhlthau's model, in which users engage in task initiation, selection and the exploration of a general topic. Hence, as argued in [4], approaches to support exploratory search on the Web may be valuable to support the early stages of Kuhlthau's model as well. In terms of support, exploratory search prototypes have offered ways to rapidly refine queries, to perform advanced filtering (using facets),

to use visualizations and to perform task management [19]. Second, *sensemaking*, in the context of Human-Computer Interaction, has been characterized as a combination of information seeking, analysis and synthesis [18]. Sensemaking may occur in complex, information-intensive tasks, for instance carried out by learners, but also by information analysts. The analysis and synthesis steps have similarities with the later stages of Kuhlthau's model [4], but also with the 'Use of information' and 'Synthesis' stages of the Big6 model, since sensemaking encompasses the "iterative process of formulating a conceptual representation" from encountered information [18]. Concrete support for sensemaking in experimental search systems includes features to group and organize information and to take notes.

### 3.2 Limitations in Search Support

Despite positive evidence for the usefulness of exploratory search and sensemaking features in experimental settings, online search engines still focus on supporting query formulation and results list inspection, and rarely provide explicit support for complex and open-ended tasks [21]. While search engines' functionality and returned results may be highly relevant to a searcher's query and context, they are not necessarily relevant for the searcher's stage of search. Personalization, for instance, does support displaying search results relevant to individual users' characteristics and preferences, but not the learning or construction occurring *within* a complex task. In addition, the concept of relevance is pivotal in both information literacy and information seeking. Relevance is multidimensional and dynamic, and is connected to the information needs of a user [22]. Retrieved documents, whether relevant or irrelevant, may influence a user's knowledge state and subsequent actions, making critical judgement of key importance. However, modern search engines do not offer support in judging relevance, or quality of information items.

Summarizing, as Beaulieu [23] has stated, current IR systems may not provide a mode of interaction which is rich enough for task-sharing between user and system. Current IR systems support cycles of micro-level interactions (e.g. consisting of entering queries and selecting results list items), but do not explicitly support the macro-level information seeking or problem-solving stages as described in Kuhlthau's and Eisenberg's models. However, as Wilson [6] has indicated, it may be possible to use aspects of models of information-seeking behavior to "inform the general design principles of such systems", and we explore this idea in the next section.

## 4 Reconciling Perspectives: Towards Stage-Aware Systems

Novel ways to support complex tasks performed by non-expert searchers may be inspired by reconciling IL and system perspectives. We look at appropriate ways to increase task-sharing between searcher and system by introducing the concept of adaptive, stage-aware systems.

### 4.1 Designing Stage-Aware Search Systems

We define a stage-aware system as a potential tool supporting not just *micro*-level cycles of interactions with search systems, at the level of information searching, but also providing support for broader level *macro*-level information seeking and problem-solving stages (see Fig. 1).

**Stage-based Adaptation.** First of all, search tools may be adapted to a user's current information-seeking stage. Search tools supporting information literacy could support the information seeking process by adaptively introducing *functionality* in a certain information-seeking stage. Pivotal stages in Kuhlthau's model are 'Exploration' and 'Focus formulation', the latter essentially being a "turning point" in the information seeking process. According to Kuhlthau [2], various time points may exist in which instructors could intervene, for example at moments of increased uncertainty. In these Zones of Intervention, guidance and assistance may help users to accomplish what they cannot do on their own (p. 129). We could extend this view to the search system, and potentially offer different levels of support and assistance in different stages, by means of adapted functionality. For instance, in early stages, with higher levels of uncertainty, more potentially assistive features (e.g. search suggestions) could be included, inspired by features useful for exploratory search. Thus, it could serve to support searchers with limited domain knowledge, which as Vakkari [15] has stated, "need support to expand and differentiate their conceptual model of the topic", and which have trouble judging the relevance of information items. During later stages, on the other hand, Kuhlthau indicates that users are increasingly able to specify their needs, and to perform comprehensive searches. Hence, in those stages, less support may be needed, but systems could for instance provide functionality for categorizing and organizing encountered results. The design of these features could be inspired by common approaches to support sense-making.

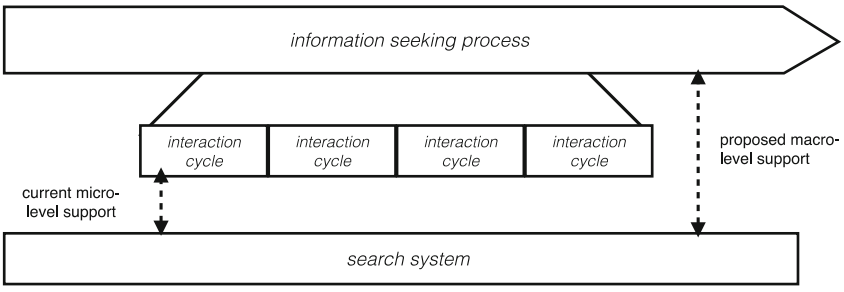


**Fig. 1.** Micro and macro-level support

A second way to adapt search systems to the various information seeking stages is at the *content* level. This could be achieved by selectively showing results, or by customizing the ranking of retrieved search results. From Kuhlthau's model [2] we can derive the importance of showing introductory sources in the early stages, and the idea to not 'overwhelm' the users. This could be performed by ranking introductory sources

highly in the beginning of the process, while systems could show specific and in-depth sources (pertinent to the focused topic) more prominently in later stages of the process. Hence, a system should rank sources highly which are relevant to a user's current stage in the process, not just relevant to a user's current query.

**Stage-based Instruction.** Both the ISP and Big6 model suggest the positive influence of 'being aware' of one's own information seeking process; for instance by encouraging reflection. A system which aids a user in distinguishing their stage, but also provides search-stage specific guidance, thus may be helpful. Therefore, we can introduce more *prescriptive* search tools, supporting the overarching process and the development of information literacy skills. It is possible to use the Big6 model as an inspiration to design these types of search tools. An integrated tool supporting learning tasks could specifically ask users to define their problem and information requirements ('Task definition'), to determine the appropriate range of sources and weigh criteria ('Information seeking strategies'), and to locate sources and information ('Location and access'), while providing feedback in every step of the process. This can be backed up by literature related to information seeking and retrieval: experimental results by Moraveji et al. have shown that including search tips can have beneficial effects on search skills, even after their experiment finished [24]. The 'Information use' and 'Synthesis' stages have similarities with sensemaking activities, and thus may be supported by system features towards that end, such as note-taking tools. The final stage of the Big6 model is 'Evaluation', encouraging learners to reflect on how 'effectively' and 'efficiently' a task has been performed. An integrated system supporting the process could use all logged interactions as a way to provide feedback and reflection. Some elements of such a feature can be inspired by Bateman et al.'s 'search dashboard' [25], which could be used for "reflection on personal behavior" (e.g. summarizing search techniques and sought topics). The experimental results suggest that users changed their search behavior, and their attitudes towards search, based on reflection using the dashboard. The dashboard also provided ways to compare search tactics with 'expert' searchers. The latter element corresponds to the Big6 model's notion that an 'awareness of other styles' can be helpful. However, despite this positive evidence, to our knowledge, an integration of information literacy stages as described in the process models has not been attempted in systems-oriented research, perhaps due to the various *requirements* of such a system.

### 4.2 Requirements and Ongoing Studies

An essential requirement of a potential stage-aware system is the detection of stages occurring in a user's information seeking process. First of all, a system could rely on the manual input of a user to select which 'stage' of an interface to show. In a joint study in a *Social Book Search* context [26], we have followed this approach. Searchers for books could manually select panels of an experimental multistage interface, representing exploration, search and review stages in the book search process. The outcomes of this large-scale collaborative study (192 participants) suggest that the users of the multistage interface explore more different kinds of books, and have higher levels of engagement as compared to the baseline interface [27]. Second, a multistage system could rely on

automatic approaches to detect a stage a user is in, instead of manual input. Considering the complex nature of learning tasks [28], this is not straightforward. To derive a user's current stage, extensive logging of a user's interaction with a system is required. For example, evidence could be found in a user's search terms and tactics, or in her patterns of interaction with a search system [4, 29]. In ongoing research involving user studies, we are experimenting with optimal ways to detect stages. In addition, we are evaluating which search system features are most useful in which information seeking stage. Eventually, this will lead to the design of stage-aware search prototypes, offering pinpointed functionality, content and (guiding) instructions to a searcher.

## 5 Discussion

This paper has looked at ways to reconcile information literacy and system perspectives in the context of information seeking. While 'intelligent' information retrieval systems from a distant past initiated a dialog with their users to perform task-sharing between user and system, current systems are predominantly focused on queries and results list inspection. However, as discussed in IL literature, non-expert searchers may need additional support during complex and information-intensive tasks, in order to find, assess, evaluate and use appropriate information. These information ventures are inherently dynamic, and the stage a user is in has a profound influence on information sought, judgements of relevance, and searchers' abilities to express their needs [2]. Hence, increasing the support related to a user's *process* may have positive effects on the outcomes of learning tasks. This is supported by the positive effects of information literacy interventions (e.g. [30]), but also of experimental search systems encouraging reflection on encountered materials and search behavior [24, 25]. Furthermore, including information literacy instruction into search tools used in the context of research-based tasks may encourage learners to learn by doing, and apply these skills in their later information ventures.

Potential drawbacks of multistage and prescriptive search systems include "lockstep strategies", which could force "one specific method for problem-solving and decision-making" upon a user [3]. Therefore, stage-aware tools should allow users to flexibly switch between 'stages' and interface panels, and a user should be able to remain in control. Also, we have to bear in mind the risks of a 'tick the box' approach in the context of information literacy posed by Johnston and Webber: the idea of "reducing a complex set of skills and knowledge to small, discrete units" [31]. This implies a careful balancing of the potential system guidance towards learners.

## 6 Conclusion

Information literacy, as the countless definitions, models and standards imply, is a wide ranging and evolving concept, of pivotal importance in our current, information-intensive environment. By supporting the synergy of the stages described by various IL process models in actual search tools, we argue that it may be possible to encourage critical use of information, up to the point that it may change searchers' information behavior.

To increase task-sharing between non-expert user and system, we have introduced the concept of stage-aware tools, which support stages occurring in the information seeking process. We discussed stage-based *adaptation* and stage-based information literacy *instruction*, and pinpointed some of the requirements for stage-aware systems. We are experimenting with these approaches in the context of book and general Web search [4, 5, 26, 27].

## References


1. ALA, ACRL: Information literacy competency standards for higher education (2000). http://arizona.openrepository.com/arizona/handle/10150/105645
2. Kuhlthau, C.C.: Seeking Meaning: a Process Approach to Library and Information Services. Libraries Unlimited, Westport (2004)
3. Eisenberg, M.B.: Information literacy: essential skills for the information age. DESIDOC J. Libr. Inf. Technol. **28**(2), 39–47 (2008)
4. Huurdeman, H.C., Kamps, J.: From multistage information-seeking models to multistage search systems. In: Proceedings IIiX, IIiX 2014, pp. 145–154. ACM, New York (2014)
5. Kumpulainen, S., Huurdeman, H.C.: Shaken, not steered: the value of shaking up the search process. In: Proceedings of the First International Workshop on Supporting Complex Search Tasks co-located with ECIR. CEUR-WS, Vienna (2015)
6. Wilson, T.D.: Models in information behaviour research. J. Doc. **55**, 249–270 (1999)
7. Bawden, D.: Information and digital literacies: a review of concepts. J. Doc. **57**(2), 218–259 (2001)
8. Virkus, S.: Information literacy in Europe: a literature review. Inf. Res. **8**(4) (2003). http://www.informationr.net/ir/8-4/paper159.html
9. Doyle, C.S.: Information Literacy in an Information Society: a Concept for the Information Age. Information Resources Publications, Syracuse University, Syracuse (1994)
10. Lloyd, A.: Information Literacy Landscapes. Chandos Information Professional Series. Chandos Publishing, Oxford (2010)
11. Association for College and Research Libraries: Framework for information literacy for higher education (2015). http://www.ala.org/acrl/standards/ilframework
12. Eisenberg, M.B., Berkowitz, R.: Information-Problem Solving: the Big Six Skills Approach. Ablex, Norwood (1990)
13. Kuhlthau, C., Heinstrom, J., Todd, R.: The information search process revisited: is the model still useful? Inf. Res. **13**(4), 45 (2008). http://www.informationr.net/ir/13-4/paper355.html
14. Eisenberg, M.B.: Technology for a purpose: technology for information problem-solving with the Big6. TechTrends **47**(1), 13–17 (2003)
15. Vakkari, P.: A theory of the task-based information retrieval process: a summary and generalisation of a longitudinal study. J. Doc. **57**(1), 44–60 (2001)
16. Wilson, M.L.: Search User Interface Design. Synthesis lectures on information concepts, retrieval, and services **3**(3), 1–143 (2011)
17. Ingwersen, P., Järvelin, K.: The Turn - Integration of Information Seeking and Retrieval in Context. Springer, Dordrecht (2005)
18. Hearst, M.: Search User Interfaces. Cambridge University Press, New York (2009). http://searchuserinterfaces.com/book/
19. White, R.W., Roth, R.A.: Exploratory search: beyond the query-response paradigm. Synth. Lectures Inf. Concepts Retr. Serv. **1**(1), 1–98 (2009)

20. Marchionini, G.: Exploratory search: from finding to understanding. Commun. ACM **49**(4), 41–46 (2006)
21. Cole, C.: Google, tear down this wall to exploratory search! Bull. ASIST **40**(5), 50–54 (2014)
22. Borlund, P.: The IIR evaluation model: a framework for evaluation of interactive information retrieval systems. Inf. Res. **8**(3) (2003). http://www.informationr.net/ir/8-3/paper152.html
23. Beaulieu, M.: Interaction in information searching and retrieval. J. Doc. **56**(4), 431–439 (2000)
24. Moraveji, N., Russell, D., Bien, J., Mease, D.: Measuring improvement in user search performance resulting from optimal search tips. In: Proceedings SIGIR, SIGIR 2011, pp. 355–364. ACM, New York (2011)
25. Bateman, S., Teevan, J., White, R.W.: The search dashboard: how reflection and comparison impact search behavior. In: Proceedings CHI, CHI 2012, pp. 1785–1794. ACM, New York (2012)
26. Gäde, M., Hall, M., Huurdeman, H., Kamps, J., Koolen, M., Skov, M., Toms, E., Walsh, D.: Overview of the INEX 2015 interactive social book search track. In: CLEF 2015 Online Working Notes. CEUR (2015)
27. Huurdeman, H., Kamps, J., Koolen, M., Kumpulainen, S.: The value of multistage search systems for book search. In: CLEF 2015 Online Working Notes. CEUR (2015)
28. Freund, L., O'Brien, H., Kopak, R.: Getting the big picture: supporting comprehension and learning in search. In: Proceedings Searching as Learning Workshop. University of Regensburg, Regensburg (2014)
29. Vakkari, P.: Exploratory searching as conceptual exploration. In: Proceedings HCIR, pp. 24–27. Rutgers University, New Brunswick (2010)
30. Walton, G., Hepworth, M.: A longitudinal study of changes in learners' cognitive states during and following an information literacy teaching intervention. J. Doc. **67**(3), 449–479 (2011)
31. Johnston, B., Webber, S.: Information literacy in higher education: a review and case study. Stud. High. Educ. **28**(3), 335--352 (2003)

# Information Seeking Behaviour of Scholars Using Resource Discovery Systems

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**Abstract.** The purpose of this paper is to conceptualise how academics seek information relevant to their work or study in an academic library context. To accomplish our goals, we involved several stakeholders to better elicit their information seeking behavioural patterns. In this paper we perform a user test which allows us to establish customised information seeking models, which conceptualise the behavioural activity patterns of academic scholars from the information need stage until the termination of the search activity. We also propose suitable user requirements using personas as contextual settings, which might be helpful for informing the design and development of such systems.

**Keywords:** Information seeking behavior model · Library electronic resources · Academic libraries

## 1 Introduction

Within the context of information seeking students and researchers rely heavily on generic search engines. However, when these scholars are constrained as to the perceived resources that are available to them when using academic libraries, their search is inhibited. In the digital environment of the library, an information seeker is required to explore and discover likely resources before utilising them to find sources for information gain.

Libraries and their web-based services are one form of gateway for seeking information. Despite libraries having a long history of organizing information, however, a study on the information seeking' behavior of academic scholars shows evidence describing library resources available to their institution as "poor usability, high complexity, and lack of integration" that "act as a barrier to information search and retrieval" [1]. Hypotheses for this barrier to effective resource utilisation and discovery have been attributed to factors such as an "information overload" [2] and the inability to decide "where to search" [3]. One of the key problems is that in order to locate desired electronic information, academic scholars often have to "search across several different databases that have different operating procedures" [1]. Additionally, academic scholars are "unaware of the scope of their own institutions' library resources" [1], and how to access these resources through a successful search strategy.


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The contributions made in this article are twofold. Firstly, we present an information seeking model, identifying the user's journey taken within a digital library environment utilising electronic resource discovery systems. The model conceptualises the information seeking behaviour of academic scholars, especially in their choice of information resources.

Secondly, we elicit suitable user requirements using personas as a contextual setting, which assists in informing the design and development of such systems. These created heuristics can also be used to evaluate already existing systems.

To accomplish our goals we involved several stakeholders, such as students, researchers, professors, and librarians in an initial exploratory study. Data was collected using an online questionnaire and from analysis of the results we were able to refine and expand our model to a more detailed version with further granularity. Follow-up questions then probed for further clarity on their answers.

The context of this research is Estonian universities, however we hypothesize that the validity of the findings is not constrained to the Estonian academic system due to the similarities in the systems, information needs and methods for seeking for information within an academic environment.

The paper is organised as follows. Section 2 situates the reader and gives a foundation of the work undertaken by providing a short and clear definition of the terms and concepts being used in this paper. Section 3 gives a description of the research design and Sect. 4 presents the findings, including the proposed model and the discussion of the findings. We conclude with future directions and a summary of the work.

## 2 Background

Different authors have addressed the information seeking behavior of graduate students and researchers [4, 6]. Urquhart and Rowley [7] conducted research on the information seeking behaviour of students in an electronic environment. Asher et al. [8] in their study compared the search efficacy of students, when using different discovery tools. They discovered that "students treated almost every search box like a Google search box, using simple keyword searches" [8, p. 473]. As a result, students received too many results for them to evaluate one-by-one. Furthermore, 92 % of the resources were selected from the first page of results [8]. Sadeh [6] explored the information-related behaviour of high-energy physics (HEP) researchers and defined six personas to represent HEP scholars. The author also developed a model to reflect researchers' practices towards information seeking and searching. As a result, an interface of the information seeking system was designed and evaluated by using defined personas. Hemminger et al. [9] studied the information seeking behavior of academic scientists and how electronic communication affects different aspects of their information seeking. According to study "researchers prefer to retrieve content electronically when available" [9]. In comments, researchers indicated their preference for a convenient, accurate and easy to access single search tool to search across different resources.

We now introduce the reader to the terms and concepts being used in this paper and to the work that is directly related to our model. In the context of this paper **information**

**seeking behaviour** is "human information behaviour dealing with searching or seeking information by means of information sources and (interactive) information retrieval systems" [10].

**Academic Libraries.** The main aim of academic libraries is to meet the information needs of the members of their institution. More specifically, there are two aspects to this; firstly, they provide for the educational needs of students and secondly, support research needs by offering up-to-date material [11].

**Library Search Systems.** Library search systems offer an interface to the homogeneous data, that is "cataloged in the same way, have the same data structure, and often relate to one topic" [12]. The shift from library search systems to federated search tools happened in the early 2000s, as an initial attempt to offer something similar to the Google [13]. "Within the library, faculty and students have come to expect a simplified, fast, all-inclusive, and principally online research experience that mirrors their use of Google and other search engines" [8] Federated searching, also known as meta-searching or cross-database searching, involves software that searches multiple databases and aggregates the results [13].

**Resource Discovery Systems.** We make a distinction between a ***'resource'***, which is an asset, material, person or capital which might contain the required material to accomplish a goal and ***'source'***, which is the place where something, like relevant information, originates. In 2007 discovery tools came "to supplement or replace existing online catalogs and older federated search tools" [14]. These electronic resource discovery systems are search and retrieval systems that enable users to search from different platforms – including library e-catalogs, scholarly databases, institutional repositories, and non-library discovery systems. Resource discovery systems, such as EBSCO's Discovery Service, and ProQuest's Summon index content from the variety of libraries' sources and provide single search tool to discover these resources [15].

## 3 Research Design

As an exploratory first step, we began by involving several stakeholders using in-depth interviews, to identify the high level areas for scrutiny by the investigators. Specifically, we conducted interviews with an undergraduate student, a post-graduate student, a lecturer and two industry professionals. From the initial interviews a draft of our hypothesized model was created and we were able to refine our exploratory study to ensure that the results would reflect more accurately the needs of the users; in this case being academic scholars. Results from these interviews also enabled us to plan a larger scale questionnaire to investigate a wider stakeholder pool. The questionnaire captured data from over 137 participants (27 undergraduate students, 44 master students, 20 doctoral level students, 23 teaching oriented academics and 23 research oriented academics) from the four largest universities in Estonia. Respondents were specifically selected based on two factors: (a) the perceived usefulness of resource discovery systems to the user and (b) the level of experience with scholarly work of the users. This stage

gave us the second version of the model, which encompasses different personas within the journeys.

Blomkvist [16] defines personas as "a model of a user that focuses on the individual's goals when using an artefact. The model has a specific purpose as a tool for software and product design. The persona represents patterns of users' behaviour, goals and motives, compiled in a fictional description of a single individual". Sadeh [6] in her dissertation was the first one, who proved that personas could be used to define a model of information seeking as they describe different types of actual users and their patterns of information seeking.

## 4 Findings and Discussion

Using visual analysis of the patterns in the questionnaires, three investigators identified five different personas whose behaviours are represented by a model. We rank low probability actions as anything that received less than 34 % of the specific responses as affirmative, average probability actions as anything that received more than 33 % and less than 68 % of the specific responses as affirmative and high probability actions as anything that received more than 67 % affirmative answers. Percentages were calculated after the omission of responses, which stated that they were unfamiliar with the item in question.

In general, most of doctoral students and researchers search for information relative to their study daily. Bachelor and master students and teaching staff stated that they search a few times a week. Researchers were the most confident (52 %) about their skills to find relevant information for their research, despite of the fact that most of them were self-taught; sixty-one percent stated that they had never participated in a lecture about the using of electronic information resources.

Interestingly, researchers' most used tools were generic search engines and bibliographic or citation databases. Institutional repositories, scholarly databases, resource discovery systems such as EBSCO Discovery Service and scholarly oriented search engines were rated as averagely utilised by researchers. Low probability used tools included library public access catalogs, A–Z list of journals, online book search engines and general websites.

We now present the personas. Each persona is accompanied by its own specific model. Each information seeking model identifies academic scholars' activity patterns when seeking for information relative to their research or/and study.

**The Bachelor Student.** A student studying for an undergraduate degree, requiring three or four years of study but not requiring to undergo academic research. In order to graduate, a student has to do pass a final exam or write a thesis. The bachelor student in this study can be described as follows (Fig. 1):

- He/she has attended a lesson about using library electronic resources;
- He/she is moderately confident about his/her skill to find information relevant to study;
- His/her information search takes place mostly at home;

- He/she mostly uses non-library tools, such as generic and book search engines (for example Google and Google Books), and general web sites;
- His/her most used library tool is an online public access catalog (OPAC);
- He/she sometimes uses other library electronic resources such as repositories and scholarly databases;
- He/she asks for help from other students when seeking information, but also teaching staff.
- He/she contacts a librarian when public access catalog does not return relevant results.

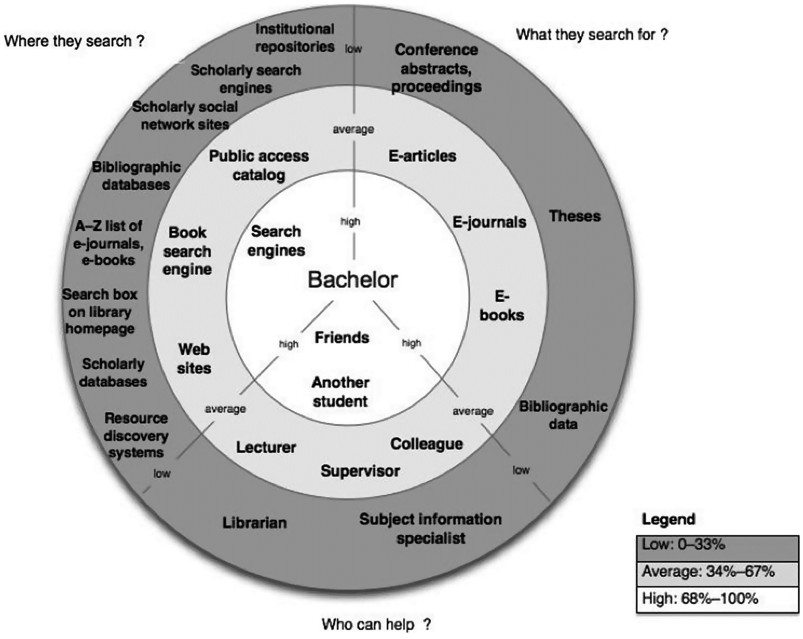


**Fig. 1.** The information seeking model of bachelor student

**The Master Student.** A student, who has completed his undergraduate studies successfully and is currently on a graduate degree. There is limited, but existent research involved in the study (Fig. 2).

- He/she has attended a class about using library electronic resources;
- He/she is moderately confident about his/her information seeking skills;
- He/she seeks information few times a week;
- His/her information search takes place mostly at home;
- He/she very often uses non-library search engines, mainly generic search engine, but also books search engine (Google Books) and scholarly oriented search engine (Google Scholar);

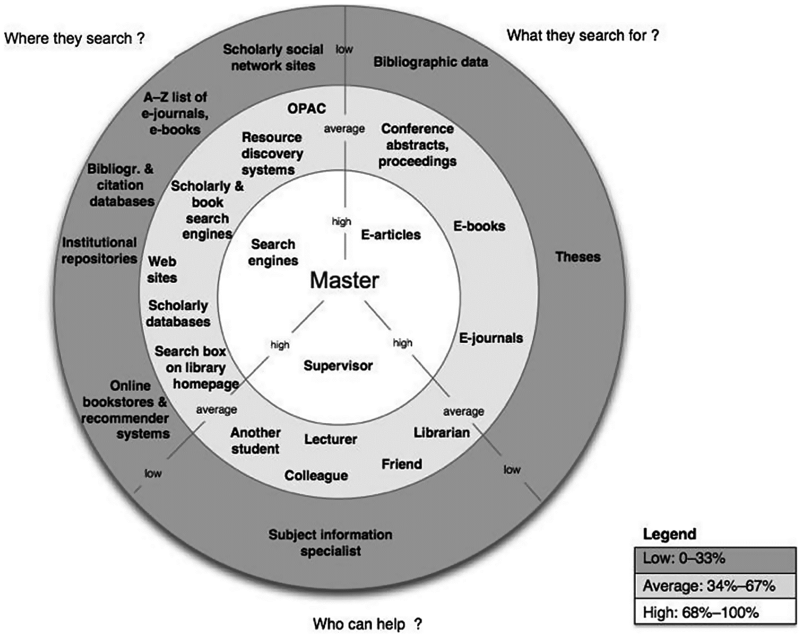


**Fig. 2.** The information seeking model of master's student

- His/her most used library tools are an online public access catalog (OPAC) and a resource discovery system;
- He/she searches for information resources, such as e-articles, e-journals and e-books;
- He/she asks for help from supervisor when seeking electronic information; he/she contacts a librarian only when trying to locate printed resources in a library.

**The PhD Student.** A student, who has most likely completed his Master studies successfully and is at the early stages of conducting research for a terminal degree (Fig. 3).

- He/she has attended a class about using library electronic resources;
- He/she is moderately confident about his/her information seeking skills;
- He/she seeks information daily;
- His/her information search takes place mostly at home or at university campus;
- He/she prefers to search in scholarly and generic search engines and library resource discovery system;
- He/she contacts a supervisor or a colleague for help, when source is not accessible to him/her;
- He/she also uses help from a librarian and subject information specialist.

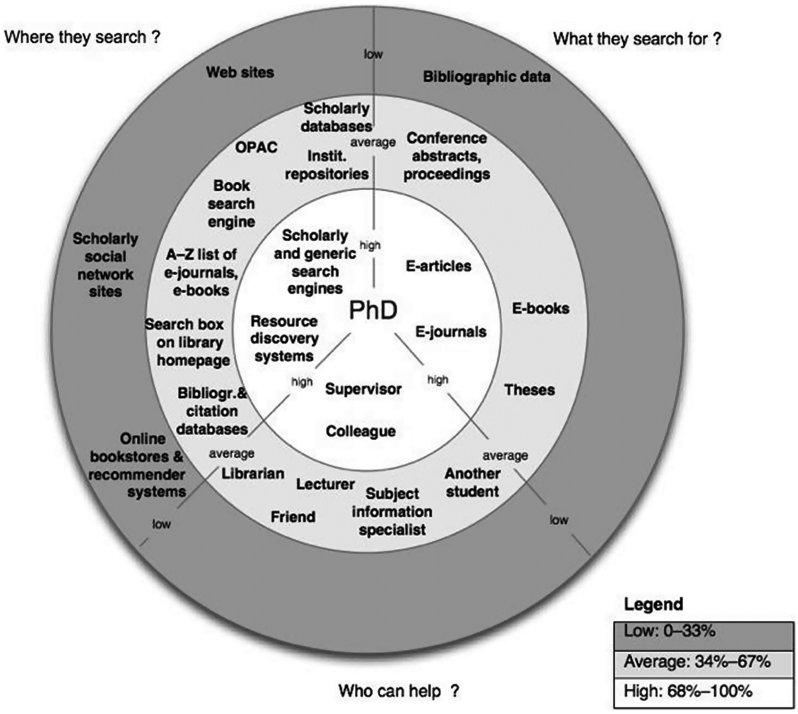


**Fig. 3.** The information seeking model of doctoral student

**The Teaching Oriented Academic.** Lecturers or professors, who are employed at a university. Their primary task in their professional careers is classroom instruction rather than research (Fig. 4).

- He/she has attended a class about using library electronic resources;
- He/she is moderately confident or very confident about his/her information seeking skills;
- He/she seeks information few times a week;
- His/her information search takes place mostly at home or at university campus;
- He/she prefers to search in scholarly and generic search engines and library resource discovery system;
- He/she mostly asks help from a subject information specialist or colleague
- He/she most frequently searches for resources such as e-articles, e-journals, and e-books.

**The Research Oriented Academic.** Scientists, clinicians or professors who are employed at a university whose primary tasks in their professional careers are systematic inquiry and investigation into a subject rather than teaching, or are at least at equal level (Fig. 5).

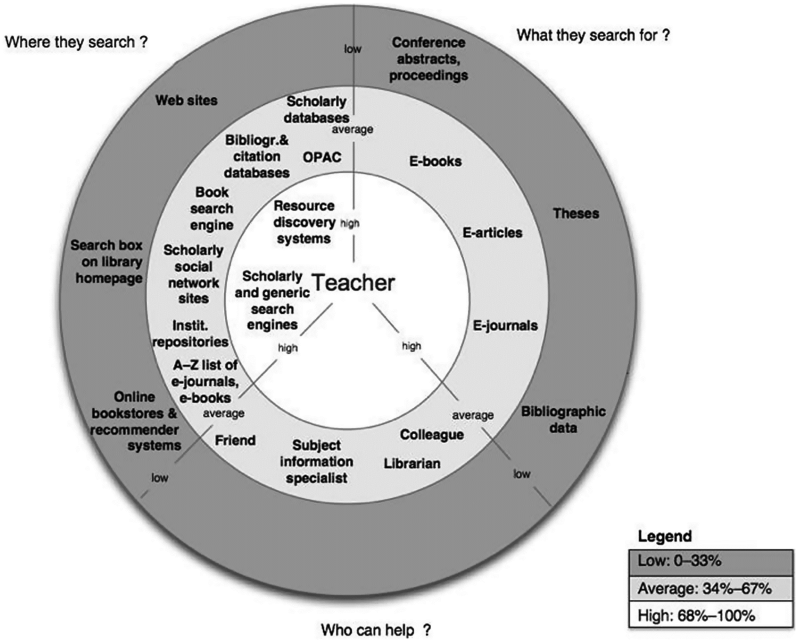


**Fig. 4.** The information seeking model of teaching oriented academic

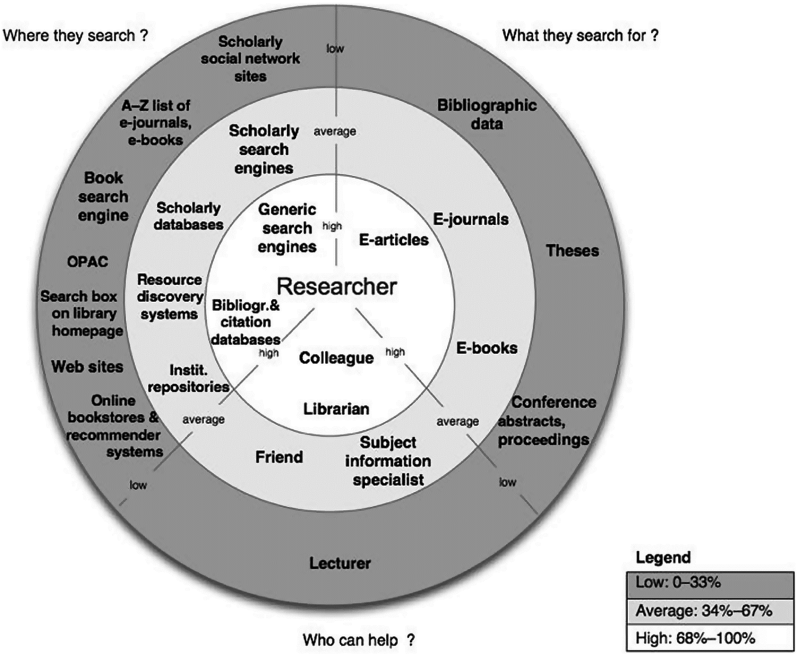


**Fig. 5.** The information seeking model of research oriented academic

- He/she has not attended a class about using library electronic resources;
- He/she is very confident about his/her information seeking skills;
- He/she seeks information daily;
- His/her information search takes place mostly at university campus;
- He/she searches in generic search engines and bibliographic and citation databases;
- He/she also uses scholarly databases and scholarly oriented search engine.

As the number of scholarly resources available increases, scholars are increasingly requesting tools that search across all resources for initial discovery searching. This is evidenced by the popularity of generic and scholarly search engines among students and researchers. Doctoral students and teaching oriented academics are the groups who also use research discovery systems such as EBSCO Discovery. The models presented here will assist designers and developers to create more targeted tools, as well as researchers to study the behaviour of scholars. It is our prediction that the models will evolve over time.

## 5 Summary and Future Work

The study presented in this paper can be classified under the category of digital university libraries, although due to the nature of the data, the ecological validity of the findings may extend well beyond this domain. Thus far, we have presented the behavioural model without a thorough analysis of the cognitive process of the participants. In other words, we present the 'what' and not the 'why' people do what they do. Our research continues currently by performing a targeted study, involving in depth interviews of users and their search process within a digital library setting as well as diary (log) studies. This will allow us to collect further empirical evidence, which will assist the evolving of our user model and complement the models with cognitive explanations. We also hope to uncover factors affecting behaviour such as emotions and cognitive state, similar to those investigated by Kuhlthau's information seeking model [17]. Those will be used in the end to elicit suitable user requirements that formulate heuristics, informing the design and development of resource discovery systems and adding cues on how to use these created heuristics to evaluate already existing systems.

## References

1. Wong, W., Stelmaszewska, H., Barn, B., Bhimani, N., Barn, S.: User Behaviour in Resource Discovery: Final Report. JISC User Behaviour Observational Study, JISC (2009)
2. Bawden, D., Robinson, L.: The dark side of information: overload, anxiety and other paradoxes and pathologies. J. Inf. Sci. **35**, 180–191 (2008)
3. Shneiderman, B., Byrd, D., Croft, W.B.: Clarifying search: a user-interface framework for text searches. D-Lib Mag. **3**, 3–20 (1997)
4. Ellis, D.: A behavioural approach to information retrieval system design. J. Doc. **45**(3), 171–212 (1989)
5. Al-Suqri, M.N.: Information-seeking behavior of social science scholars in developing countries: a proposed model. Int. Inf. Libr. Rev. **43**, 1–14 (2011)

6. Sadeh, T.: A Model of Scientists' Information Seeking and a User-Interface Design. Ph.D. Thesis, City University, London (2010)
7. Urquhart, C., Rowley, J.: Understanding student information behavior in relation to electronic information services: lessons from longitudinal monitoring and evaluation, Part 2. J. Am. Soc. Inf. Sci. Technol. **58**(8), 1188–1197 (2007)
8. Asher, A.D., Duke, L.M., Wilson, S.: Paths of discovery: comparing the search effectiveness of EBSCO discovery service, summon, google scholar, and conventional library resources. Coll. Res. Libr. **74**, 464–488 (2013)
9. Hemminger, B.M., Lu, D., Vaughan, K.T.L., Adams, S.J.: Information seeking behavior of academic scientists. J. Am. Soc. Inform. Sci. Technol. **58**(14), 2205–2225 (2007)
10. Ingwersen, P., Järvelin, K.: The Turn: Integration of Information Seeking and Retrieval in Context. Springer Science & Business Media, Dordrecht (2006)
11. Feather, J., Sturges, P.: International Encyclopedia of Information and Library Science. Routledge, London (2003)
12. Sadeh, T.: From search to discovery. In: IFLA WLIC 2013, Singapore (2013)
13. Luther, J.: Trumping google? metasearching's promise. Libr. J. **128**(16), 36–40 (2003)
14. Fagan, J.C., Mandernach, M.A., Nelson, C.S., Paulo, J.R., Saunders, G.: Usability test results for a discovery tool in an academic library. Inf. Technol. Libr. **31**, 83–112 (2012)
15. Hanrath, S., Kottman, M.: Use and usability of a discovery tool in an academic library. J. Web Libr. **9**(1), 1–21 (2015)
16. Blomkvist, S.: The user as a personality: using personas as a tool for design. In: Position Paper for the Workshop at the Interaction and Presentation Laboratory of the Royal Institute of Technology, Sweden (2002)
17. Kuhlthau, C.C.: Inside the search process: information seeking from the user's perspective. J. Am. Soc. Inf. Sci. **42**(5), 361–371 (1991)

# Usability Evaluation of Information Literacy Programmes: The Case Study of *"Orion"*

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**Abstract.** This paper refers to an evaluation project conducted at the Alexander Technological Educational Institute of Thessaloniki during 2014. The project aimed to evaluate the information literacy programme Orion. Orion is a useful tool that constitutes a most vital part of the information literacy skills evolution. The project aimed to evaluate the usability of Orion, specifying whether or not the programme improves information literacy skills of students providing content and functionality excellence. Additionally, it is very important to measure the usability of the structure that the programme follows. The method applied was measuring effectiveness, efficiency, learnability, and satisfaction. Most users appeared to be positively inclined towards the service, but during task performance and as they became more acquainted with the system, they became more critical as they confronted difficulties; such as the terminology used in it.

**Keywords:** Information literacy · Information literacy programmes · Evaluation · Usability · Accessibility · Information systems · Orion · Digital literacy · Media literacy · System evaluation · Effectiveness

## 1 Introduction

Information literacy (IL) has proved to be a crucial component in education, starting in early school years and constantly appearing in one's life. Effective use of information and information technology (IT) seem to be the key to lifelong learning, something that is easily conceivable during academic studies and always present in professional evolution and personal life.


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Web 2.0 has brought new opportunities to education, reinforcing engagement and interactivity between individuals; students today approach the world with an "information-age mindset" and consider technology as a fact of life [1]. Therefore, information pervasion in people's lives through many means (through Internet, social media, libraries, community resources and organisations) leads to the need for IL, inviting people to mark their limits and think carefully about whether they need all this information.

In an attempt to endow students with a set of skills that will enable them to discern what sort of information is useful to them, many university libraries provide courses on IL. Additionally, many of them have also created IL programmes that "substitute" for librarians in IL student training. Likewise, in Alexander Technological Educational Institute of Thessaloniki (ATEI) students can use Orion, which is the main source of IL training for the university students.

The aim of this paper was to evaluate the usability of Orion, in order to find out whether or not it fulfills its aim and scope. Furthermore, this evaluation aimed at dredging up any problems encountered by users when using the programme, preventing them from finding the answers they need. Last but not least, the results of this research will enhance and assist in further development of the programme and possibly of other similar ones.

### 1.1 Literature Review

Evaluation of IL programme platforms finds its origins in 2004, when there was an obvious distinction between IL and IT literacy. According to the American Library Association, IL is increasingly important and defined as "a set of abilities requiring individuals to recognise when information is needed and have the ability to locate, evaluate, and use effectively the needed information" [2]. Supplementing this definition, IL incorporates the notion of an acquired set of competences, including foundation for academic coursework, qualifying people with effective job performance, enhancing active citizenship, and motivation for lifelong learning [3].

On the other hand, while IL is considered to be developed in an intellectual framework, IT literacy involves acquisition of practical skills concerning computers, software, applications and databases that might provide support for and supplement IL. In detail, "IT literacy is a set of capabilities, knowledge and skills needed to use IT at a level appropriate to a person's position, work environment and discipline; and the ability to continue develop them into the future" [4]. According to Saranto and Hovenga [5], this distinction occurred because evaluation of IL may have different aims according to the perspective of the researcher, concluding with the fact that these two qualifications should be examined from different perspectives [5]. IL programmes have developed various teaching techniques in order to help students acquire the desirable skills, but how would that be possible if the platform used in each case does not complement the aims of these programmes?

Evaluation of IL programmes formed an integral part of the process of achieving the main objectives of the IL. In the first place, students must be provided with awareness of the discipline's literature and skills to locate and retrieve information. Secondly, their research skills should be enhanced, leading them to become

discerning users of information. Concluding, all users are supposed to acquire fundamental skills in using research: bibliographic citation and configuring library catalogue information as bibliographic citations [6]. Furthermore, research on IL programmes assists in improving curricula at all education levels [3].

IL programmes create student centered learning environments, where inquiry is the norm and problem solving becomes the focus. Many researchers claim that usability of such digital environments consists of different attributes. Blandford and Buchanan [7, 8] suggest these are technical and cognitive, as well as social and design oriented elements. This is translated as functionally correct, with an attractive interface and the asset of providing users the ability to learn the environment when navigating it. Brinck et al. [9], share a similar perspective, characterizing usability as functionally correct, efficient to use, easy to learn, easy to remember, error tolerant, and subjectively pleasant.

Moreover, Karoulis and Pombortsis [10] claim that usability has three main attributes: effectiveness, efficiency and satisfaction, but when it is examined in an educational environment, these attributes are positively correlated with learnability. Opinions about usability dimensions have been formulated by various researches, leading usability to be measured by a range of attributes including not only the aforementioned, but also other characteristics such as usefulness, attitude, likeability, good impression, memorability, error tolerance, helpfulness, and speediness, as well as ease of task performance [11–15].

According to Jeng [16], examining the usability of digital environments is a multidimensional construct that is fully tested by the perception of effectiveness, efficiency, learnability and satisfaction. Her suggested evaluation model summarises these attributes for assessing usability of academic digital libraries. She tested this model with two academic library websites (Queens College Website and Rutgers University Libraries Website), concluding that the model meets the expectations of usability evaluation and can be generalised and used in evaluating usability of any academic digital environment [16].

In addition to Jeng's model that was used for conducting this research, some extra questions were included. According to Salisbury and Ellis [18], in many research routines conducted by libraries after the end of IL lessons, users are asked to complete a questionnaire that consists of perceived user satisfaction questions. This method appeared in early 90's and is the most commonly implemented form for these cases, with these questionnaires also known as "happy sheets" [19, 20].

### 1.2 Orion

Orion is an IL programme developed by the Library of ATEI of Thessaloniki and founded by the European Structural Funds. It aims to teach students how to specify autonomously their information needs, locate sources of information, evaluate retrieved information among the plethora of information available to them and to use it effectively, so as to promote knowledge and research activities. Orion is available to all members of the academic community of the institution but is not limited to them. It is a useful tool that constitutes a most vital part of the information literacy skills evolution (Fig. 1).


**Fig. 1.** Homepage of Orion

The Online Information Literacy Programme follows the standards of the American Association of College and Research Libraries (ACRL) and the Information Literacy Institute of Australia and New Zealand. The programme is offered to any person interested in using it at http://orion.lib.teithe.gr.

The programme is divided in five main sections, which can be accessed either as a whole (following the sequence that is suggested by the library) or individually (when users are aware of the exact information they require) [21]. These sections are:

- Identification of information needs is a section that guides users on how to analyse the subject of their search, how to choose the right keywords for their subject, which are the possible sources in which to find information, what type of material the users will need, and how to locate it if it is printed, according to the Dewey Decimal System.
- Search and information retrieval includes information on the sources that could prove helpful according to the type of material needed (including links to these sources), search strategies, guidelines for the library catalogue and the Hellenic Academic Libraries Link (HealLink), connection to the Institutional Repository Eureka!, and valuable help information for databases and search engines.
- Evaluation of information guides users on how to set criteria to evaluate the validity and usefulness of the retrieved information, and provides them with additional tips.
- Writing and publishing contains guidelines for writing a research paper.
- Referencing provides access to an online referencing tools and guidelines for citing and properly referencing the retrieved information.

## 2 Methodology

Incorporating information literacy across academic services consists of a continuous effort from all faculty members, not only for its maintenance, but mainly for measuring its efficiency and effectiveness. As aforementioned, evaluation of the IL tool Orion was measured according to the four attributes that Jeng [16] proposed as the main characteristics summarising usability testing in digital environments: effectiveness, efficiency, learnability, and satisfaction.

Effectiveness, efficiency, learnability, and satisfaction are attributes that are intrinsically connected to each other. Satisfaction is the result of ease of use, organisation of information, labeling, visual appearance, content and error correction. These individual features when highly rated not only lead to highly rated user satisfaction from the digital environment he/she is browsing, but also lead to compensatory effectiveness rates. Effectiveness on the other hand, is measured according to the number of correct answers that users provide when performing predetermined tasks and is a crucial component of estimating the efficiency, combined with the average steps and time needed for each task to be performed correctly.

This model has been previously used and extended by Garoufallou et al. to evaluate usability of two digital libraries and a digital archive. The first research was evaluating the usability of the digital archive of the Hellenic Broadcasting Corporation (ERT) [22]. The other two researches were conducted the same year with the one evaluating the usability of Orion, but their objects of evaluation were Europeana and the World Digital Library [23, 24]. The present evaluation tool has been developed and used in a way similar to the aforementioned papers. The questionnaire contained a series of scavenger hunt style tasks and consisted of three parts. The first part aimed to collect demographics, the second included seven evaluating tasks on Orion and in the third one, users were asked to evaluate the five components that satisfaction is comprised of: ease of use, organisation of information, labeling, visual appearance, and error correction [17]. The evaluation tool is described in more detail by Garoufallou et al. [22, 24].

According to Nielsen, by testing five users one can locate 85 % of the usability problems a system might have. When multiplying the number of users tested it is more possible that the same problems will be repeated, rather than locating different ones [12, 13]. It has to be acknowledged that eagerness of students to participate in the research was surprisingly unexpected, but they were limited to 20 participants. Data collection was accomplished during May and June 2014, at the ATEI of Thessaloniki. The usability evaluation was conducted by students of the Library Science and Information Systems Department. Results were analysed using SPSS version 19.

## 3 Results

### 3.1 Demographics and Computer Experience

Analysis of the first part of the questionnaire assisted in forming an overall picture of the population sample. Sixteen of the participants were women (80 %), a fact that is consistent with the population due to the large number of female students studying at

the Department of Library Studies and Information Systems. Secondly, 14 out of 20 people that filled out the questionnaires were at the sixth semester of their studies, while the rest of them belonged to the seventh and eighth semesters. The fact that no younger students were willing to participate in the research could be attributed to their lack of confidence, despite the fact that Orion is introduced to all first year students.

In this section, users were also asked to estimate the average time they spend on computers on a daily basis, their experience on using Web provisions, and whether they are familiar with the existence of IL programmes.

As presented in Fig. 2, students described themselves as quite experienced in using simple and advanced search techniques, emails, social media, YouTube, Blogs, and even in evaluating Information Systems, but their experience in using the Web in general only reached 50 %. As far for the daily use of Web, 60 % of them noted that they use it three to five hours daily, 20 %, zero to two hours, 15 %, six to eight hours and only five percent use it for over eight hours. Last but not least, 16 out of 20 students were familiar with the existence of IL programmes.

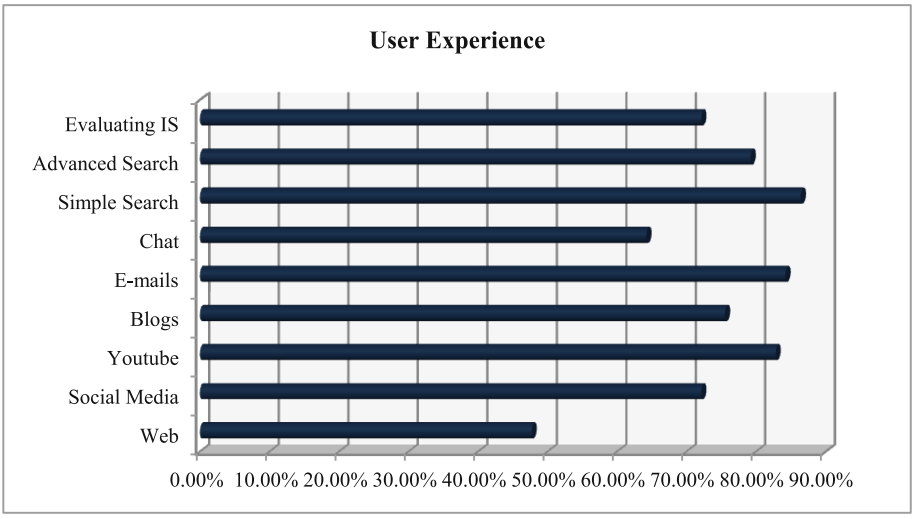


**Fig. 2.** User experience on Web provisions

### 3.2 Usability Evaluation of Orion

As already mentioned, tasks were designed in such a way, in order to enable the researchers to measure effectiveness, efficiency, learnability, and satisfaction. Effectiveness is estimated according to the number of correctly completed tasks by users. It has to be acknowledged that students were not informed if the task completion was successful, so their comments after performing them were more impartial. Table 1 includes information regarding the type of tasks and the measurement of effectiveness for each one.

**Table 1.** Effectiveness

| Type of tasks | Correct answers (%) |
|---|---|
| Send an e-mail asking for information | 95 |
| Locate the automated referencing tool | 100 |
| Find the definition of "Secondary Information Sources" | 15 |
| Find the writing stages of dissertation | 100 |
| Locate the definition of Dewey Decimal System | 30 |
| Find the criteria for evaluating information sources | 60 |
| Find the unit related to HealLink and perform a search | 50 |

The total average for correct answers was 64.2 %, which is not as high as expected according to user comments. In the second and the fourth tasks, all users answered immediately and with eagerness, as they felt very confident of their response. Most comments that followed these tasks were "*This was an easy one*", "*I have used this section of Orion before*". Comments for the task concerning the referencing tool included "*That's clear enough*" or "*The labeling helps for this one*" for the fourth task. For the third task, the results were not that satisfying; many users did not understand the question or rushed into finding the answer, commenting that it was easy to find these answers. In reality, most of the users failed to complete this task mainly due to carelessness. The task required them to locate a definition and they should have looked in the glossary. However many of them went into the Orion section that contained general information concerning information sources. Furthermore, some of the students who perceived the difficulty of this question commented that "*This is something that cannot be easily found if the user is not experienced*".

In order measure the efficiency of the IL platform, the researchers recorded the time and steps needed for each user to complete each task. As presented in Table 2, the average time was zero minutes and 39 s whereas the average numbers of steps were five.

What should be noted here is the fact that the fourth task was answered 100 % correctly, but it proved to be rather time-consuming as indicated by the results. Furthermore, the fifth task that included locating the definition of the Dewey Decimal System was answered correctly by only 30 % of the participants and required an average of nine steps, but the average time required was very low (16 s). This means that the task was relatively easy, but once again students did not fully concentrate on the requirements of the particular search.

The third attribute of usability evaluation, learnability, is measured by the response time of each user before he/she starts performing the tasks. In the case of Orion, the average response time for all tasks was zero minutes and four seconds, and there were no considerable variations among users. According to this outcome, Orion offers an attractive environment for its users that motivates them to perform a search and is easily memorised.

On the issue of usability satisfaction (when completing the last part of the questionnaire), apart from rating the attributes, they were asked to provide further feedback,

although users did not express any further thoughts. In many cases though they made some comments indicating satisfaction while performing the tasks, such as "*interesting material*", "*useful tool*" and "*clear labeling is very helpful*".

**Table 2.** Efficiency

| Efficiency | Average time | Average steps |
|---|---|---|
| Task 1 | 0 m 22 s | 3 |
| Task 2 | 0 m 22 s | 4 |
| Task 3 | 0 m 49 s | 6 |
| Task 4 | 1 m 04 s | 4 |
| Task 5 | 0 m 16 s | 9 |
| Task 6 | 0 m 26 s | 5 |
| Task 7 | 1 m 15 s | 9 |
| Average | 0 m 39 s | 5 |

As presented in Table 3, the overall feeling of satisfaction for students after performing the tasks in Orion reached 71.5 %. This result, although satisfactory, allows room for further development and examination in some topics, such as ease of use and information organisation. Terminology was rated at 72.9 %, but most of the users commented that it was quite clear and does not require any changes. Furthermore, they were fully satisfied with the browsing and they did not feel lost while using the IL programme. In addition, 90 % of them said that when making a choice while searching they were confident that it would lead them to the correct answer.

**Table 3.** Satisfaction

| Attributes | Satisfaction (%) |
|---|---|
| Ease of use | 63.6 |
| Information organisation | 69.3 |
| Terminology | 72.9 |
| Interface | 70.7 |
| Error correction | 75.8 |
| Lostness | 85.0 |
| Browsing | 100.0 |
| General satisfaction | 71.5 |

## 4 Conclusion

The Orion IL programme is one of the most useful tools for students of ATEI of Thessaloniki. The research aimed to provide evidence for its usability evaluation, concerning the measurement of effectiveness, efficiency, learnability, and satisfaction.

According to the findings of this study, Orion offers an attractive interface and is structured in a promising environment. In some instances though, further development is required to improve ease of use. Users also indicated that information organisation in some cases has proven to be rather confusing. However, the programme platform is structured in such a way that is error tolerant and helps users recover easily from their mistakes. From notes kept during the task performance, the researchers determined that in many cases users were rather negligent and too confident, which resulted in assuming completion of a task although they had not reached the correct answer (for example, as far as definitions were concerned, they would open the glossary but not to the definition itself).

To conclude, Orion is generally appreciated by the students for the great help and information it offers, but it still contains some domains that could be improved to raise its usability standards.

**Acknowledgment.** This research paper was made possible through the project "*Digital Libraries and Open Access services of ATEI of Thessaloniki*" funded by the European Union within the framework of "Digital Plan" and the Greek Ministry of Education. This project undertakes the assignment of Digital Services of increased value from the library towards the academic community, according to which Information Literacy Services for the academic community of ATEI of Thessaloniki were created.

## References

1. Luo, L.: Web 2.0 integration in information literacy instruction: an overview. J. Acad. Librarianship **36**(1), 32–40 (2010)
2. American Library Association: Information Literacy Competency Standards for Higher Education (2000). http://www.ala.org/acrl/standards/informationliteracycompetency
3. Cameron, L., Wise, S.L., Lottridge, S.M.: The development and validation of the information literacy test. Coll. Res. Libr. **68**(3), 229–237 (2007)
4. Winship, J.: The First Step Forward: IT Literacy Policy Project. Council of Australian University Directors, New Zealand (2001)
5. Saranto, K., Hovenga, E.J.: Information literacy-what it is about?: Literature review of the concept and the context. Int. J. Med. Inf. **73**(6), 503–513 (2004)
6. Wallace, M.C., Shorten, A., Crookes, P.A.: Teaching information literacy skills: an evaluation. Nurse Educ. Today **20**(6), 485–489 (2000)
7. Blandford, A., Buchanan, G., Jones, M.: Usability of digital libraries. Int. J. Digit. Libr. **4**(2), 69–70 (2004)
8. Blandford, A., Keith, S., Connell, I., Edwards, H.: Analytical usability evaluation for digital libraries: a case study. In: Proceedings of the 2004 Joint ACM/IEEE Conference on Digital Libraries, pp. 27–36. IEEE, London (2004)

9. Brinck, T., Gergle, D., Wood, S.D.: Designing Web Sites that Work: Usability for the Web. Morgan Kaufmann, San Fransisco (2002)
10. Karoulis, A., Pombortsis, A.: heuristic evaluation of web-based ODL programs. In: Usability Evaluation of Online Learning Programs, pp. 88–109. Information Science Publishing, London (2003)
11. Booth, P.A.: An Introduction to Human-Computer Interaction. Psychology Press, Sussex (1989)
12. Nielsen, J.: Why You Only Need to Test with 5 Users. NNG [S.l.] (2000). http://www.nngroup.com/articles/why-you-only-need-to-test-with-5-users/
13. Nielsen, J.: Usability inspection methods. In: Conference Companion on Human Factors in Computing Systems, pp. 413–414. ACM, New York (1994)
14. Oulanov, A., Pajarillo, E.J.: CUNY+ Web: usability study of the web-based GUI Version of the Bibliographic Database of the City University of New York (CUNY). Electron. Libr. **20**(6), 481–487 (2002)
15. Clairmont, M., Dickstein, R., Mills, V.: Testing for usability in the design of a new information gateway. In: Living the Future, 2. AZ, Arizona (1999)
16. Jeng, J.: Usability assessment of academic digital libraries: effectiveness, efficiency, satisfaction, and learnability. Libri **55**(2–3), 96–121 (2005)
17. Jeng, J.: What is usability in the context of the digital library and how can it be measured? Inf. Technol. Libr. **24**, 47–56 (2005)
18. Salisbury, F., Ellis, J.: Online and face-to-face: evaluating methods for teaching information literacy skills to undergraduate arts students. Libr. Rev. **52**(5), 209–217 (2003)
19. Ragains, P.: Evaluation of academic librarians' instructional performance: report of a national survey. Res. Strat. **15**(3), 159–175 (1997)
20. Shonrock, D.D.: Evaluating Library Instruction: Sample Questions, Forms, and Strategies for Practical Use. American Library Association, Chicago (1996)
21. Vasileiadis, L., Chatzilia, M.: Online information literacy programme 'Orion'. Periskopio **6**, 7 (2011). (in Greek)
22. Garoufallou, E., Mystakopoulos, F., Siatri, R., Balatsoukas, P., Zafeiriou, G.: Usability evaluation of the digital archive of the hellenic broadcasting corporation (ERT). Qual. Quant. Meth. Libr. (QQML) **1**, 17–26 (2013)
23. Dani, A., Chatzopoulou, C., Siatri, R., Mystakopoulos, F., Antonopoulou, S., Katrinaki, E., Garoufallou, E.: Digital libraries evaluation: measuring Europeana's usability. In: Garoufallou, E., Hartley, R.J., Gaitanou, P. (eds.) MTSR 2015. CCIS, vol. 544, pp. 225–236. Springer, Heidelberg (2015). doi:10.1007/978-3-319-24129-6_20
24. Garoufallou, E., Dani, A., Siatri, R., Chatzopoulou, C., Virkus, S., Mystakopoulos, F., Katrinaki, E.: Usability evaluation of world digital library: estimating the utility of service platform. In: 7th International Conference on Qualitative and Quantitative Methods in Libraries (QQML 2015), 26–29 May 2015, Paris, France (2015)

# Reading Preference: Print vs Electronic

# Paper or Electronic: Preferences of Slovenian Students

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**Abstract.** This paper presents Slovenia's results as part of an international study investigating student preferences of class readings regarding format (print or electronic) and factors impacting these preferences and behaviours. Common beliefs are that digital media is about to prevail over print materials, but several studies have found the contrary: most students still prefer print format over digital for their academic readings. They feel their comprehension and retention is better in print, but they like the convenience and accessibility of electronic. This issue is relevant to both libraries and teachers and instructors. The main research question of this study is: *What are students' format preferences when engaging with their academic readings?* Secondary questions ask about the factors that impact their behaviors. An online survey of 25 questions was distributed in spring 2015 to students in different disciplines and levels at three public universities. Results were obtained using descriptive statistical analysis.

**Keywords:** Academic reading · Students · Preferences · Paper materials · Electronic materials · Slovenia

## 1 Introduction

In recent years we have seen many common beliefs and observations by university teachers that students increasingly use digital devices and digital resources in their study-related activities. Concerns are that digital media are about to prevail over traditional ones in all areas of life, including study. The question is how these developments might (or will) influence the organization of academic institutions as a whole, and academic libraries as the traditional main providers of study materials. Another question is whether or not these are actually serious concerns.

Several studies of students' reading format preferences show that most of them still prefer print format over digital for their academic readings. They feel their comprehension and retention are greater when they read their assignments in print, but they like the convenience and accessibility of electronic resources. This debate has relevance for:

- Academic libraries which provide resources to students, but are struggling to find a balance of electronic and print items in their collections, and a balance between traditional and digital services
- Teachers and instructors who wish to make academic readings as accessible as possible, but question the pedagogical effectiveness of digital format.


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## 2 Current State of Research

In the first part of this section we cover the findings related to reading comprehension and quality of learning in regard to the format of the material. Most studies showed that print materials are most efficient for deep understanding and learning while digital materials can be better for quick scanning, browsing and superficial reading tasks (for example when getting acquainted with a certain topic) [1–8]. Ackerman and Goldsmith [4] summarize reasons greater comprehension with print as: reading digital materials presents greater cognitive load for the reader, more commonly causes difficulties with concentration, orientation, remembering, and knowledge construction, gives more options for distractions, is more demanding for the eyes, does not offer the tactile aspect e.g. of flipping the pages, is more difficult to be annotated. Thayer et al. [9] found that electronic readings supported receptive reading, which means reading a text from beginning to end without a critical approach, taking notes, or interrupting one's train of thought. Responsive reading is more common with print material. Some studies show no differences in reading comprehension and retention between digital and print materials (see for example [10, 11] or that younger students (such as undergraduates or high school students) showed stronger preference for digital format and perhaps better retention and comprehension [12, 13]. The reasons for this which are given by the authors are: reading digital materials presents greater cognitive load for the reader, more commonly causes difficulties with concentration, orientation, remembering, and knowledge construction, gives more options for distractions, is more demanding for the eyes, does not offer the tactile aspect e.g. of flipping the pages, is more difficult to be annotated [13, 14, 8].

The second issue is students' preferences regarding the format of reading material. Quite surprisingly, studies showed that the common belief of which we spoke in the introduction, namely that everything seems to be leading in the digital direction, seems to be false. Studies showed that for intense study which includes gaining deep understanding most students still prefer materials on paper. They do, however, value the effectiveness of digital information tools which make easier access and searching, but emphasize that intense reading requires print materials. This was found in numerous studies over the last two decades. Dilevko and Gottlieb [15] found that students believed print books to be more reliable, better for gaining an insight and understanding and are as such more useful for high-quality academic work; they are also too long to be read online. Digital resources were associated with "getting things done quickly and easily" (pp. 391), thus clearly showing an example of the Zipf's Principle of least effort [16], and also with shorter, sometimes non-academic, materials. For example, early studies by Liew et al. [17] and Sathe et al. [18] found that students prefer electronic journals over print journals. Similarly, Corlett-Rivera and Hackman [19] identified paper preferences with academic books and digital preferences with proceedings and reference works, while Foasberg [20] showed that students read digitally short non-academic texts. Some studies (e.g. [21]) found preference differences between students of different disciplines. Another recurring issue is that students use digital paths for searching and accessing the materials but then often print them out for reading [21, 22, 5–8]. Mizrachi [8] also investigated students' attitude towards

highlighting and annotating and found it to be more linked to print materials. She concludes that this feature will probably need to be improved in electronic materials before it becomes more popular. Quayyum [24] confirmed that students had difficulties using the interface to annotate documents and complained that this method did not support critical thinking and elaborated reading. Therefore it seems that format preferences are affected by many factors, such as convenience, purpose, available time/urgency, price, environmental awareness, length of material, accessibility, weight [23, 8]. We have not found studies which investigate the influence of language of the material.

## 3 Scope of the Study

### 3.1 Research Problem and Research Questions

In this study we would like to investigate the student preferences of academic readings regarding format of material (print or electronic) and factors which impact these preferences and behaviour. The study in Slovenia is a part of international study in different countries (Europe, Middle East, Asia, USA, Australia) with the aim to produce comparative results, to see whether students' reading format preferences vary or maintain consistent across multi-national student populations (Mizrachi, 2015b). Another motivation is that most research previously published on this topic was performed in English speaking environments. According to this, the research questions were as follows:

The main research question was: *What are students' format preferences when engaging with their academic readings?*

And related questions were: *What factors impact students' preferences with academic readings? and How do these factors impact students' behaviours?*

### 3.2 Methodology and Sample

We included students of different disciplines and levels and with different Information Communication Technologies (ICT) inclusion and use from three public universities (University of Ljubljana, University of Primorska, and University of Maribor). Participants were: 147 students were from 1$^{st}$ level of Bologna study, 69 students from 2$^{nd}$ level Bologna study and 20 students from doctoral level. There were 140 female students and 120 male. They were from different fields of study: Library and Information Science and Book studies (38), Translating (42), Psychology (28), Geography (16), Engineering (104) and Design (16).

Like all participating countries, we used an online survey with 25 questions, 17 of them with Likert-scale. It focused on different aspects of academic reading formats:

- reading format preferences,
- behaviours and attitudes,
- devices used to read electronic texts,
- a prompt for open-ended responses or comments.

Six demographic questions were applied as well: gender, age, level of Bologna study, a field or discipline, and visual or other limitations.

The survey in Slovenia was opened from 11 March till 13th May 2015. Results were obtained with descriptive statistical analysis.

## 4 Results and Discussion

We will present the results and discussion in 6 different sections:

1. Preferences regarding course material
2. Preferences regarding electronic textbooks and electronic devices
3. Role of language on print and electronic academic readings
4. Behaviours of changing academic readings' original format
5. Highlighting and notating academic readings
6. Learning aspects of different formats of academic readings (remembering, focusing and reviewing)

### 4.1 Preferences Regarding Course Material

Students confirmed that they prefer print material when they have to read academic texts (Fig. 1). They agree when asked about print materials and disagree when asked about the digital course readings. The percentage of those who cannot decide on print or electronic material is quite low. This prevalence was confirmed in other studies as well which means that in this respect Slovenian students do not differ from students in other countries.

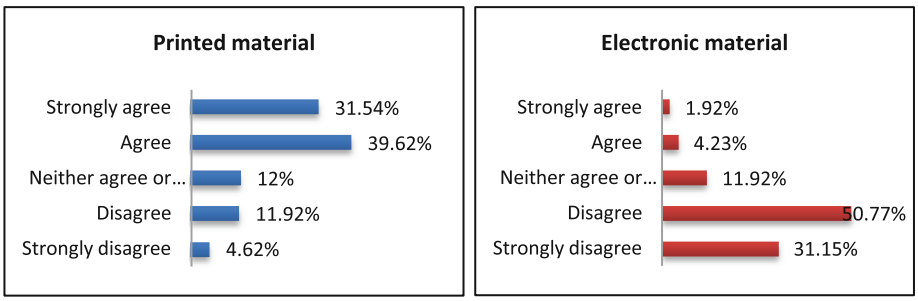


**Fig. 1.** Students' preferences regarding course material

### 4.2 Preferences Regarding Electronic Textbooks and Device Preferences

Most of students do not prefer to read electronic textbooks for study purposes (Fig. 2); 43 % disagree and more than one third strongly disagree (35 %). But if they do read electronic textbooks they do this predominately on laptop (78 %) and desktop computers (41 %). One third of students use smartphones and 15 % tablets.

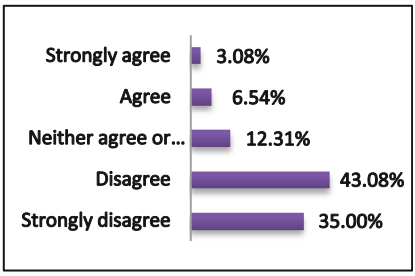


**Fig. 2.** Students' preferences regarding electronic textbooks

### 4.3 Role of Language of Print and Electronic Academic Readings

Results also show that language (native or foreign) is not an important factor in reading electronic academic material. They prefer to have print material in native and foreign language as well (Fig. 3). We assume that the students may have the feeling of knowing the foreign language (which is predominantly English) well enough that this does not pose a problem for them. In the future it would be interesting to investigate their understanding and retention when reading foreign language texts; for now we do not have any results to compare our findings with. It is, however, known that Slovenian schools put quite a lot of emphasis on teaching foreign languages, which may have some influence on student learning.

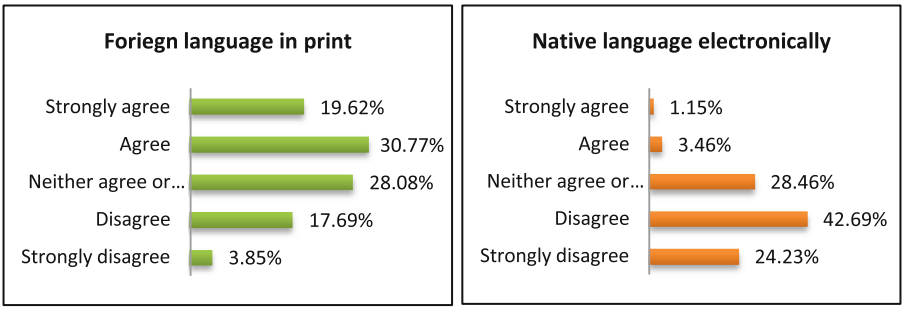


**Fig. 3.** A role of language in format of academic readings

### 4.4 Students' Intentions of Academic Readings' Transformation

Students are not willing to transform print material into electronic, but they are willing to print electronic material (Fig. 4). Previous research confirmed that the use of academic readings is related to different factors. One explanation offered in the literature is that print texts enable the students to focus on the text itself while electronic materials include many disturbing factors. Another one could point out an absence of digital skills among students.

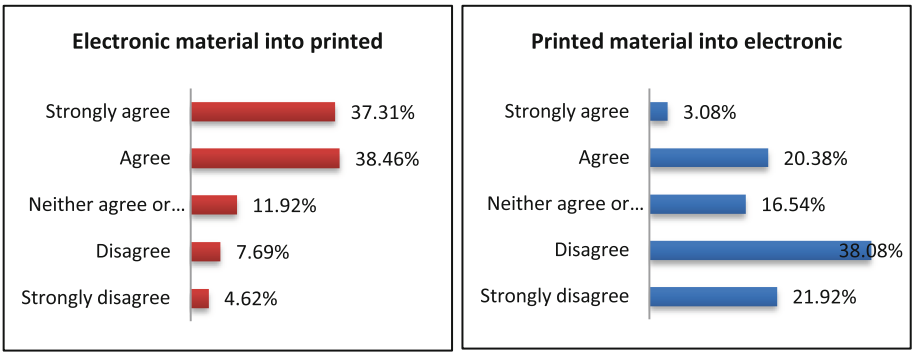


**Fig. 4.** Students' intentions to transform academic reading into another format

### 4.5 Highlighting and Notating Academic Readings

There is a big difference between print and electronic materials in highlighting and notating behaviours (Fig. 5). Students use these techniques when the readings are print; but if they are electronic, they are not willing to annotate and highlight them. This means that academic study should also develop skills which would enable students to utilize a more active approach to reading academic texts. This would help them become more efficient also in searching and retrieval and in evaluating their resources. There is also the need for technical skills which would help students make more use of their electronic materials, which is related to digital literacy as mentioned before (4.4).

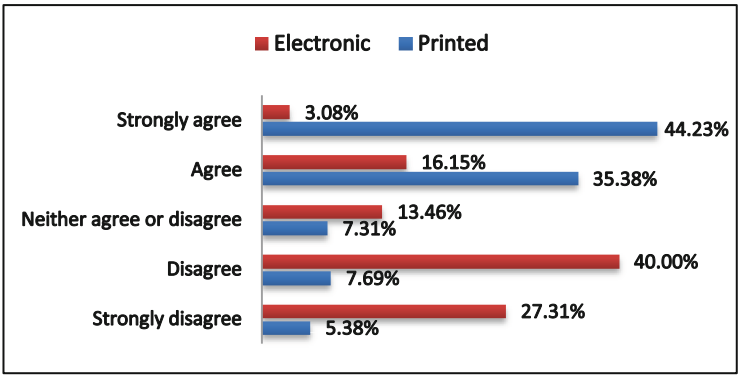


**Fig. 5.** Students' highlighting and notating academic readings regarding format

### 4.6 Learning Aspects of Different Formats of Academic Readings (Remembering, Focusing and Reviewing)

Students believe that print academic readings are more effective in the sense of remembering and focusing on materials, and they are more willing to review materials again if they are printed (Fig. 6). They strongly agree that focusing when using print

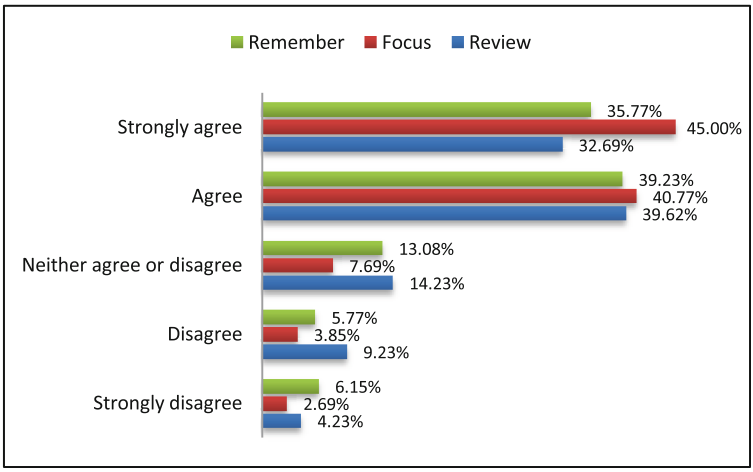


**Fig. 6.** Learning aspects of different formats of academic readings: remember, focus and review

materials is really better than when they have electronic versions. This finding is also similar to the findings of other studies.

## 5 Conclusions

In viewing the results of our study we followed two directions: firstly we looked at the primary aim of the study, preferences and use of print versus electronic papers. Here it is obvious that Slovenian students do not differ much from students in other countries, as it is shown in many studies. It was confirmed that most students prefer print format over digital for academic reading. We also found that when students use electronic documents, they mainly read them on laptop or desktop computers, and one third of them use smartphones. They do not find it convenient to read documents in digital format; they mostly print them even when they are less than 7 pages). We also found that the language does not play an important role in the choice of format, which has certain implications for further studies. While the students often print electronic materials, they do not choose to digitize print materials.

The other viewpoint of the results is to look at what they mean for the learning process and for all the participating stakeholders. As it is obvious that print material is more convenient for students to highlight and notate, and that there are only some students who find highlighting and notating useful and easy with electronic documents. This has many implications for the organization and various emphases of contemporary study practices. Students also strongly confirmed that it is easier for them to remember, focus and review material when it is printed, which is another clue for the university community.

As such, our results have implications for both, academic libraries and academic teachers and instructors. It is important for the libraries to know that print materials are still very important for academic readings and that students prefer print material for

academic readings more than electronic ones. Therefore, a carefully planned and thought over balance between print and electronic materials and services is still needed. Another opportunity for the library is teaching students to deal with this balance, preferably in collaboration with the teachers. As we know, an entire generation is growing up with new technology and is likely to have different expectations and preferences toward the choice of print and digital materials and consequently use of digital or traditional libraries. Studies are needed to follow students' perception and preferences toward digital and print material.

Teachers and instructors may also find it interesting that students' learning materials are still print ones. This result can be explained in a few ways: students are used to print materials and do not have enough experience with electronic materials in a learning context. This brings the need that academic study also incorporates teaching learning strategies and metacognitive approaches with electronic academic readings. Future studies should investigate learning results in more details, like remembering, understanding, analyzing, synthesizing and evaluating in relation to digital and print academic readings. Metacognitive skills, like awareness, applying and evaluating in a context of academic reading materials should be thought more systematically with the aim to support and develop students' competences for lifelong learning.

Our results are not only interesting within the boundaries of Slovenia and its academic study; they will no doubt be interesting when compared with the findings of the other countries which participate in this large international study.

## References

1. Wästlund, E., Reinikka, H., Norlander, T., Archer, T.: Effects of VDT and paper presentation on consumption and production of information: psychological and physiological factors. Comput. Hum. Behav. **21**(2), 377–394 (2005)
2. Mangen, A., Bente, R.W., Kolbjørn, B.: Reading linear texts on paper versus computer screen: effects on reading comprehension. Int. J. Educ. Res. **58**, 61–68 (2013)
3. Chen, G., Cheng, W., Chang, T., Zheng, X., Huang, R.: A comparison of reading comprehension across aaper, computer screens, and tablets: does tablet familiarity matter? J. Comput. Educ. **1**(2–3), 213–225 (2014)
4. Ackerman, R., Goldsmith, M.: Metacognitive regulation of text learning: on screen versus on paper. J. Exper. Psych. Applied **17**(1), 18–32 (2011)
5. Ji, S.W., Michaels, S., Waterman, D.: Print vs. electronic readings in college courses: cost-efficiency and perceived learning. Internet High. Educ. **21**, 17–24 (2014)
6. Mizrachi, D.: Undergraduates' academic information and library behaviors: preliminary results. Ref. Serv. Rev. **38**(4), 571–580 (2010)
7. Mizrachi, D.: Online or print: which do students prefer? In: Kurbanoğlu, S., Špiranec, S., Grassian, E., Mizrachi, D., Catts, R. (eds.) ECIL 2014. CCIS, vol. 492, pp. 733–742. Springer, Heidelberg (2014)
8. Mizrachi, D.: Undergraduates' academic reading format preferences and behaviors. J. Acad. Librarianship **41**(3), 301–311 (2015). http://dx.doi.org/10.1016/j.acalib.2015.03.009

9. Thayer, D., Lee, C.P., Hwang, L.H., Sales, H., Sen,P., Dalal, N.: The Imposition and Superimposition of Digital Reading Technology: The Academic Potential of E-readers. In: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, pp. 2917–2926. Association for Computing Machinery, Vancouver (2011). http://dx.doi.org/10.1145/1978942.1979375
10. Noyes, J.M., Garland, K.J.: VDT versus paper-based text: reply to Mayes, Sims and Koonce. Int. J. Ind. Ergon. **31**(6), 411–423 (2003)
11. Zambarbieri, D., Carniglia, E.: Eye movement analysis of reading from computer displays, ereaders and printed books. Ophthalmic Physiol. Opt. **32**(5), 390–396 (2012)
12. Strouse, R.: The changing face of content users and the impact on information providers. Online **28**(5), 27–31 (2004)
13. Eshet-Alkalai, Y., Geri, N.: Does the medium affect the message? the influence of text representation format on critical thinking. Hum. Syst. Manage. **26**(4), 269–279 (2007)
14. Li, C., Poe, F., Potter, M., Quigley, B., Wilson, J.: UC Libraries Academic e-Book Usage Survey (2011). http://www.cdlib.org/services/uxdesign/docs/2011/academic_ebook_usage_survey.pdf
15. Dilevko, J., Gottlieb, L.: Print sources in an electronic age: a vital part of the research process for undergraduate students. J. Acad. Librarianship **28**(6), 381–392 (2002)
16. Case, D.O.: Principle of least effort. In: Fisher, K.E., Erdelez, S., McKechnie, L. (eds.) Theories of Information Behavior, pp. 289–297. Information Today Inc, Medford, NJ (2005)
17. Liew, C.L., Foo, S., Chennupati, K.R.: a study of graduate student end-users; use and perception of electronic journals. Online Inf. Rev. **24**(4), 302–315 (2000)
18. Sathe, N.A., Grady, J.L., Giuse, N.B.: Print versus electronic journals: a preliminary investigation into the effect of journal format on research processes. J. Med. Libr. Assoc. **90** (2), 235–243 (2002)
19. Corlett-Rivera, K., Hackman, T.: E-Book usage and attitudes in the humanities, social sciences, and education. Portal Libr. Acad. **14**(2), 255–286 (2014)
20. Foasberg, N.: Student reading practices in print and electronic media. Coll. Res. Libr. **75**(5), 705–723 (2014)
21. Liu, Z.: Print vs. electronic resources: a study of user perceptions, preferences, and use. Inf. Process. Manage. **42**(2), 583–592 (2006)
22. Tenopir, C.: Use and Users of Electronic Library Resources: An Overview and Analysis of Recent Research Studies (2003). http://www.clir.org/pubs/reports/pub120/pub120.pdf
23. Mizrachi, D., Bates, M.J.: Undergraduates' personal academic information management and the consideration of time and task-urgency. J. Am. Soc. Inform. Sci. Technol. **64**(8), 1590–1607 (2013)
24. Quayyum, M.A.: Capturing the online academic reading process. Inf. Process. Manage. **44** (2), 581–595 (2008). http://dx.doi.org/10.1016/j.ipm.2007.05.005

# Students' Reading Behavior: Digital vs. Print Preferences in Portuguese Context

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**Abstract.** This paper presents and discusses data from a survey on students' reading format preferences and behavior considering digital or print options. The questionnaire was administered in Polytechnic Institute of Porto, Portugal, and 262 complete answers were gathered, mainly from undergraduates. The analysis of the results will be contextualized on a literature review concerning youngsters' reading format preferences. The importance of language and text dimension to determine the preference format is discussed. Format influence in the students reading behavior, including aspects such as ability to remember, opinions on access convenience, active engagement with the text by highlighting and annotating, and ability to review and concentrate on the text will be analyzed.

**Keywords:** Academic reading · Print reading · Digital reading · College students · Portugal

## 1 Introduction

Digital reading has invaded our daily life. It is common sense that young people prefer technological devices to access any text content: the print format has its days numbered especially for the so called Google generation. These assumptions are reinforced by the common idea that new generations use electronic devices in optimal ways for any task they have to perform. However, scientific studies show that this pattern needs a more accurate analysis and comprehension. Grounded on a literature review, my paper will present Portuguese data from a survey on aspects that influence students' reading preferences and behavior with print and digital formats.

## 2 Literature Review

Academic learning is deeply rooted on reading. As reading moves from an exclusive print format, its context for centuries, to digital format, still in its infancy, ICT presents new features for the personal reading experience.

Mangen et al. [1] performed a study with 72 students with ages ranging between 15 and 16 years old from two schools in Norway. The participants read one of two texts, one narrative and one expository text, of 1400–2000 words and graphical and/or pictorial illustrations. The students were randomized into two groups: the first one read


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the texts on print and the other one read it digitally. Authors intended to measure, in a learning situation, if students' reading comprehension was impacted by print or digital format. Findings show that subjects who read the texts on print format scored significantly better on a reading comprehension test than subjects who read the texts digitally. Despite the fact that they are digital natives embedded in the use of electronic devices, they demonstrated better skills using a paper format.

Woody et al. reported that young adults focused better on content through in-depth reading of text [2]. The ninety-nine participants in their study, with a mean age of 19 years, stated that they were more likely to read captions and charts in print books rather than in e-books and that they experienced greater satisfaction with print books. They stressed the fact that, for learning purposes, even e-books users still preferred print text and that, overall, undergraduate students seem to have aversion to e-books. This preference for printed books occurs regardless of gender, computer usage rates, or prior comfort with computers.

According to Liu [3], within the academic context, electronic sources are more frequently used than print sources with some variations among different disciplines. However, the frequency of printing electronic documents is similar across disciplines and is always around 80 %. Liu concluded that this reinforces the pattern found in other studies where respondents consistently reported their preference to printing digital documents for reading purposes. Ji et al. [4] found that a majority of students presented a slight preference for electronically supplied readings especially when they are supplied free of charge. However, a large majority of students in their study believed that they generally study more and learn better using printed resources. This can explain that, for students, self-printing/binding is justified because they believe that they learn more using print resources.

On the contrary, Rockinson-Szapkiw et al. [5] conducted a study where they demonstrated that e-textbook is as effective for learning as the traditional textbook. They found that students who choose e-textbooks have significantly higher perceived learning skills than students who choose to use print textbooks. Since cognitive learning seems to be the same in printed text or via an e-reader or tablet, e-textbooks are a supportive option for university students. However, students using e-textbooks have higher perceived psychomotor and affective learning skills than students who choose to use print textbooks.

These findings are confirmed by current research [6] on e-book reading devices that offers new possibilities in the field of reading. Due to innovation in the characteristics of new generation of electronic devices, such as displays based on e-ink technology with properties similar to printed paper and not active LCD displays, the reading experience tends to be not so different in print or electronic format. With a sample of ten participants with ages ranging between 16 to 72 years old and using eye-tracking methodology, Siegenthaler et al. [6] concluded that reading behavior on e-readers is very similar to the reading behavior on print. Participants were required to read six pages of a novel on five e-readers and one classic paper book, reading one page per device. Data analysis shows that eye movements using i-ink displays are very similar to the reading behavior for print format. Significant differences were found in fixation durations with participants having longer fixations when reading the printed book. Longer time fixation can be taken as empirical evidence that the reader has problems in

extracting information from the content. The possibility of choosing the letter font size on e-readers can improve legibility and explain less time fixation. It seems that features of future generations of reading's devices can improve comfort reading and comprehension that are reinforced by familiarity with the device [7, 8].

Reading and comprehension are fundamental pillars that support information literacy skills. My paper will present an investigation about print and digital influence on reading and comprehension among students, mainly undergraduate, from Portugal. This complements previous work [9] on information behavior and information literacy skills of Portuguese undergraduates allowing a better knowledge and understanding of the national reality and also an international comparison.

## 3 Methodology and Sample

The current research follows the work of Mizrachi [10, 11]. I intended to gather data at an international level on the format preference for class readings– electronic or print– and the reading behaviors of students from all levels (bachelors, master or PhD) and in all disciplines. The aim of the research is to find out *What are students' format preferences when engaging with their academic readings? What factors impact their preferences and behavior?* and *How do these factors impact their behaviors?*

In this paper I present the Portuguese results. I collected data with an adaptation of the Academic Reading Questionnaire previously created by Mizrachi [10, 11], that consists of 14 Likert-style statements regarding the format influence in students' reading behavior with learning purposes and additional questions to gather demographic information. This matrix was adapted to a multi-national study and a questionnaire including 24 questions was created. Six questions gather demographic information (sex, age, year of study, major of study, and personal limitations that may impact format preferences); 17 questions focus on reading format preferences, behaviors that reflect those preferences and learning engagement; and one open question was provided for comments.

An online survey was created on LimeSurvey, and sent to students from Polytechnic Institute of Porto, Portugal. The survey was available from March, 23$^{rd}$ to June, 16$^{th}$ 2015. I sent emails directly to the students of one of the Polytechnic Institute of Porto schools and I requested the help of the schools' administrations in administering the surveys to students at the six other schools. The questionnaire was opened 585 times and 262 students completed the survey. The data gathered show an interesting picture of the sample that can be further enhanced with new data collection.

Of the 262 completed questionnaires, 42.75 % were answered by females and 57.25 % by male. The mean age was 25.42 years (st. dev.7.89): 39.69 % were between 18–21 years, 30.53 % between 22–25 years, 19.08 % between 26–35 years, 7.25 % between 36–45 years, and 3.44 % were over 46 years. The great majority (72.52 %) were undergraduate students, 24.81 % were master's students, 0.38 % were PhD students and 2.29 % were in other status categories.

## 4 Results and Discussion

I will present findings on reading format choices and discuss whether students preferred electronic or print textbooks; if they print course readings to read them; and if the language of the text had any influence on the decision to printing the resources or not. I also analyzed data from self-reported opinions on focus and remembering and attitudes like highlighting, annotation, and re-reading, as signals of appropriation of the text and learning.

### 4.1 Format and Reading Preferences

Textbooks are an important resource for course study and in some areas they are the main information source. So, it is very significant that only 16.03 % of the sample agreed or strongly agreed that they preferred electronic textbooks over print textbooks as shown in Table 1. On the other hand, a majority of 66.80 % strongly disagreed or disagreed with this statement. A minority of 17.18 % neither agreed nor disagreed, being what we can call format agnostic. On the comments, one student mentioned that he/she preferred the print version because of better manual handling.

**Table 1.** I prefer electronic textbooks over print textbooks (Q10)

| | n | % |
|---|---|---|
| Strongly disagree | 52 | 19.85 |
| Disagree | 123 | 46.95 |
| Neither agree or disagree | 45 | 17.18 |
| Agree | 26 | 9.92 |
| Strongly agree | 16 | 6.11 |

These results are consistent with the choices regarding the statement, "I prefer to print out course readings rather than read them electronically" seen in Table 2. Almost 53.00 % agree or strongly agree, while 30.54 % strongly disagree or disagree, and 16.79 % neither agree nor disagree.

**Table 2.** I prefer to print out my course readings rather than read them electronically (Q5)

| | n | % |
|---|---|---|
| Strongly disagree | 29 | 11.07 |
| Disagree | 51 | 19.47 |
| Neither agree or disagree | 44 | 16.79 |
| Agree | 96 | 36.64 |
| Strongly agree | 42 | 16.03 |

Comments to this question mainly refer to the advantages of digital format including the use of the find option to make a selected reading, ecological arguments,

and cost issues. One individual explained that it is uncomfortable to read on the pc/laptop but since he/she bought a tablet to read technical books, printing course readings is no longer an option. Those who prefer to print, argue with the length of the document and that they make a more accurate reading when they use paper format.

The length of the text seems to influence the reading preferences, especially when students have to read larger documents, as shown in Table 3. If they have an assigned reading of seven or more pages, they tend to choose reading it in print: 67.18 % agreed or strongly agreed with the statement "if an assigned reading is 7 pages or more, I prefer to read it in print". Only 16.41 % strongly disagreed or disagreed with that with 16.41 % seeming to be indifferent. To justify the print option, students argued that taking notes is easier in paper and it is better to have an overall idea of the content. Some students were careful to explain that it depended on the document subject or usefulness. The eye strain and fatigue can justify the answers because the reading of digital documents is more demanding from an optical perspective. So, for longer documents students prefer print format which is more comfortable for the eyes.

**Table 3.** If an assigned reading is 7 pages or more, I prefer to read it in print (Q4)

| | n | % |
|---|---|---|
| Strongly disagree | 14 | 5.34 |
| Disagree | 29 | 11.07 |
| Neither agree or disagree | 43 | 16.41 |
| Agree | 100 | 38.17 |
| Strongly agree | 76 | 29.01 |

However, it should be noted that for shorter documents the sample did not have a clear preference for printed or digital format. In fact, when they had to make a choice regarding the statement, "if an assigned reading is less than 7 pages, I prefer to read it electronically," the percentages are almost equally split as shown in Table 4. Slightly more strongly disagreed or disagreed (35.88 %), while 32.44 % neither agreed nor disagreed, and 31.68 % agreed or strongly agreed, as noted in Table 4. Some of the comments explain that it is easy to read short texts on a digital version and it is not difficult to handle it in the pc/laptop. One student said that it is an option to save paper and ink. Anyway, it also depends on the content of the document but some of them stressed that they print the most important readings.

**Table 4.** If an assigned reading is less than 7 pages, I prefer to read it electronically (Q8)

| | n | % |
|---|---|---|
| Strongly disagree | 16 | 5.86 |
| Disagree | 78 | 28.57 |
| Neither agree or disagree | 87 | 31.87 |
| Agree | 63 | 23.08 |
| Strongly agree | 21 | 7.69 |

Tables 5 and 6 indicate that the language of the resource seems to have some influence on the choice between digital or print format but it is not possible to find a strong tendency. Anyway, students show an overall preference for printed material. One third of the students (33.97 %) neither agrees nor disagrees about the statement "I prefer to read course readings which are in my native language electronically rather than in print," 40.46 % strongly disagree or disagree, and 25.57 % agree or strongly agree with that. Moreover, the comments stress that language is not a reason to choose between print or digital resources: "The language issue is indifferent to my preference"; "There is definitely a difference between digital and printed form but it is not the language"; "The language does not condition my reading, either in Portuguese or another language I prefer printed material."

**Table 5.** I prefer to read course readings which are in my native language electronically rather than print (Q14)

| | n | % |
|---|---|---|
| Strongly disagree | 29 | 11.07 |
| Disagree | 77 | 29.39 |
| Neither agree or disagree | 89 | 33.97 |
| Agree | 47 | 17.94 |
| Strongly agree | 20 | 7.63 |
| Comments | 12 | 4.58 |

**Table 6.** I prefer reading foreign language material in print than electronic (Q15)

| | n | % |
|---|---|---|
| Strongly disagree | 24 | 9.16 |
| Disagree | 61 | 23.28 |
| Neither agree or disagree | 94 | 35.88 |
| Agree | 54 | 20.61 |
| Strongly agree | 29 | 11.07 |
| Comments | 11 | 4.20 |

This point of view, that format preference does not depend on language, is reinforced by data from Table 6. When asked if they prefer to read foreign language resources in print rather than electronically, students were divided in three almost equal groups: 32.44 % strongly disagree or disagree; 35.88 % neither agree nor disagree, and 31.68 % agree or strongly agree. So for only on third of students was the language a relevant factor in choosing the format of the resource.

The comments that support their foreign language reading are: "In foreign language or in Portuguese"; "I disagree with the preference for languages because whatever they may be in Portuguese or English" "Whatever the language I prefer printed"; and, "No matter the language, it is the same logic".

### 4.2 Appropriation of the Text and Learning

Questions 7 and 11 (Table 7) inquired about students' highlighting and annotation, re-reading practices, focus, and remembering feelings about printed and electronic format. These are important issues for text assimilation because understanding, and summarizing are the basis for personal knowledge creation.

**Table 7.** I usually highlight and notate

| | Printed format (Q7) | | Electronic format (Q11) | |
|---|---|---|---|---|
| | n | % | n | % |
| Strongly disagree | 9 | 3.44 | 65 | 24.81 |
| Disagree | 16 | 6.11 | 117 | 44.66 |
| Neither agree or disagree | 25 | 9.54 | 36 | 13.74 |
| Agree | 120 | 45.80 | 38 | 14.50 |
| Strongly agree | 92 | 35.11 | 6 | 2.29 |
| Comments | 11 | 4.20 | 6 | 2.29 |

A majority of students (80.91 %) agreed or strongly agreed with the statement. "I usually highlight and notate my printed course readings." On the contrary, only 16.79 % agreed or strongly agreed with the same behavior regarding electronic readings. In fact, most of them answered that they strongly disagreed or disagreed with the statement, "I usually highlight and annotate my electronic readings".

Regarding the habit of highlighting and annotating, format has a big influence and, despite the fact that we are dealing with a generation that uses electronic devices, printed materials seemed to have a fundamental component to the appropriation of the text and, consequently, to deeper learning.

On the comments, students explain why they felt that the use of printed resources is important: "It helps to summarize what is most relevant"; "Underline and annotate facilitates the understanding of ideas"; "It will be easier to remember what I consider important"; "For memorizing, it is easier to underline and write notes in the printed sheets." On the other hand, students also try to explain why they tend not to underline and annotate on an electronic resource: "Personally I do not consider it practical"; "Only few software do that and this technique is little known"; "Usually I do not annotate in digital format but I do it on printed resources"; "Only those who have an advanced tablet can take notes".

Students seemed to value printed format because they could handle it in an easy manner when they wanted to make comments or underline some ideas of the text. The technique is simple and do not require any special effort or technology. According to the comments, the fact that the content is in digital or print format determines the appropriation of the text and that physical and intellectual appropriation occur better and deeply with print.

**Table 8.** I can focus on the material better when I read it in print (Q12)

| | n | % |
|---|---|---|
| Strongly disagree | 6 | 2.29 |
| Disagree | 17 | 6.49 |
| Neither agree or disagree | 31 | 11.83 |
| Agree | 123 | 46.95 |
| Strongly agree | 85 | 32.44 |
| Comments | 4 | 1.53 |
| Agree | 112 | 42.75 |
| Strongly agree | 86 | 32.82 |
| Comments | 22 | 8.40 |

When students annotate and highlight print, this type of "physical" appropriation of the text helps them sustain their focus. According to data shown in Table 8, three fourths (79.39 %) of the students agreed or strongly agreed with the comment, "I can focus on the material better when I read it in print." The fact that only 11.83 % neither agreed nor disagreed indicated that students were aware that format influenced the reading behavior and that horizontal and sequential reading, typical of printed format, influenced their focus capability. The focus difficulty can also be explained by the fact that on electronic devices students have greater tendency to multitask, combining study readings with other activities (e.g. listening music, chat, and leisure reading). As Margolin et al. [8] noted, distraction may influence comprehension, reducing individual available working memory capacity, thus affecting negatively the mental representation of the text. In their comments some students stressed that they had the same ability to focus despite the format: "Both in print or digital, I can have the same concentration" and "It is not a matter of concentration, but because it helps taking notes and underline the most important." On the contrary, one student said "I prefer to read texts in print for better understanding and memorization" and another one stated "I prefer in print version for better handling."

A sign of engagement with the text is their attitudes toward reviewing. This re-reading capacity enables new forms of understanding and remembering. For a majority of the students, format influenced their personal relation with the text as 72.51 % of them agreed or strongly agreed with the statement, "I am more likely to review my course readings (after I've read them at least once) when they are in print." Only 16.8 % stated that they strongly disagreed or disagreed with the sentence and 10.69 % neither agreed nor disagreed. One of the most important features of digital resources is their easy access almost everywhere at any time as long as one has the adequate device and internet. However, this does not seem to favor repeated access to course readings. So, the easy physical access, facilitated by technology, does not determine the repeated intellectual access, since printed format is preferred for repeated reading. These results are congruent with Ji et al. [4] who found out that about two thirds of the respondents on their research printed at least some readings and that there is a pattern of printing for later reading (Table 9).

**Table 9.** I am more likely to review my course readings (after I've read them at least once) when they are in print (Q12)

| | n | % |
|---|---|---|
| Strongly disagree | 15 | 5.73 |
| Disagree | 29 | 11.07 |
| Neither agree or disagree | 28 | 10.69 |
| Agree | 116 | 44.27 |
| Strongly agree | 74 | 28.24 |
| Comments | 6 | 2.29 |

As Table 10 illustrates, the students' ability to remember was also related to resource format. A majority of students felt that the print format was more suitable for guaranteeing their ability to remember, since 75.57 % agreed or strongly agreed with the statement, "I remember information from my course readings best when I read them from printed pages." On the other hand, only 9.16 % strongly disagreed or disagreed with that and 15.27 % neither agreed nor disagreed. The need for scrolling and the lack of spatiotemporal markers seem to make memorization harder. The presentation format determine memory level as reading on computer screens is associated with episodic memory and paper triggers a semantic memory [1].

**Table 10.** I remember information from my course readings best when I read them from printed pages

| | n | % |
|---|---|---|
| Strongly disagree | 11 | 4.20 |
| Disagree | 13 | 4.96 |
| Neither agree or disagree | 40 | 15.27 |
| Agree | 112 | 42.75 |
| Strongly agree | 86 | 32.82 |
| Comments | 22 | 8.40 |

## 5 Conclusions

I analyzed and discussed students' auto-related perceptions and preferences about reading and format preferences. Accordingly, we can make some assumptions based on these results. Students did not show an exclusive preference for electronic textbooks. Printing out course readings was an option for a great number of students, especially if it is a longer text of more than seven pages. Language content did not seem to influence that preference. Highlighting and annotation practices were more related with print and students felt they focus better on this traditional format, which also seemed to enhance a review attitude and favored memorization.

Even if they preferred to read print format, respondents seemed to desire using a mix of print and digital resources. Thus, print and digital format are complementary and the characteristics of each one enhance their mutual use. Thinking that digital format simply excludes printing is too simplistic. As Liu [3] states, users desire an

hybrid information environment, combining digital and print, where they could choose according to situational factors. According to Foasberg [12], students found electronic media convenient especially for shorter and non-academic reading and they preferred print for academic reading because they engage with the text more deeply. That is, students perceived print as more suitable for successful learning. Portuguese results from our survey seemed to be congruent with these findings.

In this study, we made no difference between digital resources. These resources can be linear text, as in pdf format, or interactive combining text, audio, photograph or film, allowing or not interaction between user and content. If students prefer to print their academic materials it could mean that resources apply an analogical pattern in digital context. Further studies can enhance this issue, specifying the characteristics of the digital content, allowing understanding if the structure of the content, in educational context, influences reading and information behaviors of individuals.

Issues related to the use of electronic text as educational tools need to be deeply studied, especially in the Portuguese context.

## References

1. Mangen, A., Walgermo, B.R., Brønnick, K.: Reading linear texts on paper versus computer screen: effects on reading comprehension. Int. J. Educ. Res. **58**, 61–68 (2013)
2. Woody, W.D., Daniel, D.B., Baker, C.A.: E-books or textbooks: students prefer textbooks. Comput. Educ. **55**(3), 945–948 (2010)
3. Liu, Z.: Print vs. electronic resources: a study of user perceptions, preferences, and use. Inf. Process. Manage. **42**(2), 583–592 (2006)
4. Ji, S.W., Michaels, S., Waterman, D.: Print vs. electronic readings in college courses: cost-efficiency and perceived learning. Internet Higher Educ. **21**, 17–24 (2014)
5. Rockinson-Szapkiw, A.J., Courduff, J., Carter, K., Bennett, D.: Electronic versus traditional print textbooks: a comparison study on the influence of university students' learning. Comput. Educ. **63**, 259–266 (2013)
6. Siegenthaler, E., Wurtz, P., Bergamin, P., Groner, R.: comparing reading processes on e-ink displays and print. Displays **32**(5), 268–273 (2011)
7. Chen, G., Cheng, W., Chang, T.-W., Zheng, X., Huang, R.: A comparison of reading com prehension across paper, computer screens, and tablets: does tablet familiarity matter? J. Comput. Educ. **1**(2–3), 213–225 (2014)
8. Margolin, S.J., Driscoll, C., Toland, M.J., Kegler, J.L.: E-readers, computer screens, or paper: does reading comprehension change across media platforms? Applied Cogn. Psychol. **27**(4), 512–519 (2013)
9. Terra, A.L.: Information literacy skills of Portuguese LIS students: some topics on evaluation of resources credibility. In: Kurbanoğlu, S., Špiranec, S., Grassian, E., Mizrachi, D., Catts, R. (eds.) ECIL 2014. CCIS, vol. 492, pp. 752–762. Springer, Heidelberg (2014)
10. Mizrachi, D.: Online or print: which do students prefer? In: Kurbanoğlu, S., Špiranec, S., Grassian, E., Mizrachi, D., Catts, R. (eds.) ECIL 2014. CCIS, vol. 492, pp. 733–742. Springer, Heidelberg (2014)
11. Mizrachi, D.: Undergraduates' academic reading format preferences and behaviors. J. Acad. Librarianship **43**(3), 301–311 (2015)
12. Foasberg, N.M.: Student reading practices in print and electronic media. Coll. Res. Libr. **75** (5), 705–723 (2014)

# Reading Format Preferences of Finnish University Students

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**Abstract.** The reading format preferences of Finnish university students were studied as part of an international research project. The research material was compiled by a web based questionnaire sent to 18 universities in Finland and over 600 completed questionnaires were received. Printed class readings were preferred by a clear majority of informants, especially if the texts are long. However, only less than half of the informants would want all course materials in print format, often due to ecological reasons. Moreover, electronic publications are easy to store on a computer, and there is also a minority preferring electronic format, especially among students of technology. In most cases also informants with visual limitation preferred printed format to electronic, suggesting to the need for further develop the latter group.

**Keywords:** Reading format preferences · Electronic publications · University students

## 1 Introduction

The question of publishing format concerns not only authors but also readers, faculties, and libraries. Electronic publications are often easy to deliver and access. They can include links to reference material, and it is easy to store them on computer. According to previous studies, students do not oppose digital journals but, after years of growth, sales and use of e-books [1, 2] are stagnating [3].

Since 1999, university and other libraries in Finland have had a joint consortium, FinELib (Finnish Electronic Library), to acquire electronic resources centrally [4]. Simultaneously, printed collections of, especially scientific journals have been reduced, while the collections of e-books are growing. To some degree this development is in contradiction with the format preferences of students. Previous studies in Finland have focused on the impact of digital technologies on reading and writing [5], the use of electronic journals, and impact of the FinELib [6, 7]. However, research of students' reading format preferences, covering most Finnish universities, has not previously been done.

The purpose of my paper is to investigate Finnish university students' format preferences for class readings, electronic or print. The study is part of a multi-national research project, the joint results of which have not yet been published. The survey instrument was been prepared by Dr. Diane Mizrachi from the University of California,


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Los Angeles [8]. The survey includes questions concerning convenience of reading electronically or in print, in which format it is easier to focus, and the informants' visual limitations and their influence on format preferences.

The aim of this study is to answer the following research questions:

1. Do Finnish university students prefer electronic or print format in course readings?
2. How do students justify their format preferences?
3. Do format preferences of visually impaired students differ from those of other students?

## 2 Theoretical Background

Print and electronic media compete for students' attention and students consume more time in interaction with new web based media than reading [9]. Electronic media are often easy to access, are searchable, and students are familiar with using computers and e-reading devices [10]. More than half (52 %) of students in Lincoln's research read articles on a computer although more than third of them (38 %) printed them before reading and almost an equal proportion (34 %) read photocopies of printed articles or printed versions of journals (27 %) [11]. Printed books are better for learning [1, 12], when reading for a child or sharing books with other people, whereas electronic books are better while travelling, for having a wide selection of books to choose from, and for getting a book quickly [13]. In spite of these advantages, earlier studies agree that students prefer to read academic materials "ink-on-paper," especially longer texts [1, 7, 9]. In Hartell's and Cheek's study, print books satisfied readers' needs much or more than the other formats [14]. An e-book causes significantly more eye fatigue and its reading efficiency is lower than that of a conventional book [15]. However, according to Mizrachi [8] we cannot assume that the current situation will remain unchanged. We may be experiencing an evolutionary transition leading to a situation where both formats support learning equally.

Several factors influence reading preferences: availability of print version, price of printing, time factors, and desired outcomes of the assigned task [1, 8], whereas gender does not effect this and previous experience with e-books does not increase preference for them [1]. Reasons for preferring print versions include factors such as less eyestrain and fatigue, the tactile aspects of holding and a printed work, better concentration, and the possibility to highlight and annotate the text. Especially longer texts are preferred to read in print, while the views vary for shorter texts [13].

Different formats designed for visually impaired readers have been studied [16], as well as the impact of reading for them [17], but do not present much research about their reading format preferences.

## 3 Research Methods and Material

I sent a web questionnaire concerning university students' reading format preferences by LimeSurvey to 18 Finnish university libraries that were asked to forward it to their students in March 2015. The questionnaire was opened 1,534 times and completed 668

times. The number of answers concerning each question varies. Nevertheless, there were about 500 informants answering each question. Since the students represented different subject disciplines, their responses can be regarded as representative. In Finland there are 169 000 university students [18], so there is about one informant per every 300 students. The informants over 130 main subjects indicated that they represented several different universities although the questionnaire does not provide an identification of the home university of the student.

I analyzed the data statistically with the IBM SPSS Statistics Data Editor, which produced diagrams and tables. Informants were given the option to provide comment and some questions received more than a hundred comments. I studied their contents qualitatively and used these results to enlighten in detail the quantitative results.

## 4 Results

The 668 informants represented a rich variety of major subjects: 287 (43 %) represented social sciences, 142 (22 %) medical or nursing sciences, 95 (14 %) technology, 74 (11 %) sciences, and 70 (10 %) humanities. Seventy one percent of the informants were women and 29 % were men. Half of the informants were younger than 26 years and 70 % of the informants were younger than 31 years.

More than half of the informants used a desktop or laptop computer to read electronic course materials about 20 % used an iPad or Tablet and equally as many also mentioned a phone. The students chose several options, when needed. The choice of the 53 informants with a visual limitation was nearly the same as that of others. The visually impaired did not use dedicated e-readers. They more often used audio applications and some answered that they do not read course materials electronically.

A great majority (78 %) of the informants could focus on material better when they read it in print (8 % disagreed; 14 % were neutral, as shown in Table 1). A slight exception to this were students of technology; 13 % of whom disagreed or strongly disagreed with the statement, *I can focus on the material better when I read it in print*. In all other disciplines this proposition was clearly less than 10 %. If an assigned

**Table 1.** Focusing on the material

| Statement: I can focus on the material better when I read it in print | | | | | | |
|---|---|---|---|---|---|---|
| Major subject | Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree | Total |
| Medicine, nursing | 2 | 8 | 27 | 47 | 58 | 142 |
| Sciences | 1 | 3 | 12 | 24 | 34 | 74 |
| Social sciences | 7 | 15 | 32 | 84 | 149 | 287 |
| Humanities | 2 | 4 | 4 | 20 | 40 | 70 |
| Technology | 5 | 7 | 15 | 29 | 39 | 95 |
| Total | 17 | 37 | 90 | 204 | 320 | 668 |

reading is fewer than seven pages, a third of informants preferred to read it electronically, another third disagreed with this, and the rest (32 %) neither agreed nor disagreed. Respondents added 68 written comments in which they described how they got lost on the web, went to other websites, or read Facebook when reading online. However, several commentators focused equally well on any format; what mattered to them was the content of the text. Still another theme was that a printed text made it is easier to perceive the entirety of the text, in other words, to see "how far" the reader had gotten.

*"I can be absorbed in a concrete, tangible text that I can feel spatially, it captures my attention. A digital one makes me squirm for uncomfortableness, wanting to run away and come up with something new. – But then an exception to this is a tablet of quality, reading on which is easier than on a computer."*
*"Reading [a book] is more corporal."*
*"With a book I can walk, lie or do headstands. This substantially helps me to focus."*

Sixty nine percent of informants remembered information best when reading it in print. A larger proportion of women (74 %) agreed with this than of men (56 %). Sixty of 143 informants commented that learning is supported by the possibility to make own notes on printed texts. However, several commentators did not find differences in their learning caused by the format of the text and, moreover, some commentators stated that it was easier to write notes on an e-book and to carry along the whole "library".

*"I can write, scribble, and draw on papers."*
*"On an e-book it is more handy to make notes, and the library travels always in my backpack."*

Forty five percent of informants wanted to have all their course materials in print format and in the social sciences and humanities over half of representatives agreed with this statement as shown in Table 2. This question was presented in the form of statement: *I prefer to have all my course materials in print format* (e.g. book, course reader, handouts). The distribution of men's and women's views was very similar. This question was followed by 198 free comments, 170 of which included an explanation for their preference:

**Table 2.** Format preferences

| I prefer to have all my course materials in print format | | | | | | |
|---|---|---|---|---|---|---|
| Major subject | SD | D | NAND | A | SA | Total |
| Medicine, nursing | 17 | 46 | 25 | 36 | 18 | 142 |
| Sciences | 7 | 20 | 20 | 16 | 11 | 74 |
| Social sciences | 34 | 74 | 35 | 88 | 56 | 287 |
| Humanities | 4 | 17 | 10 | 17 | 22 | 70 |
| Technology | 4 | 28 | 11 | 23 | 12 | 95 |
| Total | 21 | 185 | 101 | 180 | 119 | 668 |

SD = Strongly disagree, D = Disagree, NA/D = Neither agree/disagree, A = Agree, SA = Strongly agree

*"Books are heavy and inconvenient to read on screen, but articles and handouts work better on computer."*
*"It would be too bulky [to have everything printed], only important things."*
*"I do prefer, but to protect nature, I after all do not want…"*

The informants wanted to read long texts and books in print but other material, such as articles or PowerPoint slides were preferred in electronic format. Saving natural resources was mentioned in numerous comments. In this respect the results differ from those of Mizrachi [7] who did not mention this viewpoint in the results of her research although the topic is mentioned in the theoretical review. This question was also considered from an equality viewpoint: an informant with slight dyslexia considered print format important for learning.

Only 17 % of informants (13 % of women, 26 % of men) agreed with the statement, *reading in electronic format is more convenient than in print*. An exception to this were informants representing technology of whom 29 %agreed.

The statement. *It is more convenient to read my assigned readings electronically than to read them in print*, was followed by 158 free comments. In comments agreeing with the statement, electronic materials were described as easier to read in vehicles, more accessible, and lighter to carry. Instead, statements that disagreed with the statement included comments such as:

*"My eyes cannot read so much electronically. Also it is more difficult make own comments and take pages with you everywhere (for example in train)."*
*"Reading on a screen is tiring and brings about temptations to do something else."*
*"Reading from an iPad is equally easy as reading a book, but not reading from a computer."*

Several comments concerned highlighting. Some informants preferred print version because it enabled highlighting, while others thought it is easier in electronic material:

*"Reading is all the same. Highlighting is more appropriate in electronic material."*
*"I prefer to read difficult texts on paper on which I can make notes."*

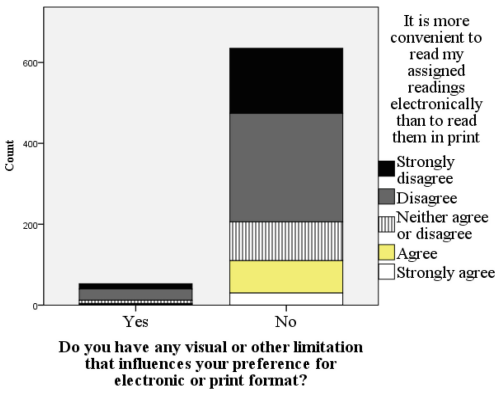


**Fig. 1.** Opinions concerning statement *It is more convenient to read my assigned readings electronically than to read them in print* by visual limitation.

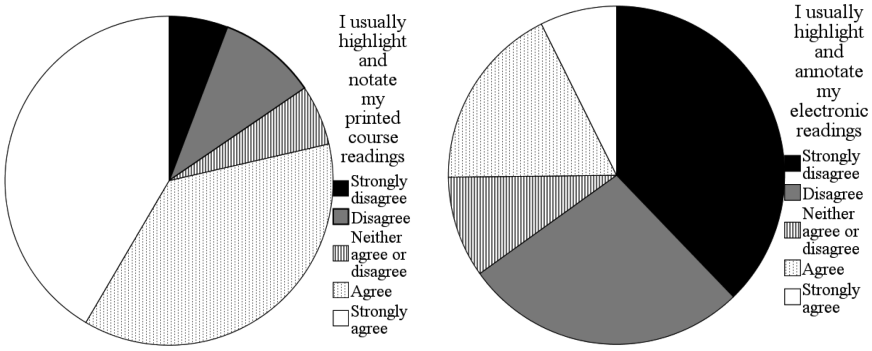


**Fig. 2.** Highlighting and making notes on printed and electronic course readings

More than half of informants preferred to print out their course readings rather than to read them electronically. Twenty four percent of humanist informants disagreed with this while in all other fields the proportion was more than 30 %. The distribution of men's and women's opinions were almost the same. In free comments printing depended on the lengths of texts, was not considered ecological, informants tried to avoid extra printing, and they wanted to save paper.

Highlighting or annotating electronic course readings was much less common than highlighting or annotating print (shown in Fig. 2), although the importance of highlighting is emphasized in many free comments. Perhaps informants did not find this

**Table 3.** Reading preferences of visually impaired and others

| Statement | Visual limitation | SD | D | NAND | A | SA | Total |
|---|---|---|---|---|---|---|---|
| It is more convenient to read assigned texts in e- than in print format | Yes | 13 | 28 | 8 | 2 | 2 | 53 |
| | % | 24.5 | 52.8 | 15.1 | 3.8 | **3.8** | 100 |
| | No | 161 | 268 | 96 | 80 | 30 | 635 |
| | % | 25.4 | 42.2 | 15.1 | 12.6 | 4.7 | 100 |
| I prefer to have all my course materials in print format | Yes | 7 | 9 | 8 | 15 | 14 | 53 |
| | % | 13.2 | 17.0 | 15.1 | 28.3 | **26.4** | 100 |
| | No | 78 | 180 | 97 | 170 | 110 | 636 |
| | % | 12.3 | 28.3 | 15.3 | 26.7 | 17.4 | 100 |
| I like to make digital copies of my printed course materials | Yes | 22 | 16 | 8 | 6 | 1 | 53 |
| | % | 41.5 | 30.2 | 15.1 | 11.3 | 1.9 | 100 |
| | No | 278 | 193 | 86 | 59 | 19 | 635 |
| | % | 43.8 | 30.3 | 13.6 | 9.3 | 3.0 | 100 |
| I prefer to print out my course readings rather than read them electronically | Yes | 2 | 9 | 5 | 19 | 18 | 53 |
| | % | **3.8** | 17.0 | 9.4 | 35.8 | 34.0 | 100 |
| | No | 79 | 132 | 92 | 203 | 128 | 634 |
| | % | 12.5 | 20.8 | 14.5 | 32.0 | 20.2 | 100 |

SD = Strongly disagree, D = Disagree, NAND = Neither agree/disagree, A = Agree, SA = Strongly agree

feature in electronic publications, the existence of which is implied by the 25 % of informants using it.

Informants with a visual impairment answered in the same way as those without it to statement, *It is more convenient to read my assigned readings electronically than to read them in print* (Fig. 1). One could expect electronic publications to enable the adjustment of text size or visibility to facilitate reading with limited eyesight. However, visually impaired informants also preferred print format. This implied that either all electronic publications do not include possibilities to adjust the text suitable for the reader or this possibility was not found or used.

Table 3 shows three cases, indicated in bold text, where there was a notable difference: visually impaired disagreed less with the statement, *I prefer to print out my course readings*, and agreed more with statements, *It is more convenient to read my assigned texts in e format*, and *I prefer to have all my course materials in print format.* Some visually impaired respondents preferred electronic format but the majority, however, preferred printed versions of study materials.

## 5 Discussion

A great majority of Finnish university students representing several different universities and 130 different main subjects, considered reading long texts in print format most convenient and enabling both focusing on information and remembering it better than in electronic format. The electronic format is to some degree more favored by students in technological fields than other fields. The results support previous research where gender effects in format preferences were not found [1].

Students' decision to print electronic course materials or read them in electronic format was not influenced by the price for printing, as in Mizrachi's study [8]. Instead, excessive printing was avoided to protect the environment. This was also one reason to favor e-publications despite their inconvenience. In other respects the results support previous studies [9, 11], according to which print format is preferred if the texts are long, while shorter texts can equally well be read in e format. The strengths of e format are its searchability, reference linking, easiness of access, and transportation. The results also support previous studies [15] in which e-books cause more eye fatigue than printed ones. Moreover, when reading online you easily get lost to other web sites. Only a minority of all informants mentioned the possibility to highlight text or make notes on electronic publications, indicating either their non-existence or difficulties in their use. This possibility was obviously not familiar to all readers or not available in all e-publications. Print format was liked because of its tangibility and because it was easy to see how far you are in your reading, and to highlight the text and make notes.

A minority of 53 informants mentioned a visual or other limitation that may influence their reading preferences. Also they preferred printed texts, suggesting that the electronic publication format has not yet reached its height. Its usability needs further development [14] according to these results especially with regard to readers with visual impairment. The hundreds of free comments in this study did not include mentions about adaptability of e-books according to a reader's vision or any other characteristics that would facilitate reading.

## 6 Conclusions

Despite the development of electronic publishing, both earlier research and this study indicate that the majority of university students preferred to read their assigned texts in print format largely because it helped them to remember information better than when reading in electronic format. Digital text has features, such as the possibility to highlight texts or make notes, that would support its use but only a minority of informants used them and not one of the informants with visual impairment mentioned that electronic format would ease their reading. Electronic publishing formats still need to be developed into a more user friendly direction and this may have consequences in the format preferences and learning of students. Libraries and faculties should also take students' reading preferences into account when making decisions about collection development.

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## References

1. Woody, W.D., Daniel, D.B., Baker, C.A.: E-books or textbooks: students prefer textbooks. Comput. Educ. **55**, 945–948 (2010)
2. Wu, M., Chen, S.: Graduate students' usage of and attitudes towards e-books: experiences from Taiwan. Prog.: Electron. Libr. Inf. Syst. **45**(3), 294–307 (2011)
3. Robb, A.: 92 Percent of College Students Prefer Reading Print Books to E-Readers. New Republic (2015). http://www.newrepublic.com/article/120765/naomi-barons-words-onscreen-fate-reading-digital-world
4. The Finelib Consortium. The national library of Finland. http://www.nationallibrary.fi/libraries/finelib/
5. Taipale, S.: The affordances of reading/writing on paper and digitally in Finland. Telematics Inform. **31**(4), 532–542 (2014)
6. Kortelainen, T.: An analysis of the use of electronic journals and commercial journal article collections through the FinELib portal. Inf. Res. **9**(2), paper 168 (2004). http://InformationR.net/ir/9-2/paper168.html
7. Impact and Evaluation. FinELib. The national electronic library. The national library of Finland. http://www.nationallibrary.fi/libraries/finelib/imapctandevaluation.html
8. Mizrachi, D.: Undergraduates' academic reading format preferences and behaviors. J. Acad. Librarianship **41**(3), 301–311 (2015)
9. Loan, A.F.: Media preferences of the net generation college students. Int. J. Libr. Inf. Sci. **3**(7), 155–161 (2011)
10. Tan, T.: College students still prefer print textbooks. publisher weekly (2014). http://www.publishersweekly.com/pw/by-topic/digital/content-and-e-books/article/63225-college-students-prefer-a-mix-of-print-and-digital-textbooks.html

11. Lincoln, T.D.: Reading and e-reading for academic work: patterns and preferences in theological studies and religion. Theological Librarianship **6**(2), 34–52 (2013)
12. Mangen, A., Walgermo, B.R., Bronnick, K.: Reading linear texts on paper versus computer screen: effects on reading comprehension. Int. J. Educ. Res. **58**, 61–68 (2013)
13. Rainie, L., Zickuhr, K., Purcell, K., Madden, M., Brenner, J.: The Rise of E-reading. PewInternet & American Life Project, Washington, DC (2012). http://libraries.pewinternet.org/files/legacy-pdf/The%20rise%20of%20e-reading%204.5.12.pdf
14. Kang, Y.-Y., Wang, M.J., Rungtai, L.: Usability evaluation of e-books. Displays **30**, 49–52 (2009)
15. Hartell, L.J., Cheek, F.M.: Preferred book formats in an academic medical center. J. Med. Libr. Assoc. **99**(4), 313–317 (2011)
16. Evett, L., Brown, D.: Text formats and web design for visually impaired and dyslexic readers – clear text for all. Interact. Comput. **17**(4), 453–472 (2006)
17. Creaser, C., Spacey, R., Hicks, D.: Assessing the Impact of Reading for Blind and Partially Sighted Adults. Report to RNIB. The Reading Agency, Loughborough University (2012). http://readingagency.org.uk/news/RNIB%20-%20Impact%20of%20reading%20report.pdf
18. Statistics Finland. Published 23.4.2013. http://tilastokeskus.fi/til/yop/2012/01/yop_2012_01_2013-04_23_tie_001_fi.html

# The More they Tried it the Less they Liked it: Norwegian and Romanian Student's Response to Electronic Course Material

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**Abstract.** In this paper we will present and compare survey findings from Romania and Norway taken from the "Multinational study on students' preferences regarding print versus electronic resources for course readings". This study was conducted in April 2015 and surveyed undergraduate, graduate and postgraduate students of various subjects at different universities. The aim was to investigate students' format preferences when engaging with academic readings and what factors impact their preferences and behaviors. The comparative study will show whether students' reading format preferences vary or remain consistent across multi-national student populations. We also make comparisons with results from an earlier study of Romanian and Norwegian students' attitudes towards using academic libraries. In particular, we look at the reasons given for preferring course readings in either electronic or print format, and we discuss what this could mean for collection development policies.

**Keywords:** Print · Electronic study material · Norway · Romania · Academic libraries · Student services

## 1 Background I: The Multi-national Study

This paper is a first, exploratory investigation of data from the multinational study *Students' Print versus Electronic Preferences: A Multi-national Study.*

Diane Mizrachi, University of California Los Angeles (UCLA), presented a research paper at the second European Conference on Information Literacy (ECIL) in Dubrovnik in 2014. Her presentation had the title "Online or Print: Which Do Students Prefer". The underlying study investigated academic reading format preferences for class readings (electronic or print) and reading behaviors of undergraduate students at UCLA. The survey aimed to answer the questions: "*What are undergraduates' format preferences when engaging with their academic readings? What factors impact their preferences and behaviors? How do these factors impact their behaviors?"* [1].

In her literature review, "of selected studies comparing reading comprehension in different formats" Mizrachi [1, p. 301] found a general consistency in the findings. In


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her words: “A growing body of evidence however, shows that the presentation format, print or electronic, affects how efficiently the brain processes information (e.g. see Eshet-Alkalai and Geri 2007 and Mangen et al. 2013). Expanding on Adler’s observation that different levels and types of reading are employed according to the purpose and desired outcome of a reading task, we see that scanning and browsing for example, are effective strategies for many online tasks such as sorting through email, reviewing headlines, and checking facts and definitions. But the process of linear reading in print format appears to be more effective for deeper learning and comprehension goals, when focus and deep reading are demanded in order to internalize the information and make it understood.

Mizrachi also cites surveys going back for more than a decade, showing that undergraduate students prefer reading their academic texts in print. On the other hand they are influenced by convenience, ecological sustainability, and often the lower cost of accessing texts electronically [1].

After ECIL 2014, Joumana Boustany, from University of Paris Descartes, suggested replicating the survey in different countries to produce comparative results and to see whether students’ reading format preferences vary or maintain consistency across multi-national student populations. More than 20 countries from all over the world were asked to participate: Australia, Bulgaria, China, Croatia, Czech Republic, France, Hungary, India, Israel, Italy, Latvia, Lithuania, Moldova, Norway, Peru, Poland, Portugal, Romania, Singapore, Slovenia, Switzerland, Turkey, UK, USA. Almost all have completed the data collection.

Boustany created the online survey on the LimeSurvey platform, based on the questions from the study at UCLA, however targeting students from higher education on all levels (undergraduates, graduates and postgraduates) in all disciplines. Some countries translated the survey from English into their own language, while others decided to use the English version. In spring 2015 the participating countries collected data in their own institution(s). Later these data will be combined for comparative work. So far the only publication of results from this survey is Mizrachi 2015.

The multi-national study seeks to investigate the format preferences for class readings - electronic or print - and the reading behaviors of students. The results of the research may further our understanding of how students prefer to read their course material and inform the decisions and policies of libraries and instructors regarding the collection and dissemination of online and print academic materials.

The results of this research may further our understanding of how students prefer to read their course material and inform the decisions and policies of libraries and instructors regarding the collection and dissemination of online and print academic materials.

## 2 Background II: The Survey from 2007

In 2007 two of the present authors made surveys in their respective libraries. In this survey, the focus was on comparing the attitudes of Romanian and Norwegian university students to using the academic library and the different facilities. Landøy and Repanovici [2] showed that Romanian students were much less satisfied with access to

study literature through the library than Norwegian students. It also indicated that students in Romania were more in favor of electronic study literature than those in Norway. Landøy and Repanovici speculated that Norwegian students might have tried electronic study literature and been disappointed, while Romanian students might have a more idealized view of the possibilities since they at that time did not have a substantial amount of electronic documents in the Romanian libraries. This earlier study is one of the reasons why we want to present the findings of the Multi-national Study from Norway and Romania together instead of separately.

## 3 Methodological Issues

Data and comments from Norwegian and Romanian students were gathered using the online Academic Readings questionnaire. The study was conducted in April 2015, and it surveyed undergraduate, graduate and postgraduate students of various subjects at different universities and university colleges in Norway (University of Bergen, University of Stavanger, The Norwegian University of Science and Technology, Bergen University College, Sogndal University College and Stord/Haugesund University College) and at the 18 faculties of Transilvania University of Brasov in Romania.

The questionnaire comprises two parts. The first part consists of 16 statements about students' preferences for reading formats and factors that impact their preferences and behaviors. A five-point Likert scale is used for possible answers, ranging from "strongly disagree" to "strongly agree". Each of the 16 questions/statements provides space for comments. In addition, the first part contains one question about devices that are used for electronic course readings. Students could tick off multiple answers to this question. The second part comprises six questions or statements gathering demographic information, like age, current study status (i.e. first year, third year, Ph.D.), and discipline major or field of study. Additionally, a final open-ended question asks for any other comments on academic reading format preferences.

The original survey was created in English. The authors from Norway decided to use the English version, while the author from Romania translated the survey into Romanian. In order to make sure that all questions in English would be understood properly, the Norwegian authors added an explanatory statement to question 21.

The dissemination of the URL to the survey was carried out by email in April 2015. The authors themselves or other participating colleagues sent explanatory text and the link to the questionnaire to students from different institutions in Norway and Romania.

In Norway 1063 responses were assembled. The gathered data were entered, coded, and analyzed using the SPSS statistical package.

In Romania, the study was conducted within Transilvania University from Braşov. The Research Ethics Committee of the university approved the participation in the multinational research.

The structure of the approximately 600 respondents from Transilvania University students matches the university structure of 18 faculties by gender and year of study variables. In Norway, since the survey was distributed to students of different faculties at the six collaborating universities/university colleges, no such matching was possible.

## 4 The Findings

Mizrachi [1] asked "*What are undergraduates' format preferences when engaging with their academic readings?"* and found that students, both in her own survey and in the literature, preferred to have their course material in print format. What is the preference on Norwegian and Romanian students from all levels of study and from different institutions?

The preference for course material in print format is quite similar among the respondents from both countries. A minor discrepancy may be noted in the difference between the Norwegians and Romanians who "strongly disagree" with this statement.

In the Norwegian survey, there are 72 comments on this statement, indicating that the students have definite opinions on the topic. Well over half, 41 comments, indicate that even if a large majority agree that print format is preferred for course material, there is reading material that is preferred in electronic format. Twelve others comment more explicitly that this depends on the size and kind of reading material, while seven respondents comment that electronic reading material is more easily available, and that the students themselves can choose whether to save and print. Nine students comment on the benefits of printed material; that it is more comfortable, or is better for learning.

From Brasov, there are 11 comments showing that students prefer printed courses for several reasons, for example: "I believe I have a better developed visual memory when I read in print format"; "I remember better the information from paper, but archiving courses is more practical in electronic form"; "I prefer electronic format, as it allows me to select the pages I want to print"; "Personally, I prefer to have the important electronic materials in print format as well"; "It is known that during a course a lot of information can be forgotten or can be uninteresting. But, the printed format brings an extra help to the student."

In Table 2 we see that the level of disagreement ("disagree" and "strongly disagree" combined) to this statement is quite similar for Norwegian and Romanian students.

Interestingly, there are few comments to this statement from the Norwegian respondents, only nine, and they touch upon the same issues as the comments to question 3: It depends on the content, size and importance.

In the Romanian survey the most interesting comments were: "Depending on the how the material content is presented, I prefer both printed and electronic materials"; "Usually, if I have only electronic materials, I highlight ideas which I note down on paper"; "If the material is in electronic form, I prefer to read it as is. The same is valid for printed materials."

The results as displayed in Tables 1 and 2 show that the agreement and disagreement to preferences for electronic course literature is almost opposite, and when we do a cross tabulation in the Norwegian data to see whether there is a match between disagree on one and agree on the other, we find that the responses show a clear preferences for print and against electronic at the same time.

Around 75 % of the respondents from both countries agree that they remember information from their course readings best when they read from printed pages.

In the comment section to this question in the survey, the Norwegian comments can be divided into five main groups: nine comments mainly agree with the statement, and

**Table 1.** Level of agreement to statement in Question 3: "I prefer to have all my course materials in print format (e.g. book, course reader, handouts)"

| Reply | Norway % | Norway N | Romania % | Romania N |
|---|---|---|---|---|
| Strongly agree | 33 | 353 | 30 | 182 |
| Agree | 37 | 390 | 33 | 200 |
| Neither agree or disagree | 13 | 139 | 12 | 75 |
| Disagree | 14 | 144 | 12 | 71 |
| Strongly disagree | 3 | 37 | 13 | 82 |
| Total | 100 | 1063 | 100 | 610 |

**Table 2.** Level of agreement with the statement in Question 13: "I prefer to read my course readings electronically"

| Reply | Norway % | Norway N | Romania % | Romania N |
|---|---|---|---|---|
| Strongly agree | 3 | 29 | 4 | 22 |
| Agree | 8 | 81 | 7 | 38 |
| Neither agree or disagree | 14 | 150 | 18 | 98 |
| Disagree | 41 | 441 | 48 | 265 |
| Strongly disagree | 34 | 362 | 23 | 126 |
| Total | 100 | 1063 | 100 | 549 |

four mainly disagree with the statement. Three say print and electronic basically are equal, and four find that a mix of both electronic and printed sources is the best. The main part of the comments however, (23) touch in one way or another on how the physical use of printed material supports the learning process for the student. "On printed pages, it is easier to make notes", one respondent claims. "More visual tags that I remember", says another.

The 19 comments from Romania also reveal that most respondents prefer printed course materials, for various reasons: "To be not so easily distracted by other things they can do on the PC, to learn better, remember better, read faster. Also, after some time, reading texts on the laptop becomes difficult, as the eyes start to hurt"(Table 3).

**Table 3.** Level of agreement with statement in Question 1: "I remember information from my course readings best when I read them from printed pages"

| Reply | Norway % | Norway N | Romania % | Romania N |
|---|---|---|---|---|
| Strongly agree | 38 | 400 | 30 | 164 |
| Agree | 39 | 413 | 42,5 | 232 |
| Neither agree or disagree | 16 | 168 | 12,5 | 68 |
| Disagree | 6 | 65 | 9 | 49 |
| Strongly disagree | 1 | 17 | 6 | 33 |
| Total | 100 | 1063 | 100 | 546 |

On the other hand there was the following comment: “Generally, with respect to the subjects approached during courses, I gather information from electronic sources, due to the wealth and diversified volume of materials, which I prefer not to print. It does not affect my capacity to understand/memorize/remember, as long as I read something that is of interest to me and I enjoy.”

Table 4 shows the same tendency to similar a response pattern between the Norwegian and Romanian students; where the majority (around 65 %) of the respondents disagree that it is more convenient to read the assigned readings electronically than in print.

**Table 4.** Level of agreement with statement in Question 2: “It is more convenient to read my assigned readings electronically than to read them in print”

| Reply | Norway % | Norway N | Romania % | Romania N |
|---|---|---|---|---|
| Strongly agree | 6 | 66 | 5,5 | 31 |
| Agree | 15 | 158 | 14,5 | 79 |
| Neither agree or disagree | 15 | 164 | 13 | 71 |
| Disagree | 41 | 435 | 51 | 278 |
| Strongly disagree | 23 | 240 | 16 | 87 |
| Total | 100 | 1063 | 100 | 546 |

For question 2 there are 15 respondents from Norway who comment on the convenience of saving the environment by not printing paper, or of not having to carry paper around. Eleven respondents comment that they are happy to be able to use study material in both printed and electronic format, and four comment that they prefer printed material. Six of them have some kind of problems with their eyes or concentration when reading on screen, and four comment that they can read electronically on a tablet.

Some of the Norwegian respondents commented on both questions 1 and 2. One respondent commented that s/he remembered information from course readings best “when I highlight with a marker”, and that it is more convenient with electronic versions of assigned readings because it is “easier to make a system”. Similarly, another respondent said that “I rely on visual memory and remember things better when they have a certain organized structure on a sheet. On the screen it is always different with scrolling/scaling” to question 1, and “Printing everything is a chore and for most of the papers I read I only need to get the main point, so amassing tons of papers in the office is useless”.

In Norway, there is a slight tendency for the master and Ph.D.-students agreeing more than the younger students with the statement “I prefer to read my course readings electronically”, and similarly disagreeing with the statement “I prefer to have all my course materials in print format (e.g. book, course reader, handouts)”. This may indicate that the more mature students, or the more research-oriented ones are moving towards a preference for using sources in electronic format, but more research will be needed to investigate this question further.

## 5 Comparing Results from the Surveys in 2015 and 2007

There are no significant differences between the Romanian and Norwegian students' preferences. Both Norwegian and Romanian students prefer printed course materials, but they believe that electronic materials are also important. They prefer the printed version because they read it more easily, they can make annotations, and they find it is healthier for eyesight. At the same time, they find that having access to course material in electronic format has other benefits, i.e. to be easily searchable and accessible, easier to develop a structure and more convenient in saving paper and weight.

There are also no large differences between the level of agreement to the statements about remembering the information better when reading from paper, and level of disagreement with the statement on convenience of electronic format. For the Norwegian students there was a slight tendency for the graduate and Ph.D. students to prefer electronic course literature more than the undergraduates did, but it will require more analysis, particularly into possible differences between subject areas, before a conclusion could be made.

In the 2007 survey, both groups of students indicated that they preferred to use both electronic and printed study literature: 67 % of the students from Bergen, and 56 % of the students from Brasov replied "both" when asked for their preferences. However, the students in Brasov were more in favor of electronic study literature than those in Bergen – 18 % of the Brasov students compared to 7 % of the Bergen group. Landøy and Repanovici [2] speculated that Norwegian students might have tried electronic study literature and been disappointed, while Romanian students might have a more idealized view of the possibilities without having had access to electronic material to the same degree.

Today, however, with the initiative from the Ministry of Education and the Consortia of Academic Libraries, Romanian students have access to as many electronic resources as their Norwegian peers.

## 6 Conclusions and Recommendations

This study of Norwegian and Romanian students' course reading format preferences showed that students still are in favor of reading in print, even if there is a constant change of technology and learning environments. The respondents provided many comments that can help to understand the reasons for these preferences. While course literature (required reading, assigned reading) is only one of the document types that academic libraries supply to their patrons, it is still an important task, and we need to ask how the survey findings should influence the development of the library's collections.

Of course, libraries do not have the budget to supply all students with all their required readings. It also seems to be an assumption among the academic staff (especially among those who write text books) that students should purchase their study literature. So one way of looking at it is to say that course literature is not the library's concern, and leave it at that.

In Norway, all academic libraries acquire more and more electronic resources; many of them use up to 90 % of their collection development budget for electronic materials. The latest national agreement between Kopinor, the Norwegian copyright holders' organization, and the Council of Universities and University Colleges allows academic institutions to compile electronic course material and to distribute it to their students. What does this mean for academic libraries? Will they become more involved in the distribution of study literature and assigned readings as well?

Libraries invest in electronic material for several reasons. It is accessible 24/7 when remote access has been established, far better than the library opening hours. It does not take shelf space either, freeing up space for student working stations or other activities. Many academic libraries find that the scholars expect electronic literature and have grown accustomed to having their academic information needs covered from their computers. There are added features like the possibility for note-taking or highlighting, and for electronic storage in reference management systems.

We saw from the responses from both Norwegian and Romanian students that while there were strong preferences for printed course literature and against readings in electronic format, there were qualifications to this picture of also expecting online access to required literature. Some students commented that their preferences depend on the aim of usage and on the length of the text. Others mentioned the convenience of the electronic format, in particular regarding a future retrieval of documents and for environmental aspects.

In other studies, among them one made by Repanovici and Landøy on a group of other students from Brasov and presented at ECIL 2015, it is suggested that the students' preferences may be influenced by their level of familiarity with electronic documents. The students' acceptance of electronic study literature could increase when they are exposed to it through library training or information literacy courses. It also seems that students accept electronic course material more when the academic staff makes assigned readings in electronic format a sufficiently large part of the study literature lists.

For libraries, the findings of this study should be a starting point for discussing collection development policies. In particular, libraries should ask whether they need to change policies that focus on electronic material when the students prefer print literature. Libraries are always talking about meeting users' needs, so should they follow students' preferences for print material or continue focusing on electronic documents? Libraries should also ask whether it is right to purchase mainly electronic literature when scientific studies tell us that most students learn and remember better from reading print material, a fact that also many respondents stated when commenting on the survey questions.

The survey findings and comments show as well that there seem to be a lack of skills for using and working with electronic documents, like highlighting text. Therefore, libraries should focus more on how to use and manage electronic resources when teaching students and they should raise awareness among academic staff for picking electronic versions of texts for course material.

More research will be needed to determine if there are particular groups of students that have special issues with print or electronic study literature, and to detect whether there are changes in the students' attitude following changes from print to electronic material in the course reading lists.

## References

1. Mizrachi, D.: undergraduates' academic reading format preferences and behaviors. J. Acad. Librarianship (2015). doi:10.1016/j.acalib.2015.03.009
2. Landøy, A., Repanovici, A.: Rumenske og Norske Studentars Bruk av Bibliotek og Ressursar. Paper at the Norwegian Library Meeting in Bergen (2008) (in Norwegian). http://hdl.handle.net/1956/3478

# Information Literacy in Higher Education

# Perception of Information Literacy Among Faculty at the University of Graz, Tallinn University, and University of Zagreb

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**Abstract.** The way university academic staff perceive, promote, and practice information literacy (IL) becomes a topic of great importance to IL education. The tendency towards IL education as an integrated or embedded part of the curriculum and curriculum design where students have ongoing interaction and reflection with information, give academic staff an increasingly important role. A semi-structured interview was used as a method of collecting data on the perception of IL among academic staff at three universities in Europe. The following aspects of IL were explored: awareness of IL, attitudes towards IL, motivation for IL facilitation, IL experiences and IL requirements expected from students. Since the interviewed academics were from three different disciplines (business administration, information science, information systems), subject related differences in the perceptions of IL were investigated.

**Keywords:** Information literacy · Perception of scholars · Comparison between university departments

## 1 Introduction

Several authors have indicated that IL is one of the most important skills for academic success [1–5]. It is widely acknowledged in the literature that collaboration between librarians and academic staff is essential to successfully integrate or embed IL into the curriculum [6–10]. A number of authors have analysed factors that support or hinder collaboration between academic staff and librarians [7, 11–13]. Ivey [7] found that the main success factors that constituted successful collaborative teaching partnerships were a shared goal, mutual respect, tolerance and trust, competence for the task at hand by each of the partners, and effective communication. However, her study also revealed that there were different perceptions of the role and responsibilities and conceptions of IL of academics and librarians. Christiansen et al. [13] believed that different conceptions,


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language, and assumptions about IL, different roles, and different work cultures can hinder the collaboration [14].

Several empirical studies have been performed that have investigated IL perception or conceptions and practice in higher education (HE) contexts [15, 16]. In Europe, for example, Boon, Johnston and Webber investigated conceptions of IL among UK academics and how these conceptions influence academics' practice in educating students for IL [17, 18]. Their phenomenographic study of the conceptions of IL in four disciplines showed that IL was perceived differently in different disciplines. Virkus [14], [19–21] explored the experience and perception of those (students, faculty, senior managers and librarians) involved in the development of IL in European open and distance learning HE institutions. Her findings suggested a framework for the development of IL consisting of four dimensions: strategic, educational, professional, and research. Central to the findings was the illumination of a complex interaction of factors in each of these dimensions that enhance the development of IL. It was found that the lack of a holistic approach to IL in European HE institutions may be an obstacle for the effective development of IL. Differing perceptions and expectations of different actors' roles and responsibilities in academia might create unexpected behaviours and so have an adverse impact on the implementation of programmes that facilitate the development of information-related competencies. Thus, the way academic staff perceive, promote, and practice IL has become a topic of great importance to the IL education and with this background this study was initiated.

## 2 Aims and Methodology of the Study

Our study aimed at exploring how information literacy is perceived by academic staff from different disciplinary fields at three universities in Europe: business administration and management at Graz University (Austria), information science at Tallinn University (Estonia), and information system development and informatics at University of Zagreb (Croatia). Perception of IL relates to attitudes of academic staff towards IL, in particular the value and importance they ascribe to IL. In this sense the perception of IL is on the attitude level (declarative) but it should also be on the level of behaviour/practice. Academic staff appreciating and practicing IL in their courses/programmes is a very strong channel of education in IL passing/transferring their attitudes and behaviour patterns to students. We explored the following topics in this broad sense of perception of IL:

- awareness of IL (e.g. nature and definition of IL, components of IL including knowledge/skills/abilities);
- attitudes towards IL (importance for education, professional development, and lifelong learning);
- motivation for IL facilitation (motivation for incorporating/facilitating IL in courses/programmes, and involving students in it);
- IL experience in courses they teach; and
- IL requirements expected from students.

The research participants consisted of the academic staff of the following three university departments/schools: School of Business, Economics and Social Sciences, University of Graz; Institute of Information Studies, Tallinn University; and Department of Information Systems Development, Faculty of Organization and Informatics, University of Zagreb. The selection of the three departments was pragmatic. Since we are staff members of the analysed departments, it was easier for us to collect the data.

The School of Business, Economics and Social Sciences at the University of Graz is among the largest educational and research institutions in social and economic sciences in Europe with about 7,000 students and more than 700 graduates per year. We interviewed nine academics: one was full professor, five were associate professors, and three were assistant professors. The gender distribution was nearly equal (male: five, female: four). One interviewee was from the Institute of Business Education that offers a master degree program for business college teachers. The remaining eight interviewees have long-term teaching experience in the bachelor and master programs of business administration and were from eight different business administration institutes ranging from banking, marketing, human resource management, accounting, operations research, and information science and information systems. Among the interview partners there were also the Dean of Studies and the head of the Curricula Commission of Business Administration.

Tallinn University (TU) is the third largest university in Estonia. TU incorporates 19 institutes and six colleges in which study and research is conducted in six different disciplines. More than 10,000 students are enrolled in TU's academic programmes. The Institute of Information Studies (IIS) was formed as an independent academic unit in 2008. It acts as the successor to the Department of Librarianship and Bibliography that was founded in 1966 and later renamed the Department of Information Studies. IIS includes ten academic staff members: one full professor, four associated professors and five lecturers. IIS offers the following programmes: a BA programme in Information Science (IS), a MA programme in IS, a Digital Library Learning (DILL) joint master programme with Oslo and Akershus University College and Parma University (in English), and a PhD programme in Information and Communication Sciences. All together, we interviewed seven female staff members of IIS: one professor, three associate professors, and three lecturers.

Established in 1669, University of Zagreb is the oldest and largest university in South-Eastern Europe. With more than 80,000 full-time undergraduate and postgraduate students, it offers a wide range of academic degree courses. The Faculty of Organization and Informatics has existed for 51 years and delivers study programmes in informatics, organization studies, and economics at all academic levels and consists of the following organizational subunits: Department of Economics, Department of Organization, Department of Quantitative Methods, Department of Theoretical and Applied Foundations of Information Sciences, Department of Computing and Technology, Department of Information Systems Development, and Department of Foreign Languages, and General Educational Disciplines. All together, we interviewed ten academics of the Department of Information Systems Development: five full professors (two of them are also members of faculty management), one associate professor, and four assistant professors.

We collected data using a semi-structured interview. In order to have a common basis, we developed an English-language interview guideline first that was translated into the local languages (German, Estonian, and Croatian) afterwards. The interview guideline consisted mainly of closed questions. We collected the data in May and June 2014. We collected that data ourselves at the University of Zagreb and at Tallinn University and a master's student collected data at the University of Graz [22]. Since our population is relatively small (26 interviewees), the study is only exploratory.

## 3 Findings

In this section the main findings are organized according to the research topics of exploring academics' perception of IL as stated in Sect. 2. However, we present in the paper only a selective overview of some research results due to the space limitations in this publication.

### 3.1 Awareness of Information Literacy

Regarding interviewees' awareness of IL, they were asked to

- express their familiarity with the concept and to define the concept of IL;
- link the importance of pre-prepared and given elements to the concept of IL;
- declare themselves as being information literate or not;
- express benefits, needs, and interest in advanced training in the field of IL.

At the University of Graz only five out of the nine consulted academics were familiar with the concept of IL and only two could define it as the ability to handle information, to process and transfer it, and, finally, to use it. Interestingly, this concept was not at all related to information technology (IT). At Tallinn University all interviewees were familiar with the concept of IL as it is an important and well known concept in the field of library and information science. Several definitions were offered, for example, the definitions from the American Library Association [23]; the Chartered Institute of Library and Information Professionals [24]; Doyle [25], Johnston and Webber [26]; and Horton [27]. This is not surprising because the interviewed staff members belong to the information science unit. At the University of Zagreb, most of the interviewees (nine out of ten) reported being familiar with the concept of IL, although some were not sure of its definition. Seven interviewees defined IL as "knowledge and application of information technology in everyday life" to solve the problems in obtaining information and sources of information. Two interviewees differentiated IL from IT literacy and one of them defined IL as "the ability to manage information resources" and associated it with library science.

When assessing the importance of IL elements, the interviewees from the University of Zagreb and the University of Graz stated similar priorities although there were small differences. An "overview of the most important information sources" received the most mentions at both universities together with "quality assessment of information and information sources" and "information presentation" at the University of Zagreb and

"identification and articulation of information needs" at the University of Graz. A stronger disagreement between the two universities can only be found for the IL element of "information presentation", which was mentioned only fifth most frequently by the interviewees from Graz. "Ethical use of information" received least mentions at both universities. One interviewee gave a possible explanation for the low consideration: accordingly, ethical aspects are important but more as a "supporting" element of IL. Interestingly, information search skills were given little importance at both universities. The results differ at the IIS of TU as all components were regarded important by the majority of interviewees. The interviewees noted that the importance of different elements of IL depends on the context. For example, "Being able to clearly present information" is a very important skill in the learning context or in the communication process in general. "Being able to identify and articulate (their) information needs" is probably more important in some context and less important in another. "Being familiar with the ethical use of information" is very important in the research process but maybe not so important in some prescribed class assignments. Thus, the elements were assessed equally important, but the importance is dependent on the context.

At the University of Graz six interviewees regarded themselves as information literate and three interviewees as information literate in their own subject area. All respondents at TU believed that they are information literate in their area of expertise, but they considered themselves quite illiterate in some other areas, for example in medicine, physics, or chemistry. Again, it was stressed that IL is highly subject and context dependent. Four respondents out of ten at the University of Zagreb considered themselves as information literate, while the remaining respondents were not so sure.

There was only one interviewee at the University of Graz who did not find additional IL training as necessary. The remaining eight interviewees supported the idea of additional IL education, though at different levels of agreement. One business economist noticed that skills cannot be taught, rather they must be developed over time. Two other colleagues stressed that IL has subject specific components, for instance, knowing important information sources in the sub-field. Therefore, part of IL can only be developed in the specialization, such as business administration. The staff of IIS at TU believed that it is always good to get training to be familiar with new databases, information resources, or information handling tools. They believed that to be information literate you have to improve yourself continuously. Seven out of ten interviewees at the University of Zagreb considered advanced training in IL useful, especially in structuring, organizing, and presenting information, assessment of information value; and in the ethical use of information and its referencing/documenting with software tools. Two interviewees did not give a clear answer and one interviewee considered such training not necessary.

### 3.2 Attitudes Towards Information Literacy

With regards to their attitudes towards IL, we asked the academics to:

- assess the importance of IL for HE in general and for the courses they teach,
- give their opinion how IL should be developed/taught.

In comparison to the two other departments, the business economists from the University of Graz assessed the importance of IL for universities slightly less important. Six interviewees rated IL as "very important", two as "important" and one as "partially important". Contrary to their colleagues from the University of Zagreb, they did not see any difference in the importance of IL in their courses/subject area. One researcher explained that IL was important because factual knowledge changes all the time. Therefore, students should be able to know where they can acquire the relevant information they need. With regard to the importance of IL elements, most interviewees referred to the related question covering IL elements (see Sect. 3.1). A number of comments indicated that IL was highly valued by the research participants of TU. This was quite obvious because the participants were from an information science institute. Some examples of the answers were: "We take IL very seriously and recognize it as an important learning outcome of the curriculum for our students"; "We use a lot of problem-based project work, and finding and presenting information in a good way is very important"; or, "In the LIS institute IL is just the core component of our curriculum." Also, all respondents from the University of Zagreb considered IL as being very important for HE. Six interviewees assessed IL as very important also for courses they teach. Two interviewees expressed a lower importance of IL in their courses, while two interviewees did not indicate their opinion about IL importance but considered it as an expected input competence of students.

Regarding the ways IL should be taught/developed, most interviewees (seven out of nine) at the University of Graz stated that IL should be provided in university courses. The majority of the business economists were in favour for separate IL courses. Slightly more than the half of the interviewees favoured obligatory courses. Two interviewees preferred an embedded approach [28]. According to two interviewees, both forms of IL education – teaching basic IL skills and knowledge in a separate course at the beginning of the studies and developing specific IL skills as part of subject-related courses later on, for instance, in a research seminar – might be the best way for developing IL. At the Institute of Information Studies of TU, IL was regarded as a core component of the curriculum. It was highlighted that, while it differs from other disciplines, IL is also an important part of professional competence of information professionals. The research participants indicated that in earlier times there were several separate courses for IL but nowadays IL forms a part of a constructive way of teaching and learning and the embedded approach is mainly used. Information-related competencies are developed by means of problem-based individual and collaborative work, literature review assignments, and research projects. Students have to find, evaluate, and use information effectively and ethically. Of course, the information science curriculum focuses also on specific courses that especially contribute to information-related competencies: information sources, information systems, and information management – but this is part of the professional competencies. Most of the interviewees at the University of Zagreb (seven out of ten) expressed their opinion that institutions should ensure courses on IL, while three interviewees believed that both the students/researchers should develop IL of their own and institutions should provide courses at the same time. Regarding the form of IL education, all interviewees agreed that it should primarily be a separate course that should be offered as early as possible at the beginning/first year of study. In addition, teachers should incorporate, at least to a lesser extent, necessary IL elements in their courses. Like their

colleagues from the University of Graz, the majority were in favour of obligatory courses while four interviewees opted for elective courses. The answers concerning the responsibility for IL development varied: four interviewees would prefer teachers, two argued for librarians, and three for a mixed approach (collaboration of the two). One interviewee suggested that university/faculty management should be responsible for IL development.

### 3.3 Motivation for Information Literacy Facilitation

When it comes to the motivation for facilitating IL at the University of Graz and at Tallinn University, it is a personal concern of all interviewees to increase IL of their students. Seven of the interviewees at University of Zagreb found themselves motivated to enhance IL of their students mostly because of some negative experiences with ethically incorrect situations – plagiarism and the benefits of facilitated communication with such IL educated students. Three interviewees were not so motivated expecting students to be already information literate before enrolling in their classes.

### 3.4 Information Literacy Practices

We also asked the interviewees to state if they teach some IL aspects/elements in their courses.

At the University of Graz, the interviewees referred to several above-mentioned IL elements. There is no business economist who does not integrate at least one element in his/her courses. "Having an overview of the most important sources of information," "being able to confidently and competently search for information," and "being able to assess the information quality and sources" received most mentions. Only one interviewee mentioned "being able to present information logically, concisely and accurately." All staff members from TU also indicated that IL elements are embedded in their courses. One interviewee referred to the supervised literature review assignment, another to the essay writing in her course, the third interviewee to the annotated bibliography assignment, and the fourth one to the problem-based assignment where students had to develop a learning object and find relevant literature to design the learning object and use suitable software. One interviewee also mentioned that her research methods course contains a large amount of IL elements and another one described an assignment to compile a Wikipedia entry as a collaborative group work. It was quite common that students had to find relevant resources in the class or in online assignments, to evaluate them, and use them ethically. However, it should be mentioned that courses such as "Information sources and retrieval," "Information and knowledge management systems and technologies," or "Ethics of information work" are not regarded as IL courses but, rather, as a part of the professional curriculum. Seven out of ten interviewees of the University of Zagreb stated that they teach some aspects/elements of IL (e.g. aspects such as business value of information, information management, information quality evaluation, referencing, information presenting, advanced information search, and/or ethics) in their courses, while three of them do not.

### 3.5 Required Information Literacy of Students

In another section of the interview guideline, we asked the research participants

- to express which IL skills they expect from their students, and
- to link IL skills with academic success.

All interviewees from the University of Graz referred in their answers to scholarly writing, a few of them mentioned master theses explicitly though the answers differed in the degree of detail. Several interviewees apply the IL elements given above such as, for instance, knowing where to find relevant information, searching for information, and performing plagiarism checks. Several interviewees added more detailed comments. Examples of expected IL skills were "using information critically," "scrutinizing collected data," "being able to present the state of the art about a certain topic," or "being able to analyze a research problem, to view it from different perspectives, to assess them critically, to recognize the intentions behind a certain position, to reflect them critically, and to make up one's own opinion". The interviewees at IIS from TU highlighted the ability to find, evaluate, and use information efficiently and ethically and usage of different components of IL in different context. In addition, they mentioned that critical thinking skills should be developed in the framework of IL. At the University of Zagreb respondents gave the following answers: to understand the research problem; to know how to gather information about it; to know how to structure information; to know how to process information; to present information clearly; to recognize the justification/legitimacy of research; to be able to identify and articulate information needs; to manage the literature using reference management system/software; to tailor information to a specific target group; to find relevant literature and its sources; to critically evaluate these sources; to summarize information; to know how to cite information (re)sources; and to learn new technologies.

When it comes to linking IL skills with academic success, seven interviewees from the University of Graz see a positive relation between the IL level and academic success though there are also other factors that might have an influence. Therefore, one interviewee even refused to assert such a correlation. Another interviewee suspects a much more complex relation. Six out of ten interviewees at the University of Zagreb thought that students who are information literate achieve better learning outcomes; two of the interviewees were not so sure about this. One interviewee answered, "I do not know" and one interviewee did not make any statement. The interviewees from TU agreed that without good information-related competencies students cannot achieve the expected learning outcomes – IL is part of an efficient learning and research process. However, IL should be embedded into the learning process and not taught as a separate skill. The interviewees recognized that it is evident that students are information literate if they choose good and relevant information resources for their assignments and research and if they use them ethically and efficiently. Poor learning outcomes are usually related with poor IL.

## 4 Conclusion

IL is a highly discussed issue in information studies and there is no doubt that IL has a great influence on study performance. However, the results of our study highlight that it cannot be taken as granted that IL is well known outside of the information science community. This is expressed through the answers of academics from the business administration and information systems schools. Though nearly all interviewees from the University of Zagreb said they were familiar with the concept of IL, this was only true for slightly more than the half of the business economists. When it comes to defining IL, only one interviewee from Graz could give a definition. Though more colleagues from the information systems department were able to do this, their definition was usually more IT-related. This was, of course, totally different for the information studies department where IL is regarded as a core concept in information science. This goes in line with the self-assessment of their IL skills. Where all interviewees from TU believed that they are information literate at least in their own area of expertise, this is only true for two thirds of the business economists and less than the half of the information systems scholars. It follows that the concept of IL is only partially known outside the library and information science community and therefore has to be promoted more strongly in academia. Since a high importance in HE was ascribed to IL also by all interviewees from business administration and information systems, there should be the necessary awareness for a more extensive IL development in other disciplines.

As was mentioned above, scholars from TU considered themselves to be information literate only in their own area of expertise; they considered themselves quite illiterate in other areas. This shows that IL is a highly subject and context dependent phenomenon. This was also confirmed by their colleagues from the other two departments, for instance, when asked for their opinions concerning the way how IL should be taught/developed. Though the majority of the interviewees opted for own IL courses designed to be offered closely after the beginning of the studies at the Universities of Graz and Zagreb, there were also several colleagues who were in favour of both separate IL courses and an embedded approach. Accordingly, basic IL skills and knowledge can be taught in a separate course. Specific and subject relevant IL can be developed later, for instance, in a research seminar. Not surprisingly, IIS at TU is most advanced. Here, IL forms part of a constructive way of teaching and learning, and information-related competencies are developed by means of problem-based individual and collaborative work.

Nearly all interviewees expressed that it is a personal concern for them to increase the IL skills of their students. And nearly all of them teach some IL-related elements in their courses. In many cases these IL elements were related to scholarly writing which is not surprising since the students have to compose seminar papers, bachelor and master theses, where these competences are needed.

## References


1. Rockman, I.F.: Strengthening connections between information literacy, general education and assessment efforts. Libr. Trends **51**(2), 185–198 (2002)
2. Julien, H., Genuis, S.K.: Librarians' experiences of the teaching role: a national survey of librarians. Libr. Inf. Sci. Res. **33**(2), 103–111 (2011)
3. Bowles-Terry, M.: Library instruction and academic success: a mixed-methods assessment of a library instruction program. Evid. Based Libr. Inf. Pract. [S.l.] **7**(1), 82–95 (2012)
4. Angell, K., Tewell, E.: Collaborating for academic success: a tri-institutional information literacy program for high school students. Public Serv. Quart. **9**(1), 1–19 (2013)
5. Lahlafi, A., Rushton, D.: Engaging international students in academic and information literacy. New Library World **116**(5/6), 277–288 (2015)
6. Bruce, C.: Faculty-librarian partnerships in Australian higher education: critical dimensions. Ref. Serv. Rev. **29**(2), 106–115 (2001)
7. Ivey, R.: Information literacy: how do librarians and academics work in partnership to deliver effective learning programs? Aust. Acad. Res. Libr. **34**(2), 100–113 (2003)
8. Markless, S., Streatfield, D.: Three decades of information literacy: redefining the para meters. In: Andretta, S. (ed.) Change and Challenge: Information Literacy for the 21st cen tury, pp. 15–36. Auslib, Adelaide (2007)
9. Tucci, V.K.: Faculty/librarian collaboration: catalyst for student learning and librarian growth. Sci. Technol. Libr. **30**(3), 292–305 (2011)
10. Massis, B.E.: Librarians and faculty collaboration – partners in student success. New Libr. World **113**(1/2), 90–93 (2012)
11. McGuinness, C.: Attitudes of academics to the library's role in information literacy education. In: Martin, A., Rader, H. (eds.) Information and IT Literacy: Enabling Learning in the 21st Century, pp. 244–254. Facet Publishing, London (2003)
12. Leong, K.: Information Literacy and TAFE Challenging Librarian and Teacher Collaboration in the VET Sector in a TAFE institution (2006). http://avetra.org.au/documents/06-Leong.pdf
13. Christiansen, L., Stombler, M., Thaxton, L.: A report on librarian-faculty relations from a sociological perspective. J. Acad. Libr. **30**(2), 116–121 (2004)
14. Virkus, S.: Development of information-related competencies in European higher open and distance learning: an exploration of contextual factors. PhD Thesis. Manchester Metropolitan University, Manchester (2011)
15. Bruce, C.S.: The Seven Faces of Information Literacy. Auslib Press, Adelaide (1997)
16. Lupton, M.: Information Literacy and Learning. AusLib Press, Adelaide (2008)
17. Boon, S., Johnston, B., Webber, S.: A Phenomenographic study of english faculty's conceptions of information literacy. J. Documentation **63**(2), 204–228 (2007)
18. Webber, S., Boon, S., Johnston, B.: A comparison of UK academics' conceptions of information literacy in two disciplines: english and marketing. Libr. Inf. Res. **29**(93), 4–15 (2005)
19. Virkus, S.: Information literacy in Europe: ten years later. In: Kurbanoğlu, S., Grassian, E., Mizrachi, D., Catts, R., Špiranec, S. (eds.) ECIL 2013. CCIS, vol. 397, pp. 250–257. Springer, Heidelberg (2013)
20. Virkus, S.: Development of information-related competencies in European ODL institutions. Nordic J. Inf. Literacy High. Educ. **3**(1), 120–140 (2011)
21. Virkus, S.: Development of information-related competencies in European ODL institutions: senior managers' view. New Library World **107**(11/12), 467–481 (2006)

22. Stefan, B.: Informationskompetenz von Studierenden der Betriebswirtschaftslehre aus Sicht von Mitarbeitern der Sozial- und Wirtschaftswissenschaftlichen Fakultät der Karl-Fran-zens-Universität Graz: eine explorative Studie. Master Thesis. University of Graz (2015)
23. American Library Association (ALA): American Library Association Presidential Committee on Information Literacy: Final Report. IL: American Library Association, Chicago (1989)
24. Chartered Institute of Library and Information Professionals (CILIP): Information literacy: definition. CILIP, London (2005). http://www.cilip.org.uk/get-involved/advocacy/learning/information-literacy/pages/definition.aspx
25. Doyle, C.: Information Literacy in an Information Society: A Concept for the Information Age. ERIC ED 372763, Syracuse, New York (1994)
26. Johnston, B., Webber, S.: Information literacy in higher education: a review and case study. Stud. High. Educ. **28**(3), 335–352 (2003)
27. Horton, F.W. Jr.: Understanding Information Literacy: a Primer. UNESCO, Paris (2008). http://unesdoc.unesco.org/images/0015/001570/157020E.pdf
28. Bundy, A.: Australian and New Zealand Information Literacy Framework: Principles, Standards and Practice, 2nd edn. Australian and New Zealand Institute for Information Literacy, Adelaide (2004)

# The Enactment of Information Literacy: An Exploratory Study Among Interdisciplinary PhD Students

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**Abstract.** This paper reports a practice-based study of the enactment of information literacy (IL) in a network of interdisciplinary PhD students. Previous research on this topic is scarce. The empirical material was produced through semi-structured interviews and work-place visits. It is concluded that the enactment of IL in the practice under study is a collectively sustained project that unfolds in dialogue with others and through interaction with material objects. This process comprises activities such as participation in seminars and conferences, which offer opportunities for discussions about work in progress, and is situated in socio-material practices shaped by historically developed conceptions of what it means to be an interdisciplinary researcher.

**Keywords:** Information literacy · PhD students · Interdisciplinary research

## 1 Introduction

This paper reports a practice-based [1] study of how information literacy (IL) of PhD students is enacted in an interdisciplinary research network focusing on design research. Of great importance according to this perspective is the issue of how people learn to engage with information in practice [2]. Being information literate in a specific research practice entails knowledge about what information sources that are deemed credible and thus valuable, what intellectual and physical tools to use for seeking information, and how to communicate in relation to the information used in the research practice.

It is well-established that information practices vary by discipline [3, 4] which implies that the newly recruited PhD student will have to pay attention to and learn how information is sought and used in the specific discipline he or she is active. That the PhD students, who have participated in the present study are active in an interdisciplinary research field with tilt towards the social sciences contributes to further complicate the understanding of how IL is enacted in the investigated practice. From an information perspective, interdisciplinarity can be related to the notions of core and scatter [5], according to which literatures are more or less concentrated in one discipline or distributed over a number of disciplines. In a similar vein but on the notion of "subject dispersion", Crane [6, p. 102] asserts that "[s]ocial sciences have a higher level of subject dispersion than do the natural sciences". In her review of the literature, Bates [7, p. 158] concludes, with reference to both Chubin and Crane, that "there may be dramatic


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differences in the kinds of strategies needed and the amount of effort needed to seek information, depending on the degree of coherence of the bibliographic resources of a field". In conclusion, it can be asserted that the newly recruited PhD student in an interdisciplinary field faces a demanding challenge with regards to IL.

The majority of studies of IL have been conducted in educational settings [8]. There are also a multitude of studies within the area of information behaviour that have explored how students on different levels in the education system search for and use information [9]. Even though there is an increasing number of studies that have taken a particular interest in the information practices of PhD students [10], research is scarce when it comes to this group in interdisciplinary fields.

The overarching aim of this study is to identify and elucidate IL within a complex and heterogeneous community of interdisciplinary PhD students. In order to meet the aim, the following research questions are addressed:

- How is information literacy learnt in the investigated practice?
- In what ways does information literacy relate to people and material objects in the practice under study?

Apart from contributing to the area of IL research the present study aspires to provide guidance and food for thought for prospective PhD students and their supervisors, and for librarians who are in the position of supporting PhD students' information practices.

## 2 PhD Students' Information Practices

A majority of the contributions to the library and information science (LIS) research literature that investigate PhD students is occupied with identifying, describing and analyzing information practices of this particular group. Most of the studies of doctoral students' information practice concentrate on specific aspects such as searching patterns [11], library use [12], citation or referencing practices [13], source use and information management [14], information needs [15], relevance assessment [16], and the role of people in the research process [17]. Several studies have employed a library perspective, which means that they strive to explore in what ways libraries and librarians can work in order to meet the interests of PhD students [18]. Most studies take disciplinary abode as their starting point. There is hence a range of studies investigating, for example, the information practices of PhD students in biology [15], history [12], business [19], physics and astronomy [20], and LIS [21]. Others are less specified and comprise broader groups of PhD students from areas such as the social sciences [22]. According to a comprehensive meta-synthesis of the literature on graduate students' information behaviour [10], graduate students tend to begin their research on the Web, they consult supervisors before other people, and they use libraries in diverse ways.

Summing up, it can be concluded that previous research tends to focus on what PhD students *do* in relation to information. In this respect they can throw light on the present study even though the paper at hand aspires to explicate how PhD students *learn to do* what they do, how they acquire and develop the skills and knowledge required for being a PhD student.

## 3 Research Context

There is no definite conceptual or definitional clarity regarding the concept of interdisciplinarity [23]. The definition applied in this study is to describe it as an area of knowledge production that crosses disciplinary boundaries [24].

The interdisciplinary practice of design research is characterized by heterogeneity and complexity. From a general perspective, it can be claimed that researchers in the area are occupied with the development of historical, theoretical and critical knowledge about design itself and design practice [25]. It can be concluded that design research is characterized by intellectual variety and fluidity in the sense that it is dealing with a range of different problems through the means of a variety of methods.

The research network that has been explored in the present study to a great extent mirrors the multifaceted and complex interdiscipline that emerges in the literature on interdisciplinarity [26]. The participants are all members of Nordcode, a Nordic network for research on communicative product design, which was established in 2000. Nordcode is geographically dispersed over four Nordic countries and eight universities. It gathers approximately 100 researchers and doctoral students. Even though the students come from different countries, the length and form of their PhD education is similar; they all include a certain portion of course work and the writing of a doctoral thesis.

## 4 Theory

The overarching theoretical framework guiding the study is grounded in practice theory. A common denominator for practice-based studies is the underlying assumption that social life is in flux and constantly and contingently transformed through establishments and dissolutions of connections. In this study, a practice is conceptualized as a "routinized way in which bodies are moved, objects are handled, subjects are treated, things are described and the world is understood" [27, p. 250].

A fruitful approach is to embrace the plurality of practice theories and turning the differences into strength [28]. Hence, five principles in tune with the empirical material and derived from this plurality have been developed and applied in order to guide the theorizing [29]. The first guiding principle is that (1) activities, if ever so mundane, provide access to practices. Therefore, in the analysis as well as in the empirical work, focus is on what is done rather than on who is doing. The analytical approach has, secondly, (2) striven for opportunities to include individual agency in the analysis. The conceptualization of practices as happening or taking place implies the notion of agency being distributed over people and material objects [33]. This is a standpoint that disputes the widespread conception of individuals being merely cognitive agents acting in accordance with rational choice [34]. The third guiding principle regards (3) the ambition of bringing material objects into focus [30–32]. It is argued that material objects contribute to coordinate and align practices. Fourthly: practices are always in a state of tension regarding what can be done and who can do what, therefore (4) in this study practices are perceived as constellations of power that allow people to do certain things but not others. The fifth and last principle concerns (5) knowledge which is conceived

of as collective. To be knowledgeable is, consequently, a matter of being able to act together with others, knowing what to do, what to say, how to speak and to know what tools to use in practice. These guiding principles in concert are shaping the theoretical lens through which the study object is explored.

## 5 Method

In the present study, a blended strategy inspired by Schatzki [35] has been applied. He suggests that "[u]nderstanding people's words for activities and practices provides access to the activities and practices that make up their practice-arrangement bundles" [35, pp. 24–25]. Furthermore, it is recommended that the researcher is "hanging out with, joining in with, talking to and watching, and getting together the people concerned". Additionally, it is suggested to study the relevant documents about the practice in question. Therefore, documents, such as the network Website, personal Websites, and documentation from seminars and meetings, were consulted. However, the bulk of the empirical material was produced through the means of interviews with the participating PhD students. In order to develop a sense for and knowledge about the investigated practice, further material was produced through a number of visits to the students' workplaces as well as through participation in seminars and conferences.

Ten PhD students were interviewed, seven women and three men, all in their 30s. They are located in six universities in four Nordic countries, and are at slightly different stages in their educational processes. All of them have participated in more than one network seminar and in doctoral courses arranged within the research network, and they have published research as either journal articles or conference contributions.

The semi-structured interviews were recorded and lasted for approximately one and a half hours. They were conducted on the basis of an interview guide on the following theme: *Measures taken to find and manage information and to be updated with the information area of the field*.

The interview transcripts were analyzed in accordance with qualitative content analysis [36]. At the beginning of the analytical process, open coding was applied in order to identify prominent themes in the empirical material. The process was then extended through constant comparative method [37] comprising a systematic comparison of each passage assigned to a specific theme with those already assigned to that theme, which entailed a process moving from the descriptive to the unfolding of more theoretical levels [38]. The analysis can be described as a recurrent close reading of the empirical material with a focus on instances related to the enactment of IL as these appear through the theoretical lens. Throughout the presentation of the results, excerpts from the empirical material are used to illustrate and support the analysis.

## 6 Results

The presentation of the results is structured according to the guiding principles presented in the theory section, but to avoid the risk of simplification and to elucidate the complexity of the investigated practice, the results are summarized in the concluding

section of the paper. Since attention to activities provides access to practice, the results section starts with an account of a set of salient activities in the enactment of IL among the PhD students in Nordcode.

### 6.1 Activities

The enactment of IL among the participants is associated with a range of different activities, that each contributes to the shaping of IL in the investigated practice. Several of the activities that appear as crucial for the enactment of IL are associated with collective action, of people doing things together. It is, for example, asserted that attending conferences is important because they provide opportunities for learning how "researchers reason and how networking works" (P1). In order to learn how to reason like a researcher, one needs to spend time with other researchers, listen to and interact with them, which can be done at conferences. But also to find out what conferences to attend, there is a need for networking and socializing, because *"what really forms the ground for your decisions regarding what conferences to attend is information that you receive when you talk to people: 'we usually go there' or 'I was there last year and that conference is also visited by them…'" (P1).*

From the above quote, it appears that there is a process of reproduction going on: the student receives advice from a colleague, which grounds his or her advice on the basis of someone else, who obviously is deemed credible and worth following and who has also been attending the conference in question. This is an observation that can also be traced to other prominent activities, namely those of writing and citing. It is generally asserted that much of the work carried out is conducted in "dialogue with those around you" (P8). For example, when you write "you are supposed to dutifully relate to what others have done before you" (P7). Even if it is not a matter of obligation, the activity of writing can still have a collective character. Following the discussions of others can be a matter of generating ideas and to get to know what to write about, as in the subsequent example where the student is discussing an e-mail list, which (s)he is subscribing to: *"If you go in there you can sometimes find a thread that can be wound up. I have found articles that way that have led me to full research questions, projects and so on"* (P2).

The idea of winding up a thread, as it is put in the excerpt above, corresponds with a picture that transpires from the empirical material, namely that the participants are engaged in an established, but somewhat vague, tradition of writing and of doing research. To learn IL to a great extent seems to be a matter of learning to subsume under this tradition. At the same time, however, it can be asserted that this winding activity constitutes a great challenge to these particular students. That they are active in an interdisciplinary field of research, and that this is seen as problematic, is a prominent theme in the empirical material.

Engaging in activities together with peers is obviously an important part of the enactment of IL among the PhD students in Nordcode. To participate in seminars and conferences, to discuss ones work and thereby become intellectually challenged seem to be crucial. It should also be noted that there are hardly any traces in the empirical material that indicate activities of extensive information seeking-activities in interaction with bibliographic databases.

### 6.2 Agency

Even though all of the participants in this study were recruited in their capacity of doctoral students, they are also, simultaneously, members of other communities of practice, as can be seen in the following quote: *"You have a lot of stuff that you for one reason or another must read, you may take a course or you are reviewing a paper for a conference, or you comment on a colleague's paper, or you have students on an advanced level working on something that is near your own subject and they have found a lot of interesting stuff…"* (P5).

The participant is talking about how (s)he frequently tends to bump into information as a result of being engaged in various interlinked activities in which agency clearly seems to be distributed over a range of actors: a teacher in a course, the editorial board of a conference, and supervised students. Being capable of subsuming under this practice is part of the enactment of IL.

Throughout the empirical material, there are indications that the students are caught up in bundles of activities where other people inevitably contribute to the enactment of IL.

Seen against the previous section, in which it was concluded that participation with peers constitute an important element of the enactment of IL, the focus on agency illuminates how the people around the student, but also the physical locations, intervene and thereby contribute to regulate the information practice.

### 6.3 Materiality

In the subsequent result presentation, the intention is to highlight the prominent position of material objects regardless of their potential degree of agency. In the empirical material, materiality is to a great extent connected to locations and places, for example as in the following quote: *"As a PhD student you take method courses, courses in theory of science and philosophy, you attend seminars where people talk about research, but there is no one who tells you that if you want to become a successful researcher, you need to spend time in the copying-machine room and drink coffee there"* (P1).

What is stated in the quote highlights two important material aspects in the enactment of IL. One is that the practice of being a PhD student is infused with breaks during which one is expected to engage in the activity of coffee drinking. Without being a significant observation, the instance of coffee breaks functions well as an illustration of something that is done in practice without much reflection. From an analytical perspective, it can be stated that the copying-machine functions as a coordinator of activities which is of particular importance in a community of practice where the activity of discussing is deemed important. The other observation is that in the workplace where this particular student is, the copying-machine room seems to be functioning as a coordinating object that needs to be taken into consideration when exploring the enactment of IL.

The material surroundings are providing opportunities for information seeking in various ways, for example through arrangements such as digital and traditional libraries, through which students make use of services such as the opportunity to subscribe to digitally delivered tables of contents.

In summary, regarding materiality, it can be stated that the ability to handle tools for information seeking and use, and to be capable of assessing and reading the material surroundings, so that it becomes possible to discern where the important places for discussions and dialogue are located, are salient features of the enactment of IL.

### 6.4 Power

Practices can be perceived as constellations of power that allow people to do certain things but not others. The students, for example, perceive conferences as important learning opportunities, but due to a lack of funding they are not always possible to attend. Economic conditions contribute, in different ways, to the shaping of what can be done in practice. Economy, in turn, also somewhat dictates the activities of publishing. Where you publish "affect you as a researcher in the future, if you want to get funding you have to get published in journals with good ratings" (P7). In the empirical material, there are recurrent statements, which refer to the interdisciplinary nature of design research, about the difficulties in finding journals that match the students' research interests. The previous excerpt indicates that this difficulty is not only a matter of matching journal profile with research interests, but also of finding the acclaimed and high-ranked journals.

The Nordcode network is generally perceived as providing good opportunities for fruitful discussions about research. There are several statements that aspire to explain why this is, of which some can be seen as touching upon aspects of power. Once again we are returning to the issue of economy (and ownership), but also to the issue of politics: *"There hasn't been an owner of the network and most of the people that are engaged in the steering group do their work on an idealistic basis so there is no politics in it"* (P3).

The notion of "an idealistic basis" is reverberating throughout the empirical material in connection to statements about Nordcode, which appears as "a safety framework" (P4) in which people take care of each other with no hidden agenda.

In sum, it can be argued that the constellation of power characterizing the explored practices of the interdisciplinary PhD students include aspects, which concern economy, hierarchical order, and hidden agendas.

### 6.5 Knowledge

The issue of knowledge is permeating all parts of the empirical material. The matter of knowing is also intrinsic to IL, but whereas the issue of knowledge in the previous result sections was relegated to the background, this section aspires to analytically foreground the question of what it means to be knowledgeable with regards to information in the investigated practice of interdisciplinary PhD students.

The following short quote encapsulates a number of aspects of what is needed to know as a PhD student: *"I was absolutely new as a PhD student, so I didn't know who to talk to, I didn't know what was done before, which you can find out if you know what you are looking for, but you don't know that in the beginning"* (P1).

At the very beginning of the study program, the student in the above excerpt had not yet developed the ability to orientate in the research practice and the connected literature, and since (s)he did not know what (s)he was expected to know, (s)he could not figure out who to ask for assistance. Expressions of this sense of not really knowing what one is supposed to do is prevailing in the empirical material, also among those participants who have come further into the study program: *"Sometimes I can long for a context where you do research on the third caudal vertebra of a rat, together with the greatest rat tail-professor…then you know what you are supposed to do and you know what material and what information is relevant, what you are supposed to delve into and what you can put aside"* (P2).

The ideal scenario appearing in the above quote stands in stark contrast to the dominating view in the empirical material of the field that the students are active in: *"[Design research] is very fractioned, divided into a number of different schools and orientations and it feels as if it is torn some-how… in its ambition to find a common orientation, a common idea about what it is supposed to be about and what is important and so on"* (P10).

This fragmented character of the field, which brings about challenges such as a scattered literature, is not only a difficulty in itself. It also gives rise to specific demands regarding the positioning of ones work.

In a field that is so heterogeneous and where there are a multitude of possible research topics and information sources, there is a need for strategies regarding how to assess and evaluate information and people. A prominent feature in such strategies is to develop the competency of recognizing cognitive authorities [39].

How this strategy, or competence, is learnt is indicated in the following quote: *"It is kind of an unconscious process somehow, you make a lot of choices, but it could, for example, be that if someone is extremely quantitative in his or her approach, then it is far away, I mean, then it is probably very difficult to integrate what this person has to say in one's own dissertation…"* (P10).

Despite the fact that this competence of evaluation is presented as an unconscious process, it is hinted towards the middle of the above quote where the student implies that the process of evaluation is related to, for example, the methodological approach applied in the work which is to be evaluated.

Even though a great deal of knowledge, according to the statements in the empirical material, seems to be developed unconsciously, there are also instances where the tools that are used in connection with, for example, evaluation of information are highlighted. One such tool is the library: "Somehow it feels a bit more comfortable when you find information through the library [because it adds to the credibility]" (P6). Another tool is provided through the system of citations: "someone who has written a lot and who is much cited… it simply feels credible, you sense that they know what they are talking about" (P6).

In summary, the central features regarding the knowledge needed in relation to information concern navigating a fragmented research field and assessing its cognitive authorities. The issue of positioning oneself, which is done, for example, through applying a suitable vocabulary and tuning into the right conceptual discourse, are also important aspects of the knowledge needed for the enactment of IL in the investigated practice.

## 7 Conclusion

With reference to the results, it can be claimed that the enactment of IL in the practice under study is a collectively sustained project that unfolds in dialogue with others and trough interaction with material objects. More specifically, this project comprises, for example, activities such as participation in seminars and conferences, which offer opportunities for discussions about work in progress. The enactment is, moreover, situated in socio-material practices shaped by historically developed conceptions of what it means to be a design researcher; conceptions that the students are supposed to learn how to "wind up". Involved in this project, the students face challenges in relation to positioning themselves in a fragmented interdisciplinary field, and in relation to a hegemonic academic discourse as well as hidden agendas in the university system.

To explicitly address the research question about how IL is learnt in the practice under study, it can be stated that the PhD students in this interdisciplinary network seem to be more or less constantly engaged in the enactment of IL. This learning in practice takes place in dialogue with others who can be both co-located (fellow students, supervisors and conference attendees) and distantly located, for example contributors to e-mail lists and the literature. By answering the first research question, the second question is also partly addressed, namely regarding in what ways IL relates to people and material objects. The enactment of IL occurs through discussions about work in progress, through processes of evaluation and assessment of texts and authors, and through mundane everyday activities such as participating in meetings, which offer insights into how to navigate, in the broadest sense, the world of academia. A crucial part of learning IL, which in practice is inseparable from interaction with others, is to pay attention to physical surroundings and material objects. Knowing IL in practice hence entails, for example, the ability to being in the right place and the use of suitable tools for information seeking and use.

The study at hand supports previous research on the role of people in the research process, which, for example, suggests that other students help to shape graduate students' research activities [17]. However, the assertion that graduate students tend to begin their research on the Web [10] is disputed by this study. For prospective PhD students in interdisciplinary fields as well as for their supervisors, and also for librarians who are supposed to serve these groups, the conceptualization of IL as it emerges in the present study is worth taking into consideration.

## References

1. Gherardi, S.: How to Conduct a Practice-Based Study: Problems and Methods. Edward Elgar, Cheltenham (2012)
2. Cox, A.: An exploration of the practice approach and its place in information science. J. Inf. Sci. **38**, 176–188 (2012)
3. Hjørland, B., Albrechtsen, H.: Toward a new horizon in information science: domain-analysis. J. Am. Soc. Inf. Sci. **46**, 400–425 (1995)
4. Talja, S., Maula, H.: Reasons for the use and non-use of electronic journals and databases: a domain analytic study in four scholarly disciplines. J. Documentation **59**, 673–691 (2003)

5. Chubin, D.E.: The Conceptualization of scientific specialties. The Sociological Quarterly **17**, 448–476 (1976)
6. Crane, D.: Invisible Colleges: Diffusion of Knowledge in Scientific Communities. The University of Chicago Press, Chicago and London (1972)
7. Bates, M.: Learning about the information seeking of interdisciplinary scholars and students. Libr. Trends **45**, 155–164 (1996)
8. Whitworth, A.: Radical Information Literacy: Reclaiming the Political Heart of the IL Movement. Chandos Publishing, London (2014)
9. Case, D.O.: Looking for Information: A Survey of Research on Information Seeking, Needs, and Behavior, 3rd edn. Bingley, Emerald (2012)
10. Catalano, A.J.: Patterns of graduate students' information seeking behaviour: a meta-synthesis of the literature. J. Documentation **69**, 243–274 (2013)
11. Carpenter, J.: Researchers of tomorrow: the research behaviour of generation y doctoral students. Inf. Serv. Use. **32**, 3–17 (2012)
12. Delgadillo, R., Lynch, B.P.: Future historians: their quest for information. Coll. Res. Libr. **60**, 245–259 (1999)
13. Larivière, V., Sugimoto, C.R., Bergeron, P.: In their own image? a comparison of doctoral students' and faculty members' referencing behaviour. J. Am. Soc. Inform. Sci. Technol. **64**, 1045–1054 (2013)
14. Wiliamson, K., Bernath, V., Wright, S., Sullivan, J.: Research students in the electronic age: impacts of changing information behaviour on information literacy needs. Communications in Information Literacy (2007). http://www.comminfolit.org/index.php?journal=cil&page=article&op=viewArticle&path[]=Fall2007AR1&path[]=48
15. Vezzosi, M.: Doctoral students' information behaviour: an exploratory study at the University of Parma (Italy). New Libr. World **110**, 65–80 (2008)
16. Steinerová, J.: Seeking relevance in academic information use. Information Research, 13 (2008). http://InformationR.net/ir/13-4/paper380.html
17. George, C., Bright, A., Hurlbert, T., Linke, E.C., St. Clair, G., Stein, J.: Scholarly use of information: graduate students' information seeking behaviour. Information Research, 11 (2006) http://InformationR.net/ir/11-4/paper272.html
18. Gullbekk, E., Rullestad, T., Torras I Calvo, M-C.: PhD Candidates and the Research Process: The Library's Contribution. Universitetsbiblioteket i Oslo, Oslo (2013)
19. Bøyum, I., Aabø, S.: The information practices of business PhD students. New Library World. **116**, 187–200 (2015)
20. Jamali, H.R., Nicholas, D.: Interdisciplinarity and the information-seeking behaviour of scientists. Inf. Process. Manage. **46**, 233–243 (2010)
21. Lee, J., Anderson, A., Burnett, G.: Peer Relationships and Information Sharing between LIS Doctoral Students. In: Proceedings of the 77th ASIS&T Annual Meeting, vol. 51, pp. 1–4 (2014)
22. Fleming-May, R., Yuro, L.: From student to scholar: the academic library and social sciences PhD students' transformation. Portal Libr. Acad. **9**, 199–221 (2009)
23. Salter, L., Hearn, A. (eds.): Outside the Lines: Issues in Interdisciplinary Research. McGill-Queen's Univ. Press, Montreal (1997)
24. Frodeman, R.: Introduction. In: Frodeman, R. (ed.) The Oxford Handbook of Interdisciplinarity, pp. xxiv–xxxviii. Oxford University Press, Oxford (2010)
25. Boradkar, P.: design as problem solving. In: Frodeman, R. (ed.) The Oxford Handbook of Interdisciplinarity. Oxford University Press, Oxford (2010)
26. Frodeman, R. (red.): The Oxford Handbook of Interdisciplinarity. Oxford University Press, Oxford (2010)

27. Reckwitz, A.: Toward a theory of social practices: a development in culturalist theorizing. Eur. J. Soc. Theor. **5**, 243–263 (2002)
28. Nicolini, D.: Practice Theory, Work, and Organization: An Introduction. Oxford University Press, Oxford (2012)
29. Pilerot, O.: Design Researchers' Information Sharing: The Enactment of a Discipline. Valfrid, Borås (2014)
30. Knorr Cetina, K.: Sociality with objects: social relations in postsocial knowledge societies. Theo. Culture Soc. **14**, 1–30 (1997)
31. Suchman, L.: Affiliative Objects. Organization **12**, 379–399 (2005)
32. Barad, K.M.: Posthumanist performativity: toward an understanding of how matter comes to matter. Signs J. Women Culture Soc. **28**, 801–831 (2003)
33. Gherardi, S.: Introduction: the critical power of the 'Practice Lens'. Manage. Learn. **40**, 115–128 (2009)
34. Shove, E., Pantzar, M., Watson, M.: The Dynamics of Social Practice: Everyday Life and How it Changes. SAGE Publications, Thousand Oaks (2012)
35. Schatzki, T.R.: A primer on practices: theory and research. In: Higgs, J. (ed.) Practice-Based Education: Perspectives and Strategies, pp. 13–26. Sense Publishers, Rotterdam (2012)
36. Zhang, Y., Wildemuth, B.M.: Qualitative analysis of content. In: Wildemuth, B. (ed.) Applications of Social Research Methods to Questions in Information and Library Science, pp. 308–319. Libraries Unlimited, Westport, CT (2009)
37. Corbin, J., Strauss, A.: Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory, 3rd edn. SAGE Publications, Thousand Oaks (2008)
38. Kvale, S., Brinkmann, S.: InterViews: Learning the Craft of Qualitative Research Interviewing, 2nd edn. Sage Publications, Los Angeles (2009)
39. Wilson, P.: Second-Hand Knowledge: An Inquiry into Cognitive Authority. Greenwood P, Westport (1983)

# Systemic Disturbances in Thesis Production Processes

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**Abstract.** This paper discusses disturbances in thesis production processes that lead to anomalies in information use such as insufficient referencing and plagiarism in theses made in Finnish universities of applied sciences. We develop discussion concerning systemic dynamics of these anomalies. Four different cases of information use which are the result of vague referencing or plagiarism, and the possible solutions are presented. The librarians' role on the borderline between traditional intermediary positions and their potential for more interventionist ones are discussed. Librarians can contribute to the thesis production processes in which several cultures of information seeking and use meet and challenge each other. Thesis production and evaluation processes are not homogenous. Instead, elements of machine-like systems as well as those of individuals' unique being-in-the-world contexts appear together forming colonies of information use practices that can ignore problems in references and information seeking or allow plagiarism.

**Keywords:** Information use · References · Plagiarism · Universities of applied sciences · Theses

## 1 Introduction

Since 2009, Finnish Universities of Applied Sciences (UASs) have been publishing students' theses in the Theseus full-text database. This database offers researchers an opportunity to explore patterns of information use. Vague and insufficient references and plagiarism are examples of information use anomalies. These anomalies can be defined as problems in knowledge levels of students, information literacy skills and attitudes of students. These definitions focus on the student isolating the problem from related organizational structures. For example personal thesis guidance may focus only on professional content and general writing guidelines come from a different source.


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It is tempting to accuse the students of not following the rules and conventions of traditional thesis writing. In this paper, instead of focusing on students, we develop a discussion concerning the systemic background of these anomalies with the aim of improving related practices. We do not consider the UAS institutions as neutral environments or innocent victims and the students as the "sinners". We choose a different point of view by presenting selected cases and analyzing information use anomalies that are present in theses published in Finnish Universities of Applied Sciences.

## 2 The Reformation of the Finnish Higher Education System

The Finnish higher education reformation started in the 1990's when Finland was developing a dual system of higher education consisting of (research) universities and polytechnics. The polytechnic higher education system was built from the previous colleges that offered vocational education in, for example, nursing, commerce and engineering. This process was based on the idea that a larger amount of more highly educated workforce was required in Finland in order to be more competitive globally. This led to the optimistic goal of half the population having a higher education degree - at present, in the 25–34 age group, on average 40 % have a third level degree.

The reformation has continued: the polytechnics have adopted the name Universities of Applied Sciences and the legislation has been reformed as well. The recent economic turndown has led to a decrease in the number of higher education institutions, mainly by mergers. The number of students in degree studies in UASs kept increasing until 2010 and has since stayed at the level of 139,000 degree students. The annual student intake is 39,000 [1]. There has been a slight decrease in the number of new students in Bachelor studies in the last ten years, but there is a significant increase in the number of new students in Master level studies.

The economy and the needs of the private sector have started to affect higher education policy and the former autonomy of the public sector actors, for example libraries and educational institutions. As Buschman [2] has shown, this trend started in the U.S.A. during Reagan's administration when the so called new public management (NPM) started to evolve. This meant that the rhetoric of the commerce and business started to supersede the former rhetoric of civic society and education in the public educational sector.

The result of this development can also be seen in Finland. At present the outcomes of higher education are seen as products with price tags. Universities get funding based on the numbers of publications and degrees – in a sense the government buys them. Thus the former idea of education as an autonomous and self-regulated process has been reduced to buying degrees from universities. This is evident also in the funding models of the Finnish higher education: the UASs funding model is heavily based on quantity as approximately 80 % of their funding is determined by the number of degrees. The quality of education is not taken into account [3]. This may put economic efficiency ahead of the quality of higher education especially as most UASs act as limited companies and not as units under the government or local municipalities. All of these factors may lead to a situation where theses of poor quality are accepted in UASs.

The idea to make Finnish UAS theses available online was realized in the form of Theseus full-text database, the development of which started in 2005. In the background of the database there was a more modest idea that only the abstracts would be published and the full-text theses would remain in hard copy form stored in the UAS libraries. The database made textual and information structures of the theses visible to an extent not possible before. It created a new insight to the different subcultures of making theses in Finnish UASs. In addition, a new tool set for UAS-related thesis research appeared. However, in its current form the database has had negative side effects: It created a powerful means to plagiarize more easily. Students are able to copy both ideas and research designs and formats as well as relevant textual chunks directly from a previously published thesis and modify them as required.

## 3 Systemic Contexts in Preparing and Finalizing Theses at UASs

Two systemic frameworks are used here in conceptualizing information use phenomena around the thesis-related activities:

1. Framework of three systemic metaphors: machine, being-in-the-world and colonial system stand for the basic ways a system can exist and function.
2. Framework of activity systems present in preparing and finalizing theses consists of the factitive system (maintaining the processes to accept the theses), the support system (teaching, guidance) and the object system (students writing the theses).

We apply these two frameworks to characterize relations and tensions between actors present in thesis activities. Framework 1 represents the assumptions behind general system concepts used here. Information use activities as a whole contain both technical (machine, routines) and unique human life events. When put together, they form a colony level system view, which is based on a continuum of different ways to exist [4]. Framework 2 is more application-specific and is focused on division of labor in thesis production. Framework 2 is an application from Engeström's "network of activity systems" [5] used as typology of systems' roles.

The thesis-related processes at Finnish UASs are basically performed in the frame of three subsystems, each of which has their own set of ontological assumptions:

1. The factitive system fulfills the administrative tasks related to production of completed theses. The number of theses accepted is a criterion for government support to UASs which is documented in performance agreements between each UAS and the Ministry of Education and Culture.
2. The object system represents the thesis research and reporting process as part of each student's course of life. Completion (or failure) in the thesis process is an event in the student's personal life, in a context in one's being-in-the-world.
3. The support system contains the activities and resources that are offered to help students in completing their theses.

All these processes seem to have specific dynamics of their own. Since theses have been made an obligatory part of the Finnish UAS curriculum, the factitive system has

kept on working on a routine basis. For the object system, a single thesis process appears as a non-recurrent event and a unique experience for each student. The support system again has its own modes of operation: the support appears as interventions, be they long lasting processes to create practices and rules or spontaneous acts of giving personal or group based ad hoc guidance and help.

This dynamics of multiple systems' behavior is invisibly present in the being of a UAS, until it is made explicit by research [6]. The next phase is to apply these findings by offering practical interventions to handle information use anomalies as outlined below in four different cases.

## 4 Examples of Information Use Anomalies

The case examples discussed here have come forward during the authors' work and research activities. They are interpreted here as evidence of problematic information use issues in preparing and finalizing Bachelor's and Master's theses at Finnish Universities of Applied Sciences. In the following subsections we present four cases, identify their core problems and suggest interventions as proposed solutions.

### 4.1 Case A: Unclear References Within Thesis Text

Students in third level education are expected to accurately reference the texts they have studied, and use the latest knowledge on the topic they have chosen. Using references in theses is a means to produce academic emphasis within UAS culture [7]. In a study on referencing practices constant inaccuracies in referencing were found in 17 % of theses published in Theseus. In a further 12 % referencing failed, as copy-paste plagiarism was found in the theoretical and methodological parts of theses [8].

Case A is an example of a list of in-text references given at the end of one paragraph. The student gives the reader the impression that one paragraph is based on eight different sources written by different authors. The reader does not know whether all of the information given in the paragraph has been published in all eight sources or if the student has taken bits of information from each source and integrated them into one paragraph. This could also be a case of referring to secondary sources if some of the references were included in a source that the student used. This kind of referencing style is an example of inaccuracy and can lead to misinterpretation of original author's ideas.

**Problems**: While institutions and text books offer principles and exact examples on referencing, these instructions are not followed in all theses. The factitive system does not function in uniform: all students are not expected to follow the writing and referencing norms, all guidance processes do not cover accuracy in information use, or thesis evaluation criteria are not used coherently.

**Proposed Solution:** Generally, UASs should update their overall views on knowledge acquisition and use. A certain gray area exists between knowledge practices followed by scientists, professionals, laymen and students. Knowledge concepts and criteria applied in Bachelor's theses written by UAS students are mixtures of these backgrounds.

Behaviorist approaches, in which teachers argue forcibly for scientific information practices but are not prepared to argue for these practices in professionals' everyday routines, collide with Internet native students' experiences on easier, non-formal, ways to use information.

We propose that the very ideas of a reference and a source should be taken as tools to be built together among students, industrial partners, teachers, libraries and the Internet. The processes in which negotiated concepts are built are essential skills and valuable learning results in higher education today.

### 4.2 Case B: Plagiarism in Thesis Text

All higher education institutions in Finland are adhered to follow the ethical guidelines for good scientific practice provided by Finnish Advisory Board for Research integrity [9]. In the guidelines plagiarism is defined as fraud and forbidden. Our second example is from a Master's thesis accepted and published by a UAS. Major sections of text under theoretical and methodological issues are plagiarized. It is not an isolated case. It represents an example of systemic practice in Theseus publishing as it has been found that at least 12 % of thesis includes plagiarized material [8]. In this case, the student has produced a thesis in which multiple pages of text consist of copied paragraphs from various earlier theses and dissertations that are available on the Internet. Texts published earlier on Theseus have also been used.

This anomaly consists of plagiarism or text recycling in a way that the student himself does not perform information seeking using primary sources on his topic and there is no evidence that the citations and references in the thesis are based on the student actually reading the exact primary texts he lists as his sources. Instead, the student has used a simple copy-paste technique to copy paragraphs from previously published texts about the same topic. Paragraphs of text are taken from various sources, and the student fades out the source he used by systematically changing the word order in almost every sentence and by using synonyms. However, the sentence order, in-text references and reference information are identical with the original texts.

**Problems:** Tensions occur between ethical principles of academic writing and the thesis text authored by the student. Information seeking efforts have been focused on secondary sources. Earlier evidence exists about conflicts between staff groups and management in UASs in defining plagiarism.

In systemic terms, contradictions appear between factitive, support and object systems. It seems that factitive and object systems emphasize straight-forward finalization of the thesis at hand whereas the support system stands for critical and more ethically sensitive views. In terms of background assumptions, the factitive and object systems mostly follow the machine analogy in thesis process. The support system emphasizes the nature of colonies, to which the students would join their theses through plagiarism. Both students' and teachers' being-in-the-world would carry the event, although for them the role of the event is different. Thus a technically insignificant copy-paste operation legalized by the UAS's factitive system also has a more permanent effect, both as the individuals' life events and in developing certain questionable information use colonies further.

**Proposed Solution:** Both the problem discussed here and the solution has systemic nature. The process of making a thesis is not isolated from the environment that contains, for example, values related to information use, and tools like databases, Google and Theseus. It also contains principles concerning division of labor as well as conflicts between parts of the whole. We should allow and encourage these conflicts to surface. Besides an ethical problem, plagiarism is also a handy technique to complete one's thesis quickly as well as to increase the budget of the UAS.

If both the students and the UASs accept the results of plagiarism as a good means to increase the number of the graduates, it should be proclaimed openly and a national pro plagiarism program be planned. If not, a visible statement against plagiarism ought to be declared.

### 4.3 Case C: Student Receives Disparate Instructions to Finalize the Thesis

Mutual trust and respect play an important role in the final phase of the thesis process. Trust is best understood as shared interests [10]. The students are expected to aim at a thesis of high quality. It is in the interest of the supervisor, the language consultant and the UAS to support the students in their task.

In case C, the student sends the final version of the manuscript to the language consultant for language inspection. The consultant comments on the text and presents improvement proposals to the student. This is a critical phase in the process since the student alone is, from now on, responsible for any changes made in the text.

**Problems:** The consultant trusts that the student revises the text carefully and also considers the comments he gets from the peers in the presentation seminar. Since there is no control by the factitive system, it occasionally happens that the student ignores the proposals and instructions partly or altogether in the final version. It is also possible that he or she uploads parts of a wrong version of the text to the database.

**Proposed Solution:** The student is seen here as the only actor responsible for making changes suggested. Technically speaking, the connections between object, factitive and support systems are overly optimized or originally built too loose. The UAS should guarantee sufficient resources for language consultants to make sure that the changes suggested have been implemented in the final versions of the theses. However, it can be a sensitive issue for any UAS to admit that their students would fail to follow the teachers' remarks during thesis process at the same time when they are considered promising junior experts.

### 4.4 Case D: Severe Problems in Finding Relevant Studies

In case D, the student repeats the false argument that her topic has not been studied earlier. Therefore she is in trouble with finding relevant literature for her thesis. In her study journal she maintains, that besides herself, both the teacher and project partners share the idea of the research gap. However, a few simple searches in databases and

library catalogs can tell that this hypothesis or theory-in-use is false: The topic has been studied earlier, but to find relevant reports requires the use of synonyms and broader terms in searches.

**Problems:** The situations, in which students argue that their topics lack relevant research are common in educational library work [11]. In our case D, the situation is complicated by the fact that both the teacher and project partners share the view.

**Proposed Solution:** The problem appears in a form in which it is harder to identify the problem than to find a solution. Any librarian or information specialist can easily carry out a set of searches that falsify the mistaken theory-in-use at hand. More serious issues may appear concerning prestige between information seeking and substance experts. Library staff may quite easily point out that a student didn't carry out thorough searches on relevant databases, but to tell the same to a member of teaching staff or a representative of a valuable industrial partner can be outside a librarian's comfort zone, because the non-interference principle (discussed below) does not hold [12].

In terms of systemic views, problems in search tactics belong to a different category from the ones in which the customer's (or librarian's) ego is put to a test. Systemic assumptions of "Machine" and "Being-in-the-world" are discussed respectively [4, 13]. Efforts invested in building trust between information professionals, students and teachers may turn out valuable when these kinds of problems appear.

## 5 The Roles of Library Staff in Interventions

In modernist settings, during the pre-internet era, the positions of library staff were strongly based on intermediary roles, that is gatekeepers between customers and complicated information seeking and management facilities and related principles of organizing information. The pathways from information needs to sources appeared to have quite a hierarchical nature. Known hierarchies were thought to lead from ideas to relevant sources. The central implicit part of education was to learn the essential principles of organizing knowledge and its relation to power. Then came the post-structuralists, Ted Nelson, nonlinearity, links and finally the Web and Wikipedia. Even before, Ranganathan (by introducing the principles of facet analysis) and Soergel (through discussions on polyhierarchy) had already given hints to library staff that the traditional idea of monohierarchy as an information ordering principle can be challenged [14, 15].

However, the main roles of information professionals in libraries were still based on bystanders' positions as far as production of new knowledge was concerned. We have elsewhere [12] coined the term non-interference principle to conceptualize this position: library professionals are oriented towards organizing, cataloging and indexing, but not creating information by themselves. It is up to customers how to use and create information. Contradictions between the non-interference principle and the strong emphasis on information literacy are evident. We will discuss the roles of library staff in the cases mentioned above.

In several UASs, members of library staff have a role in the storing of the theses in Theseus. Besides indexing, some of them are responsible for using, for example, Urkund to reveal plagiarism. During this process they necessarily become aware of the quality of references used (see case A). How should they react? As agents of information literacy, they should note the issues and inform students as well as teachers. According to the non-interference principle they should close their eyes, because references are evidently about information use, which is up to the customer, by definition.

In case D, one can find a complicated situation concerning librarian's traditional position: the library is expected to offer preliminary introduction about information seeking but during the thesis processes library staff usually have neither motivation nor official means to follow how thesis projects go on in terms of information sources, seeking and use. In cases where the teacher is not aware of information problems or misunderstands the issues, the potential of library staff probably remains unused.

In these cases one sees a contradictory issue that Engeström calls the double-bind: an actor receives two messages that deny each other [5]. When double bind situations are found, the structure of activity at hand should be analyzed and developed further. To recognize double binds in current situations is a prerequisite to see the need to reorganize the activity system. This may mean, for example, new divisions of labor or new tools (conceptual or technical) be developed. In case D it may even mean that the thesis should appear as a new kind of object for library staff, namely one which you share with students and teachers and use together as a tool to advance information literacy. In other words, during the analysis, the library staff's principle of non-interference may become an interventionist one.

## 6 The Thesis Process as Sisyphean Labor?

In Greek mythology Sisyphus was punished for deceitfulness and forced to push a huge stone up a mountain and after the stone had rolled down Sisyphus was to start this work again and again. This metaphor was used, for example, by Rautopuro in his research on teaching statistical research methodology to university students [16].

We emphasize here, that the issues related to the practices of information use are remarkable and intrinsic parts of UAS thesis related systemic activities. This means that you can't find or suggest a panacea to solve or heal them. Instead, the UAS community should adopt these issues as part of their very task of education. Also, efforts in analysis and policy design should be made to make the knowledge-related concepts and values of UASs visible. It is not the lot of students to carry this burden instead of the institution and personnel, whether the students are clever internet-natives or not.

As mentioned above, there is no hope that the issues related to information use, ethics and quality would finally be solved. This makes the work of teachers and library staff a Sisyphean one: again and again, you will meet new cohorts of students asking the same questions and making the same errors (or using the same shortcuts, as they may see it). Albert Camus says in "The Myth of Sisyphus" that when the stone has dropped again, and Sisyphus returns down for it, he achieves happiness, although he knows that the task would repeat eternally the same [17].

## 7 Conclusion

We argue here that the set of thesis-related processes discussed above is not to be reduced into a single system, because activity systems found maintaining processes behave differently. Instead, every UAS needs to develop means to understand and handle this inherent systemic complexity. In other words, any UAS is required to make its theories-in-use concerning theses explicit to different groups of relevant actors. This challenge is a cyclic one, because every new cohort of students, as well as new members of staff need to develop their own understanding about thesis-related activities in the UAS.

In terms of systemic background assumptions, the thesis writing process appears to teachers (who follow the machine analogy) as mundane application of practices known and rules taught before, whereas to the student (in his or her unique being-in-the-world) the process occurs in an exceptional, liminal space, where the student undergoes a rite that clearly differs from ordinary atmosphere of both earlier studies and work to come. The shared challenge for students, teachers and also library professionals is how these views can co-operate. The aim is to connect the student's thesis both as a product and as an experience to the pedagogically suitable information colonies that are informative, ethical, practical and theoretical enough.

Different systems of values conflict in the thesis making process. Universities of applied sciences should note that thesis making and evaluation processes are not homogenous in the sense of systemic backgrounds. Instead, elements of machine-like systems as well as those of individuals' unique being-in-the-world contexts appear together forming colonies of information practices that can ignore problems in references and information seeking or allow plagiarism.

The economic and political pressures emphasize the economical values and efficiency of the process. The utmost example of the efficiency is of course copy-pasting and robot writing. The scientific values emphasize the code of ethics of scientific communism where the network appraisal and referencing is done openly and the evolution of science that is based on the work done during the history of science. The hacker ethics of the internet savvies in turn emphasize the use of information as a common good that is not a scarce resource and thus should be utilized by everyone as much as they can for their own needs. The teachers, students and library professionals try to do their best in this network of operating environments and if the situation is not analyzed and mastered the proper conduct of the postmodern and digital higher education will not evolve but we are going to invent the wheel again.

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## References

1. Statistics Finland (2015). http://www.stat.fi/til/akop/2014/02/akop_2014_02_2014-11-14_tie_002_en.html
2. Buschman, J.: Dismantling the Public Sphere: Situating and Sustaining Librarianship in the Age of the New Public Philosophy. Libraries Unlimited, Westport (2003)

3. Ministry of Education and Culture. Ammattikorkeakoulujen Hallinto, Ohjaus ja Rahoitus (2015). http://www.minedu.fi/OPM/Koulutus/ammattikorkeakoulutus/hallinto_ohjaus_ja_rahoitus/?lang=fi
4. Porra, J.: Colonial Systems, Information Colonies and Punctuated Prototyping. Doctoral Dissertation. Jyväskylä, Department of Computer Science and Information Processing, University of Jyväskylä (1996)
5. Engeström, Y.: Learning by Expanding: An Activity-Theoretical Approach to Deve lopmental Research, 2nd edn. Cambridge University Press, New York (2015)
6. Kämäräinen, J.: Information Use in Bachelor Theses at the Finnish Universities of Applied Sciences: Multiple Case Study. Unpublished draft of doctoral dissertation, information studies. University of Oulu, Oulu (2015)
7. Heinonen, J.: Suomalaisten tiede- ja ammattikorkeakoulujen opinnäytetyöt ohjaajien silmin. Doctoral dissertation, pp. 55–56, 112–113. University of Tampere, Tampere (2006)
8. Moore, E.: Accuracy of referencing and patterns of plagiarism in electronically published theses. Int. J. Educ. Integrity **10**(1), 42–55 (2014). http://www.ojs.unisa.edu.au/index.php/IJEI/article/viewFile/933/656
9. Finnish Advisory Board on Research Integrity: Annual Report 2011 (2012). http://www.tenk.fi/sites/tenk.fi/files/advisory_board_on_research_integrity_annual_report2011.pdf
10. Hardin, R.: Trust and Trustworthiness. Russell, Sage Foundation (2002)
11. Pankl, E., Coleman, J.: "There's Nothing on my Topic!" using the theories of oscar wilde and Henry Giroux to develop critical pedagogy for library instruction. In: Accardi, M.T., Drabinski, E., Kumbier, A. (eds.) Critical Library Instruction: Theories and Methods, pp. 3–12. Library Juice Press, Duluth (2010)
12. Kämäräinen, J., Saarti, J.: Library professionals' and partners' implicit principle of non-interference and writing-related interventions. QQML J. **3**(4), 899–908 (2014). http://www.qqml.net/papers/December_2014_Issue/3411QQML_Journal_2014_KamarainenandSaarti_Dec_899-908.pdf
13. Heidegger, M.: Being and Time. In: Macquarrie, J., Robinson, E. (eds.). Harper & Row, New York (1962)
14. Hjørland, B.: Facet analysis: the logical approach to knowledge organization. Inf. Process. Manage. **49**(2), 545–557 (2013)
15. Soergel, D.: Organizing Information: Principles of Data Base and Retrieval Systems. Academic Press, San Diego (1985)
16. Rautopuro, J.: Sisyfoksen kivi. Tilastollisten menetelmien opetus ja oppiminen kasva tustieteissä. Jyväskylä, Jyväskylän yliopisto, Koulutuksen tutkimuslaitos. Tutkimuksia 27 (2010)
17. Camus, A.: The Myth of Sisyphus, and other Essays. Trans. Justin O'Brien. Vintage, New York (1955)

# Evaluation of Information Literacy of Slovenian University Students

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**Abstract.** This contribution summarizes the results of the evaluation of information literacy (IL) of 677 higher education students enrolled in study programs of life sciences, health, technologies, and social sciences at six Slovenian faculties. The information literacy test (ILT) that was developed, verified and validated by the authors in a previous work served as the IL measuring instrument. Statistical analyses of ILT responses were performed in SPSS. The results suggest that, on average, Slovenian students' IL is satisfactory and improves with years of education. On average, students know information sources and adequately evaluate the collected information. They possess skills to use the information in academic work and to synthesize data into knowledge. However, students are less proficient in advanced search strategies available in scientific and patent databases. The main deficit in students' knowledge is evident in topics related to intellectual property rights and in ethical issues related to acquisition and use of information. Students that participated in an IL-specific study course significantly improved their ILT achievement, most significantly in topics where their pre-knowledge was lower.

**Keywords:** Information literacy · Higher education · Evaluation · Test · Slovenia

## 1 Introduction

For the last two decades, information literacy (IL) competencies and skills have been an important part of higher education, influencing the design, content, teaching methodology, and management of academic courses. Correspondingly, attempts have been made to systematically develop and outline criteria and standards for the evaluation of IL in higher education. Examples of standards include the Big Six [1], the Seven Faces of Information Literacy in Higher Education [2], the ACRL standards (Association of College & Research Libraries – ACRL, a division of the American Library Association [3],


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The Eight Stages – The Big Blue report [4], the ANZIIL standards by the Australian and New Zealand Institute for Information Literacy [5], the UNESCO Six Skills [6], and the Seven Pillars of Information Skills by SCONUL (Society of College, National and University Libraries) [7]. Most standards seem to address similar issues, with different wording and definitions; the coverage of overall skills and outcomes in various IL standards is interrelated and similar. Among them, the ACRL standards, which were recently revised, remain the most often used and quoted in scientific literature on IL in higher education [8, 9].

Many documents report on IL assessments in higher education in different contexts. A variety of questionnaires and tests have been applied as research instruments. We presented a review of available IL assessment tools in our previous work (Boh et al. [9]). However, most of the established online IL tests for higher education have only been offered commercially (e.g., SAILS, the Madison Information Literacy Test, The iSkills™) or have been designed specifically to test a selected population of students (e.g., B-TILED and TRAILS). Due to this reason, for the purpose of our research, we developed a new, freely available information literacy test (ILT), verified it, and made it available in full text [10].

In this contribution, we used the ILT with the following aims: (a) to evaluate the IL of 677 students at six Slovenian faculties, before they participated any IL-specific study course; (b) to determine whether there is an increase in IL evident with years of study; (c) to explore in which segments of the IL, according to the ACRL standards, students have the largest deficit in knowledge and skills; and, (d) to evaluate the impacts of an IL-specific study course by verifying the IL level of students after completing the IL-related program.

## 2 Materials and Methods

### 2.1 The Information Literacy Test (ILT)

Our main IL measuring instrument was the information literacy test (ILT) we developed, verified, validated, and published [10]. It consists of 40 multiple choice questions with four possible answers and follows the recommendations of information literacy standards for higher education. Content-wise, the test covers a diversity of topics defined by the IL standards, and provides difficulty levels from lower to higher cognitive skills.

### 2.2 Test Group a – Students Who Have not Attended Any IL-Specific Study Course

The test group A consisted of 677 students from Slovenian higher education institutions (University of Ljubljana, University of Maribor, and Faculty of Information Studies Novo mesto), enrolled in study programs of life sciences, health, technologies, and social sciences. They all took the ILT before participating at any IL-specific study course. Among them, 9 % of the students in the sample were college students, 73 % were university undergraduates, and 18 % were postgraduate students (Fig. 1).

Regarding the year of study, 36 % were first-year students, 32 % second, 13 % third-year undergraduate students, and the remaining 19 % were fourth-year and postgraduates (Fig. 2).

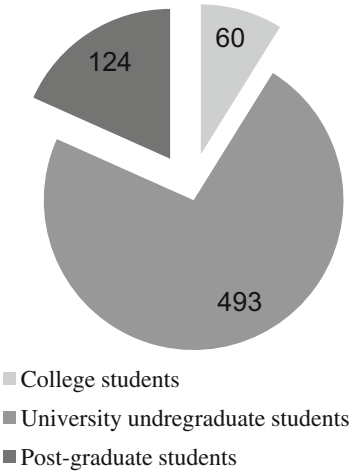


**Fig. 1.** Students in the test group A by the level of study

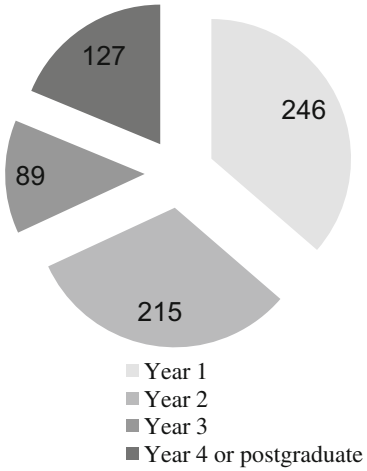


**Fig. 2.** Students in the test group A by the study year

### 2.3 Test Group B – Students After Completing an IL-Specific Study Course

One hundred and eighty one students in the test group B answered the ILT after completing an IL related course (with 1–3 credit points, i.e., 15–45 contact hours, depending on the study program). The group consisted of the first (35 %) and second-year (33 %) students of undergraduate programs, and the first-year postgraduate students (32 %) in the areas of life sciences, health, technologies, and education of teachers. The selection of students in the group B was based on the enrolment in compulsory credit-evaluated courses we taught. The IL contents followed the ACRL standards and included project-based and problem-based examples from the domains of study.

### 2.4 Testing

We conducted testing from January 2014 to May 2015, using a printed form or an electronic ILT version accessible through open access survey system 1 ka (http://www.1ka.si/) at locations within the university and supervised by teaching stuff. We applied a unified introductory protocol before testing, including clarification of the purpose, instructions, explanation of voluntary participation and anonymity, and expressing gratitude for the participation.

### 2.5 Analysis of ILT Results

We uniformly coded the results from both electronic and printed versions of ILT. We performed the following statistical analyses in SPSS:

- Descriptive statistics of the test score: mean, standard deviation, sample variance and standard error;
- Item analysis: frequencies of individual answers and item difficulty (as percentage of correct answers);
- Reliability estimates: the Cronbach alpha;
- Subscale analysis for groupings according to the ACRL standards: mean score and average difficulty;
- Test group A and test group B correlation analysis: t-test (the paired two sample for means method was used to compare the results of a group of students before and after taking the IL course).

## 3 Results and Discussion

We present the results of overall ILT analysis in Table 1. We calculated the total ILT score as the sum of points awarded for correct answers (correct answer = 1, incorrect answer = 0; max. score = 40). The calculated overall test reliability, measured as the Cronbach alpha (in the case of binary data, this is equivalent to the Kuder Richardson index KR-20), is 0.716, which is regarded as sufficient, considering an acceptability limit of 0.7.

**Table 1.** Basic statistics regarding the ILT score and the overall test reliability (test group A – students with no IL-specific study courses, N = 677)

| Analysis | Value (max = 40) | Percentage (%) |
|---|---|---|
| Mean | 26.55 | 66.3 |
| Median | 27 | 67.5 |
| Mode | 26 | 65.0 |
| Range | 31 | 77.5 |
| Minimum | 8 | 20.0 |
| Maximum | 39 | 98.0 |
| Variance | 23.472 | |
| Standard deviation | 4.845 | |
| Reliability (range/st. dev.) | 6.4 | |
| Std. error of mean | 0.186 | |
| Test reliability – Cronbach alpha | 0.716 | |

Figure 3 shows the students score distribution for the 40 questions of the ILT. A slight bias towards higher scores is evident, suggesting that students already possessed some IL knowledge and skills gained in previous formal and informal education.

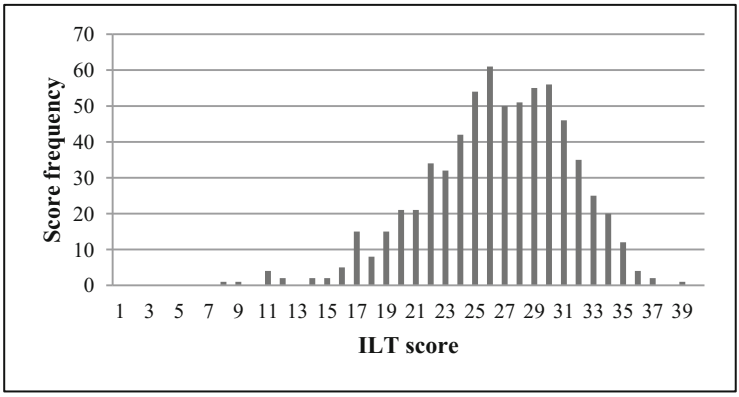


**Fig. 3.** ILT score distribution (max. score = 40; sample: test group A, N = 677)

We also calculated basic statistics for each individual ILT item. Due to the binary nature of the item scores (1 = correct, 0 = incorrect), the item mean reflects the item difficulty, as presented in Fig. 4.

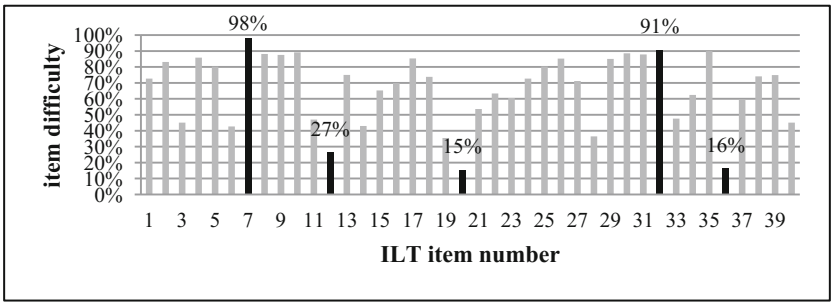


**Fig. 4.** Difficulty of ILT items: % of correct answers by individual questions (test group A, N = 677)

The difficulty should typically be in the range of 30–90 % [11]. In the ILT, 35 of the 40 questions meet this limits while questions 7 and 32 could be regarded as too easy, and three questions (12, 20 and 36) as very difficult (Table 2).

To determine whether there is an increase in IL evident with years of study, we compared the results of ILT score by the year of study, as presented in Table 3. We could observe a gradual increase of score means. The results suggest that, on average, students' IL improves with each progressing year of education.

We performed the ILT subscale analysis to explore in which segments of the IL students have the largest deficit in knowledge, understanding, and skills, We conducted this analysis according to the five ACRL standards for higher education [3] that define that the student can: 1 - Determine the extent of information needed; 2 - Access the needed information effectively and efficiently; 3 - Evaluate information and its sources critically, and incorporate selected information into one's knowledge base; 4 - Use

**Table 2.** ILT questions outside the 30–90 % range of difficulty (test group A, N = 677)

| Difficulty (%) | Content of the ILQ question |
|---|---|
| 98% (very easy) | **Question 7:** The record in this database refers to:<br>a) newspaper article<br>b) specialized book<br>c) video film<br>d) scientific journal<br><br>**Title**: Planet of the Future: Ecology, Science Fiction or a Real Possibility?<br>**Type/Content**: video DVD<br>**Pub. Date**: 2008<br>**Publishing**: Ljubljana: Umanotera, 2008<br>**Other Authors**: Zemljic, Barbara, 1978 -, Kajfez-Bogataj, Lucka<br>**Description**: 1 video DVD : colour, sound ; 12 cm<br>**Notes**: Project Website: www.planet-sprememb.si |
| 91% (very easy) | **Question 32:** Which of these schemes is the most appropriate for presenting the topics from Question 31?<br><br>a: Textiles / Cosmetics / Nutrition / Natural dyes<br>b: Uses of natural dyes → Nutrition, Cosmetics, Textiles<br>c: Nutrition, Cosmetics / Uses of natural dyes, Textiles<br>d: Textiles → Natural dyes, Cosmetics, Nutrition |
| 27% (difficult) | **Question 12:** Which of the data listed below are "raw" unprocessed data:<br>a) share prices published at the end of a trading day<br>b) weather maps<br>c) population growth data presented in tables<br>d) population growth data presented diagrammatically (in graphs) |
| 16% (difficult) | **Question 36:** I bought some old documents in a second-hand bookshop. Which of the documents can I scan and publish on my Webpage without authorization?<br>a) anonymous photo published in a women's magazine<br>b) article from a daily newspaper<br>c) original manuscript by William Shakespeare<br>d) translation of a poem written by a living poet and published by a British publisher |
| 15% (difficult) | **Question 20:** A database search interface employs pull-down menus instead of search operators. Which of the Boolean operators substitutes the concept 'optional'?<br>a) AND<br>b) NOT<br>c) OR<br>d) WITH |

information effectively to accomplish a specific purpose; and, 5 - Understand the economic, legal and social issues surrounding the use of information, and access and use information ethically and legally. We present the results of this subscale analysis in Table 4 and Fig. 5.

The results of the subscales difficulty illustrate that students have a fairly good knowledge and understanding regarding the critical evaluation of information and its

**Table 3.** Summary of ILT scores by the year of study (test group A, N = 677, max. score = 40)

| Group | No. of students | Score mean | Score standard deviation | Score variance |
|---|---|---|---|---|
| Year 1 | 247 | 25.23 | 5.198 | 27.022 |
| Year 2 | 214 | 26.57 | 4.185 | 17.514 |
| Year 3 | 89 | 27.27 | 5.051 | 25.517 |
| Year 4 or above | 127 | 28.61 | 4.205 | 17.685 |

**Table 4.** Difficulty of ILT questions according to ACRL standards subscales

| Subscale (ACRL standard) | No. of ILT questions | Difficulty (% of correct answers) |
|---|---|---|
| 1 | 15 | 67 |
| 2 | 10 | 59 |
| 3 | 5 | 82 |
| 4 | 3 | 79 |
| 5 | 7 | 56 |

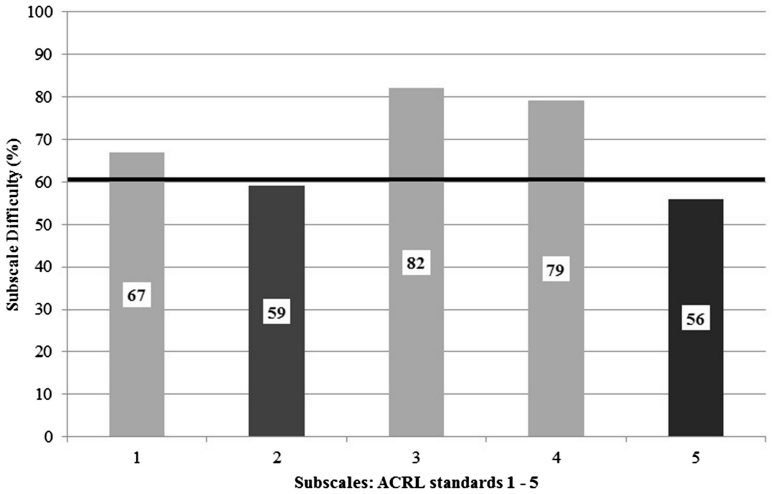


**Fig. 5.** Students' achievements according to ILT subscales, following ACRL IL standards (≥60 % is generally regarded as sufficient to pass the exam)

sources and their incorporation into one's knowledge base (subscale 3 = 82 %). They know how to use information effectively in order to accomplish a specific purpose (subscale 4 = 79 %). Students are less proficient in determining the extent of the information needed (subscale 1 = 67 %) and are not sufficiently successful in accessing the needed information effectively and efficiently (subscale 2 = 59 %). They require a combination of knowledge, comprehension and logic for advanced database search strategies. The results expose the largest deficit of knowledge and understanding in IL topics related to intellectual property and ethics (subscale 5 = 56 %).

We used the t-test in order to evaluate the impact of the IL-specific study subject among the 181 students from the test group B who took the ILT both before and after completing the IL course. The null hypothesis assumed there were no significant differences between the pre-test and post-test scores. The results of the t-test are given in Table 5.

**Table 5.** T-test analysis of ILT scores, with differences in pre-test and post-test scores (N = 181)

| Pre-test | | Post-test | | | | | Confidence Interval | |
|---|---|---|---|---|---|---|---|---|
| M | SD | M | SD | t | p< | Mean Difference | Lower Limit | Upper Limit |
| 26.4 | 4.83 | 31.4 | 3.74 | −16.755 | 0.000 | −5.033 | −5.626 | −4.440 |

**Table 6.** Improvement (%) in ILT post-test results according to subscales (N = 181)

| Subscale (ACRL standard) | Improvement (%) | Lower limit (%) | Upper limit (%) |
|---|---|---|---|
| 1 | 11 | 9 | 13 |
| 2 | 17 | 14 | 20 |
| 3 | 8 | 5 | 11 |
| 4 | 17 | 13 | 20 |
| 5 | 12 | 9 | 15 |
| Total ILT | 13 | 11 | 14 |

**Table 7.** T-test analysis of ILT scores, with differences in pre-test and post-test scores by subscales (N = 181)

| | Pre-test | | Post-test | | | | | Confidence interval | |
|---|---|---|---|---|---|---|---|---|---|
| Subscale (ACRL standard) | M | SD | M | SD | t | p< | Mean difference | Lower limit | Upper limit |
| 1 | 10.3 | 2.15 | 11.9 | 1.68 | −10.798 | 0.0001 | −1.602 | −1.895 | −1.309 |
| 2 | 5.7 | 1.73 | 7.4 | 1.51 | −11.957 | 0.000 | −1.685 | −1.963 | −1.407 |
| 3 | 4.2 | 1.06 | 4.6 | 0.77 | −5.485 | 0.000 | −0.398 | −0.541 | −0.255 |
| 4 | 2.3 | 0.76 | 2.8 | 0.42 | −9.019 | 0.000 | −0.503 | −0.613 | −0.393 |
| 5 | 3.9 | 1.27 | 4.7 | 1.21 | −8.207 | 0.000 | −0.845 | −1.049 | −0.642 |

The pre-test mean score of was 26.4 (66 %), and the post-test mean score 31.4 (79 %) with an average difference of 5.033 (13 %). We rejected the null hypothesis. Therefore, it can be stated with a 95 % certainty that the average post-test score was from 4.4 to 5.6 points higher than the pre-test score. This infers that, on average, the IL-related study course improved the IL of students by 13 %. Furthermore, the results of the pre-test and post-test correlation analysis, undertaken for the subscales, exposed the differences in improvement regarding the IL contents according to the ACRL standards (Tables 6 and 7).

## 4 Conclusions

The results of the ILT, applied on a sample of 677 students from six Slovenian faculties, indicate that on average, students' IL is satisfactory (mean achievement 66.3 %) and improves with each progressing year of education (from 63.1 % at the first year 1 to 71.5 % at the fourth year).

Among the segments of the IL, as defined by the ACRL standards, the main deficit is evident in topics related to the intellectual property rights, including authors' rights and industrial intellectual property, and in ethical issues related to the acquisition and use of information. In addition, students are not proficient enough in advanced and expert search strategies that are available in specialized scientific and patent databases. However, on average, students are successful in tasks regarding various information sources and specialized databases, evaluation of the collected information, uses of information in academic work, and organizing data into knowledge.

The group of 181 students who participated in an IL-specific study course significantly improved ILT achievement most significantly in topics where their pre-knowledge, understanding, and practical skills were lower. These areas of improvement included the students' ability (I) to access the needed information effectively and efficiently, including the advanced search strategies (subscale 2 = 17 % improvement); (II) to use information effectively to accomplish a specific purpose (subscale 4 = 17 % improvement); and (III) to understand the economic, legal and social issues surrounding the use of information, and access and use information ethically and legally (subscale 5 = 12 % improvement).

The results also suggest that these topics need to be emphasized more strongly in the higher education programs. This emphasis may include examples and discussions that not only provide factual knowledge but also stimulate comprehension, critical thinking, and application of knowledge in different situations.

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## References

1. Eisenberg, M.B., Berkowitz, R.E.: Information Problem Solving: the Big Six Skills Approach to Library & Information Skills Instruction. Ablex Publishing Corporation, Norwood (1990)
2. Bruce, C.S.: Workplace experiences of information literacy. Int. J. Inf. Manag. **19**, 33–47 (1999)

3. Information Literacy Competency Standards for Higher Education. Association of College & Research Libraries – ACRL, a Division of the American Library Association - ALA, Chicago (2000). http://www.ala.org/acrl/standards/informationliteracycompetency
4. Joint Information Systems Committee: The Big Blue Information Skills for Students. Final Report. Manchester Metropolitan University Library, Manchester; Leeds University Library, Leeds (2002)
5. Bundy, A.: Australian and New Zealand Information Literacy Framework. Principles, Standards and Practice, 2nd edn. Australian and New Zealand Institute for Information Literacy, Adelaide (2004)
6. Catts, R., Lau, J.: Towards Information Literacy Indicators. Conceptual Framework Paper. UNESCO, Paris (2008)
7. SCONUL Seven Pillars of Information Literacy. SCONUL Working Group on Information Literacy (2011). http://www.sconul.ac.uk/sites/default/files/documents/coremodel.pdf
8. Stewart, K.N., Basic, J.: Information encountering and management in information literacy instruction of undergraduate students. Int. J. Inf. Manag. **34**, 74–79 (2014)
9. Document ACRL MW15 Doc 4.0. Association of College & Research Libraries (2015). http://acrl.ala.org/ilstandards/wp-content/uploads/2015/01/Framework-MW15-Board-Docs.pdf
10. Boh Podgornik, B., Dolničar, D., Šorgo, A., Bartol, T.: Development, testing and validation of an information literacy test (ILT) for higher education. J. Assoc. Inf. Sci. Technol. (2015, in press). doi:10.1002/asi.23586
11. Ding, L., Beichner, R.: Approaches to data analysis of multiple-choice questions. Phys. Rev. S. T. – Phys. Educ. Res. **5**, 020103 (2009)

# Information Literacy and Information Culture in Higher Education Institutions in Estonia

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**Abstract.** Information culture is an important component of an organization. This paper focuses on the information culture of higher education institutions (HEIs) in Estonia and reports the results of a study that aimed to explore the relationship between information culture including information literacy, information management and satisfaction with job and leadership as well as self-reported individual performance. Factor analysis revealed three types of information culture: (1) integrated; (2) pro-active; and (3) informal. A significant correlation was found between information culture with integrated information sharing and use (type 1), and satisfaction with job and leadership as well as self-reported individual performance. It could be suggested that the construct of information culture consisting of values, norms and behaviours related to information sharing and use in organisations is a valuable construct in analysing information environments and relations with job satisfaction, leadership style and self-reported performance of HEIs in Estonia.

**Keywords:** Information culture · Information literacy · Information management · Job satisfaction · Leadership style · Self-reported performance · Higher education institutions · Estonia

## 1 Introduction

Information culture is an important component of an organization. Every organisation, no matter how large or small, regardless of type and function, wherever in the world it is situated, has an information culture [1, p. 9]. However, information culture is difficult to define. For example, Choo et al. [2, p. 493] define information culture as the organization's values, norms, and practices with regard to the management and use of information. Douglas [3, p. 307] notes that "an information culture is an emerging complex system of values, attitudes, beliefs and behaviours that influence how information is used in an organization. It exists in the context of, and is influenced by, an organizational culture and wider environments". Thus, it is suggested that information culture and organizational culture are intertwined [3–5]. In the wide range of approaches information culture is closely linked with information technology, information systems and digital world. However, Davenport notes that effective information


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management could be achieved only when people use information efficiently, not machines [6, 7].

Several researchers have identified significant relationships between information culture, information management and information use [8–12]. Certain types of information culture can develop conditions for more effective information management practices [5, 13, 14]. For example, information culture can foster knowledge creation and sharing, organizational learning, and enable organizations to achieve a competitive edge through the effective use of information [4, 15]. However, information culture can also perform as a barrier to the information sharing and use in organizations. This can be assumed that certain characteristics or combinations of characteristics of information culture have a stronger influence on organisational performance [16].

Information literacy as an efficient and ethical information behaviour [17] is an important component of information culture. Douglas [3, p. 261] asserts that improving information literacy and the underlying technological literacy have the potential to have a positive impact on making better use of information and on the state of an information culture in an organisation. Furthermore, using information appropriately is behaviour that influences the ways in which an organisation values and understands information [3, p. 278]. Douglas addresses seven of these issues that emerged from her study as significant to the development of a positive or high performance information culture. These issues were: leadership; the power and politics of information; education and training of information professionals and public sector professionals; information literacy; information use; strategic thinking and planning and role of information professionals [3, p. 312]. The results of Marchand, Kettinger and Rollins' study [9] also highlighted the capability to instill and promote behaviors and values in people for effective use of information in order to realize superior business performance [11]. The Information Culture Framework (ICF) of Foscarini and Oliver [18] builds on the outcomes of preliminary research and on observations of information and records management practices conducted in different organizations and includes information literacy and digital literacy as essential prerequisites for the development of a diffuse information culture in organizations.

The aim of our study was to explore the relationship between information culture including information literacy, information management and job satisfaction, leadership style, and self-reported individual performance. As job satisfaction and satisfaction with leadership along with the organisation's information culture are strong bases for organisational innovation [19], this study contributes to widening the understanding of information culture and effectiveness of organisations.

## 2 Methodology

Our study relies on existing frameworks on information culture [9–12]. However, it differs in scope and methods used. Marchand et al. [9] examined the information orientation of an organisation as a combination of information management capabilities, information behaviours, values (information culture), and information technology (IT) practices. Bergeron et al. [10] and Choo et al. [11] added an information use outcome variable to relate information culture to organisational effectiveness. The focus of our

study is the attitudes, norms and behaviours related to information culture in higher education institutions (HEIs). Therefore, we chose the study of Marchand et al. [9] that was adopted by Choo et al. [11] as our conceptual framework. We were guided by the six information behaviours and values – information sharing, control, integrity, transparency, (in)formality, and proactivity as constituting the information culture of an organisation in our empirical investigation. We added several aspects of information management practices and use of information resources to the survey.

Our primary method of data collection was a web-based questionnaire survey. The questionnaire consisted of 39 questions, both closed and open-ended, thus yielding both quantitative and qualitative data. We grouped similar questions together that were related to behaviour and values, information management, usage of information resources, job satisfaction, opinions about leadership, judgement of the effectiveness of respondents' own work, and the effectiveness of the whole unit. We presented most items as statements and respondents indicated their agreement with on a scale of 1 (strongly disagree) to 5 (strongly agree). We conducted a pilot study in two public universities with 32 academic staff. A total of 160 academic staff members from 12 HEIs (four universities and eight professional HEIs) completed the survey. We conducted factor analysis and multivariate analysis using statistical analysis software SPSS. We measured statistical significance (p) on the 0.05 and 0.01 levels.

We adopted fifteen questions from Choo et al's [11] survey on information culture. We added several questions on information management practices – we adopted two statements from the study of Bergeron et al. [10]. We measured the performance of an organisation in terms of job satisfaction, opinions about leadership, and self-reported individual performance. We adapted four statements from the Rego and Cunha Scale [20] to the context of this study and used them to measure self-reported individual performance. We measured satisfaction with leadership using four statements of the Spector's Job Satisfaction Survey Scale [21]. We measured job satisfaction using two statements from the Karasek's Job Content Questionnaire [22].

## 3 Results

We structured the presentation of the results according to the four themes: (a) types of information culture; (b) information culture and use of information resources; (c) information management; and, (d) self-reported performance, job satisfaction and leadership.

### 3.1 Types of Information Culture

We used six components of information behaviours and values to identify the type of information culture of HEIs: sharing, transparency, integrity, proactivity, (in)formality, and control. Fifteen questions within the questionnaire were related to these six components.

The exploratory factor analyses (principal component method with Varimax rotation) of the questions related to the information culture domain extracted three factors

that, collectively account for 54 % of the common variance. We tested the reliability and validity of this dimension using Cronbach's alphas, thus positively confirming these measures.

Factor analysis revealed three types of information culture: (1) integrated; (2) pro-active; and (3) informal. Integrated information culture (IC) (type 1) involves components of information control, sharing as the highest scores, as well as integrity and transparency. Academic staff of HEI representing this type of IC is informed about the performance of their unit as well as HEI ("*I am informed about the performance of my unit/institution of higher education*"). Information sharing in this type of IC is formally regulated ("*My unit at the HEI has a formal tradition of sharing information*"), inclusive ("*I was involved in the joint activities of my unit (meetings, projects, working groups, etc. last month*"), and transparent ("*We shared information on errors or failures in our unit last month*"). Integrity in information sharing is valued by this type of IC. Cronbach alpha for variables belonging to this factor is 0.79.

Proactive IC (type 2) involves components of information proactivity and sharing as the highest scores, as well as control to some extent. This type of IC tends to search for information on trends and changes in the higher education landscape (both at the Estonian and European level) to make work-related decisions *("I searched for information on changes and trends in higher education in Estonia/Europe to make work-related decisions last month"*), and they are more involved in joint activities (meetings, projects, working groups, etc.) with other units in the HEI as well as outside of HEI ("*I was involved in work-related joint activities of other units in my HEI/outside the institution of higher education (meetings, projects, working groups, etc.) last month"*). They use new information channels (social media, blogs, wikis, collaborative software, etc.) to find information for work-related decision-making. In addition, they feel that they are influenced by the performance of their institution *("My knowledge about organisational performance influences my work"*). Cronbach alpha for variables belonging to this factor is 0.73

The third type of IC – Informal IC – involves information informality components. This type of IC prefers colleagues as informal sources over formal ones to make work-related decisions. They also verify information that is presented in formal sources using their colleagues ("*I often use informal information sources (e.g. colleagues) to verify and improve the quality of formal sources (e.g. memos, reports*)"). Cronbach alpha for variables belonging to this factor is 0.70.

### 3.2 Information Culture and Use of Information Resources

We performed an analysis variance (ANOVA) test and t-tests in order to examine if there were differences in information usage between different types of IC. The ANOVA Test suggests that there are statistically significant differences in some aspects of the information resource usage between IC types but there were no differences in respondent gender, age, work style (working more with computer or communicating with people), or perceptions about HEI attitude to innovation/tradition. T-test shows that the Integrated IC (type 1) is more represented ($p < 0.01$ level) in the professional HEIs than in universities. We found no differences concerning other types of IC

according to the t-test. The table below shows the differences between types of IC in preference of information sources and frequency of information use.

As shown in the Table 1, the Integrated IC is more oriented to internal information resources whereas the Proactive IC tends to use more diverse information resources and has more frequent information users than the other two types of IC.

**Table 1.** Respondents characteristics by type of IC according to the analysis of variance (based on the ANOVA tests)

| | Integrated IC | Proactive IC | Informal IC |
|---|---|---|---|
| Use of information resources | More intranet | More webpages (state regulations, international strategies, statistical data), electronic lists (state regulations, international strategies, statistical data), databases (international developments, statistical data), Intranet (guidelines of HEI and unit), conferences (international developments in HE and own field), social media | Less information from databases. More from colleagues (HEI and unit regulations as well as international developments) and social media |
| Frequency of information use | No differences | More frequent information use – state and international regulations and strategies, guidelines of the HEI and unit, statistical data, and concerning developments in own field | No differences |
| Type of HEI | More represented in the professional HEIs | No differences | No differences |

### 3.3 Information and Knowledge Management

As we were not able to add? the five statements used to measure information and knowledge management (IM) practices to the aggregated score due to the insufficient

Cronbach's alpha scores, we performed the multivariate analyses to explore the correlations between individual statements about IM practices and types of IC. According to the multivariate analyses, the statement "Information that is needed for work-related decision-making in my HEI is organised to make it easy to find" correlates significantly with the Integrated IC (.468**) and statement "I shared my knowledge and experience with new or less experienced staff in my HEI last year" correlates significantly with the Proactive IC (.302**). The statement "I felt that it was hard to cope with information overload and limited time resources last month" correlates with Informal IC (.207**).

### 3.4 Self-reported Performance, Job Satisfaction and Leadership

Finally, we examined whether the different types of information culture are related to job satisfaction and leadership and self-reported individual performance in HEIs in Estonia.

We added item scores pertaining to each type of IC to create an aggregate score for each type of information culture. Similarly, we formed aggregate scores for the components of effectiveness of work, job satisfaction, and satisfaction with the immediate manager by adding their respective item scores. Table 2 shows the correlations between these variables.

As shown in the Table 2, information culture with integrated information sharing within units (Integrated IC) is significantly correlated (0.01 level) with each of the three components – satisfaction with leadership (.635), job satisfaction (.429), and self-reported performance (.597). Informal information culture (Informal IC) correlates at 0.05 level with job satisfaction (-.161). Job satisfaction, opinions about leadership, and perception of effectiveness also significantly correlate to each other on the 0.01 level: self-reported performance significantly correlates with satisfaction of leadership (.591) and job satisfaction (.470) and job satisfaction correlates with satisfaction with leadership (.428) and self-reported performance (.470).

**Table 2.** Pearson correlations between information culture type and satisfaction with leadership, job satisfaction and self-reported performance

| | IC 1 | IC 2 | IC 3 | Satisfaction with leadership | Job satisfaction | Self-reported performance |
|---|---|---|---|---|---|---|
| IC 1 | 1 | .281[a] | −.198[b] | .635[a] | .429[a] | .597[a] |
| IC 2 | .281[a] | 1 | −.070 | .141 | .000 | .069 |
| IC 3 | −.198[b] | −.070 | 1 | −.136 | −.161[b] | −.115 |
| Satisfaction with leadership | .635[a] | .141 | −.136 | 1 | .428[a] | .591[a] |
| Job satisfaction | .429[a] | .000 | −.161[b] | .428[a] | 1 | .470[a] |
| Self-reported performance | .597[a] | .069 | −.115 | .591[a] | .470[a] | 1 |

[a] Correlation is significant on the 0.01 level (2-tailed).

[b] Correlation is significant on the 0.05 level (2-tailed).

## 4 Conclusion

Based on the current study we suggest that the construct of information culture consisting of values, norms and information-related behaviours (information literacy) in organisations is a valuable construct in analysing the information environment of institutions of higher education in Estonia. Factor analysis suggests three types of information cultures. Namely, (1) information culture oriented to inward information sharing within a transparent and integrated structural unit of HEI; (2) information culture oriented to proactive, diverse and wide information sharing and use; and (3) information culture oriented to informal information sharing and use.

The prevailing information culture types can also be differentiated by the information environment and environmental scanning modes. Presumably, the type of information culture with a proactive attitude towards information sharing uses significantly more diverse information sources and information source usage is more intense. The third type of information culture orientated to informal information prefers more colleagues as information sources.

The Integrated IC is the only type of information culture that has significant relations with job satisfaction, satisfaction with the leadership, and self-reported individual performance. This type of IC is characterised by inward information sharing within a transparent and integrated structural unit, and with a feeling of control over what is happening in their unit and HEI. Our study suggests that the creation of conditions for cooperation with regular, integrated and transparent information sharing within the HEI unit is an important source for job satisfaction and satisfaction with leadership. This also gives the basis for valuing the effectiveness of the work of units and colleagues. Also, the participants' own performance is valued higher in this case.

## References

1. Oliver, G.: Organisational Culture for Information Managers. Chandos Publishing, Oxford (2011)
2. Choo, W.C., Furness, C., Paquette, S., van den Berg, H.: Working with information: information management and culture in a professional services organization. J. Inf. Sci. **32** (6), 491–510 (2006)
3. Douglas, J.: The identification, development and application of information culture in the western Australian public sector. Doctoral thesis, Faculty of Computing, Health and Science. Edith Cowan University, Joondalup (2010)
4. Svärd, P.: The impact of information culture on information/records management. Rec. Manag. J. **24**(1), 5–21 (2014)
5. Curry, A., Moore, C.: Assessing information culture – an exploratory model. Int. J. Inf. Manag. **23**(2), 91–110 (2003)
6. Davenport, T.H.: Saving IT's soul: human-centered information management. Harv. Bus. Rev. **72**(2), 119–131 (1994)
7. Virkus, S.: Information culture. learning Object. Tallinn University (2012). http://www.tlu.ee/~sirvir/Information%20and%20Knowledge%20Management/Information%20Culture%202/index.html

8. Grimshaw, A.: Information Culture and Business Performance. University of Herfordshire Press, Hatfield (1995)
9. Marchand, D., Kettinger, W., Rollins, J.: Information Orientation: the Link to Business Performance. Oxford University Press, New York (2001)
10. Bergeron, P., Heaton, L., Choo C.W., Detlor, B., Bouchard, D., Paquette, S.: Knowledge and information management practices in knowledge-intensive organisations: a case study of Québec public organisations, Canadian Association for Information Science (CAIS/ACSI) 35th Annual Conference. McGill University, Montreal 10–12 May 2007
11. Choo, C.W., Bergeron, P., Detlor, B., Heaton, L.: Information culture and information use: an exploratory study of three organisations. J. Am. Soc. Inf. Sci. Technol. **59**(5), 792–804 (2008)
12. Abrahamson, D.E., Goodman-Delahunty, J.: The impact of organisational information culture on information use outcomes in policing: an exploratory study. Inf. Res. **18**(4), paper 598 (2013). http://InformationR.net/ir/18-4/paper598.html
13. Oliver, G.: Information culture: exploration of differing values and attitudes to information in organisations. J. Doc. **64**(3), 363–385 (2008)
14. Wright, T.: Information culture in a government organization: examining records manage ment training and self-perceived competencies in compliance with a records management program. Rec. Manag. J. **23**(1), 14–36 (2013)
15. Davenport, T.H., Prusak, L.: Information Ecology: Mastering the Information and Knowledge Environment. Oxford University Press, New York (1997)
16. Choo, C.W.: Information culture and organisational effectiveness. Int. J. Inf. Manag. **33**, 775–779 (2013)
17. Virkus, S.: Information literacy in Europe: a literature review. Inf. Res. **8**(4), paper no. 159 (2003). http://informationr.net/ir/8-4/paper159.html
18. Foscarini, F., Oliver, G.: Introducing the information culture framework as a component of the digital curator's toolkit. DigCurV 2013 (2013). http://93.63.166.138:8080/dspace/bitstream/2012/139/3/paper17.pdf
19. Tien, L.-C., Chao, H.S.: Effects of information culture and job satisfaction on the organisational innovation: a study of different leadership styles as a moderatoritle. Adv. Manag. Appl. Econ. **2**(3), 83–110 (2012)
20. Rego, A., Cunha, M.P.: Authentizotic climates and employee happiness: pathways to individual performance? J. Bus. Res. **61**, 739–752 (2008)
21. Spector, P.E.: Measurement of human service staff satisfaction: development of the job satisfaction survey. Am. J. Commun. Psychol. **13**, 693–713 (1985)
22. Karasek, R.T., Theorell, T.T.: Healthy Work - Stress, Productivity, and the Reconstruction of Working Life. Basic Books, US (1990)

# Two Years of Information Culture Development for Supporting Higher Education: Initiatives, Teacher's Perceptions and Future Actions

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**Abstract.** Information Culture Development (ICD) is a holistic information literacy program that was established in 2013 and developed at CETYS Universidad in Mexico. ICD caters to all university stakeholders with different initiatives that are contained within ICD's four axes: (a) curriculum and learning support, (b) information and digital literacies development, (c) research and scientific communication support, and (d) evaluation and communication of results. This article presents such initiatives and the instruments used to evaluate them. Moreover, it analyses recent interviews with eight academic staff that have known of and benefited from these initiatives, both for themselves and for their students. The data analysis offers a means of determining ICD's role in supporting the development of an information culture and positively influencing teaching, learning and research practices in the university. Furthermore, academic staff insights help guide the program's further development, by pointing toward the need for future actions and strategies.

**Keywords:** Information literacy · Digital literacy · Information culture · Higher education · CETYS universidad · Mexico

## 1 Introduction

Information literacy (IL) is related to knowledge, skills and competencies for locating, retrieving, evaluating, and using information. IL experts have highlighted their advantages and purposes, among others: problem solving, decision-making, emancipation, citizenship, overcoming different forms of oppression and divides, critical thinking, and lifelong learning [1]. These purposes may be fulfilled by IL initiatives, are part of worldwide tendencies that seek to develop IL to support learning processes, and are present in the vision of CETYS Universidad [2] in Mexico under the umbrella term 'Information Culture' (IC). There have been different approaches to IC [3], but it basically implies shared values toward information-related activities [4]. This understanding of IC is viewed institutionally as one of the Distinctive Elements of CETYS Education (EDECS) and it is institutionally assessed with other learning indicators for quality and accreditation processes. This conception of IC includes IL and digital literacy (DL) as the 'proper use' of Information and Communication Technologies (ICTs) for teaching


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and learning. Moreover, it also includes academic communication and research competences. Recently, this latter area has been explored and enhanced at the institution.

Information Culture Development (ICD) was established in 2013 as a holistic IL program by the three-campus CETYS Universidad's System of Libraries (SL) as transversal axis and driving force for supporting the reflection upon and improvement of practices related to curriculum, teaching and research activities. ICD is a key initiative in the recent organizational evolution of the libraries, and its development and execution has been guided by the Information and Learning Development Librarians (ILDL), formerly known as reference librarians. ICD was built and defined taking into account different elements, such as: the institution's strategic plan, the recommendations made after the accreditation granted by the Western Association of Schools and Colleges (WASC), perspectives and needs pointed out by academic staff interviewed during ICD's planning stage, and previous experiences of ILDL in developing similar initiatives. ICD is driven by action research (AR) [1] and the concept of IC; it is grounded in research literature and comprised of IL, DL, as well as writing, communication and research skills. Thus, ICD aims at addressing IL and DL tasks, as well as provoking and supporting reflection and improvement upon university practices related to curriculum, teaching, and research.

## 2 The Program Information Culture Development (ICD)

ICD was grounded in previous work and research experiences of the ILDL, who were appointed at first as reference librarians and tasked with its development, as well as in a research study based on the available literature and interviews with academic staff that were conducted to study their needs, in order to apply a bottom-up participatory approach. Moreover, ICD had to be an initiative from the SL, executed by the ILDL, under close collaboration with academic staff, thus generating results and best practices from CETYS' learning community. Further institutional context and the definition of the ILDL were provided in a previous contribution to this conference [5]. ICD was framed within the ideas of key institutional documents, such as the 2020 Development Plan (P2020) [2], as it is one of the flagship projects of the SL, and the main project of the ILDL. For instance, the main P2020 pillar for ICD is our learning community, which is characterized by learning-centered curriculum design, measuring, as well as their use of information seeking and analysis for decision-making and enhancing a research culture. Within P2020 objectives, the present initiative must contribute to enhancing teaching, research and extension tasks by developing teachers with the required competences, with a focus on learning assessment and the use of technology to support learning. P2020 also proposes the so-called Distinctive Elements of CETYS Education (EDECS), which are: (a) information culture; (b) entrepreneur and innovation culture; (c) internationalization; (d) sustainability; and (e) linkage and social responsibility. As stated before, ICD was initially developed by taking into account diagnostic interviews with academics. These interviews intended to profile the academic staff interviewed, and their needs and expectations regarding library services. In consequence, these needs and expectations shaped this IL program. Given the importance placed on participation, IL, DL, reflection and improvement upon learning and teaching practices, ICD has been

driven by the methodological tradition of action research (AR) [1, 6, 7], as well as in the dichotomy between research and practice [8], because ICD intends to position the SL as a research unit of the institution, which would feed learning processes and apply research approaches to the SL's activities, to their use by the community, and to professionalize their non-professional staff. This new position of the SL, following the guidelines of P2020 [2], seeks to generate institutional conditions for academic staff to enhance research.

Given the above context, ICD's aims at addressing IL and DL tasks, provokes and supports reflection and improvement upon other university practices related to curriculum, teaching, and research. Accordingly, its general objective is to serve as a supporting axis to research, teaching, and learning in CETYS. Specific objectives are:

- Support and nurture teaching and learning practices of CETYS community through IC and reflection;
- Promote products, services, and resources of the SL and justify their increase and development through enhancing and massively increasing their use;
- Develop an IC in the CETYS community and at the individual level, develop independent and critical information users, who are able to tap into appropriate information and technological tools;
- Professionalize and enhance the staff, procedures and resources of the SL.

### 2.1 ICD Axes and Initiatives

ICD addresses university stakeholders with different initiatives: courses, workshops, instructional and promotional flyers, bulletins, tutorials, bibliographies, reference services, guides, student and teacher tutoring, research and publishing support for teachers, evaluating new information resources to increase SL's offering, assessment of IL skills for students, and improving the statistical measurement of library services. These initiatives are contained within ICD's four axes: (a) curriculum and learning support, (b) information and digital literacies development, (c) research and scientific communication support, and (d) evaluation and communication of results. All axes except the last one include the development of courses and video tutorials derived from courses and are intended for students and members of the university. The following paragraphs summarize the axes and their initiatives.

**Axis I. Curriculum and Learning Support through IL and DL.** This axis supports teachers in enhancing and innovating classroom practices, both for student learning and for teaching through IL and DL. Initiatives include:

- Subject Guides (SG): they compile references related to a given course and contain recent documents available in the library, in subscribed databases and bookstores, in order to provide the possibility of updating the library collection, the bibliography of the courses, and teachers' use of current documents.
- Library-Academia Joint Activities: product of a curricular analysis; they involve determining a learning activity with a given teacher that integrates IC into the curriculum of their courses.

- Compile and suggest digital bibliographic repertoires to support the development of newly created online courses. These compilations support all the topics included in such courses.
- Courses: audio, video, really simple syndication (RSS), social media and the integration of information resources into Blackboard.

**Axis II. Information and Digital Literacies Development.** It contains the majority of courses for teachers and students about access, use and evaluation of information, and the appropriation of ICTs for learning purposes. Initiatives include:

- Developing flyers on the SL's resources and summaries of courses' contents.
- Serials Bulletin (SB): a monthly digital bulletin first intended to enhance the use of printed serials that the SL acquires and then expanded to offer an overview of recent articles in the most consulted academic journals, new digital books available in the subscribed Academic Databases (AD), and a selection of news from Internet sites about society, technology, copyright and investigation.
- Production of promotional videos on the SL's products and services.
- Courses: on the use of the SL, SL online catalog, and AD.

**Axis III. Research and Scientific Communication Support.** It concentrates initiatives related to research and scientific communication and is targeted at each academic program of the institution. The following actions are included:

- Promotion materials for citation styles for each field (i.e. IEEE, MLA, Chicago).
- Scientific Communication Support Guides (SCSG): provided to facilitate research and lowering the barriers of entry for publication in a given field, compiling information about publications (i.e. publisher, indexing information, manuscript types and extension, citation style, and open access policy), together with information on pertinent professional congresses, groups of interest, and professional associations.
- Advice on scientific publishing, journals and peer review processes: this advice has been given at the request of one of the University's schools in order to assess and work on the possibility of launching an academic journal.
- Courses: citation styles; reference managers, research methods and 'Research Accompanying', creation and management of online researchers' profiles to improve the promotion, visibility, and recognition of CETYS researchers; open access, peer review and academic journals.

**Transversal Axis. Evaluation and Communication of Results.** It aims at conducting research to enrich the other axes as well as evaluating and communicating the results of the initiative. It is comprised of:

- Developing data collection instruments to measure learning and user satisfaction.
- Developing procedures for new services and instructional design.
- Conducting measurement and statistics.
- Supporting testing with international instruments such as SAILS and iSkills.
- Building a mirror SL website as a highly updated blog;
- Communicating ICD's results in scientific conferences and publications.

### 2.2 ICD Courses

As evident in the previous section, ICD includes the development of many courses beyond traditional offerings such as in effectively supporting the development the use of the library catalog and of AD. These ICD courses are being developed with a common methodology and the objective is to unify and formalize a solid structure of supporting materials and learning experiences comprised of learning objectives, contents, activities, and complementary readings. A modular structure is adopted in order to offer various levels of difficulty (beginner, intermediate, and advanced) for the courses according to the content. The production of the courses takes a significant amount of the ILDL workload, as they have to be exhaustive in order to generate simultaneously, and for every topic, a regular course, an online course, a video tutorial, and the corresponding flyers or manuals of instructions. The development of courses was planned this way in order to cover all demands from different learning styles and being able to offer something to all stakeholders. ICD courses also introduced the idea of the holistic cycle (HC) [5], which is a way of presenting a package of IC courses that are naturally related to each other. This HC is a reasoned and sequential articulation of courses from different axes. For the participant they are more time consuming, but the main idea is to offer different combinations of stages and competences tailored for each group of stakeholders. The HC implies sessions of training, working, and reflection, which as AR dictates: one stage can lead to another, as well as to the previous one, or to repeat the entire cycle once it is finished. An example of an holistic information culture cycle would consist of: (a) Search in AD; (b) Store and annotate with reference managers and note-taking software; (c) Research and reflect by conducting a project; (d) Communicate through presentations, conferences, publications, and media-editing software; and (e) Promote visibility using online researcher's profiles and indexes.

## 3 Teachers' Perceptions

This section presents an analysis of recent interviews with eight academic staff that have known of and benefited from ICD's initiatives, both for themselves and for their students. Hence, the academic staff selected for this survey have fulfilled at least one of the following conditions during the past year: (a) they have benefited from ICD's initiatives; (b) they have collaborated with ILDL in academic or research activities; and (c) they have tasked the ILDL to develop courses or workshops for their students and they have assumed an active participation during such activities. The data analysis was qualitative and it was conducted using the techniques of content analysis and constant comparative analysis, and furthermore, it was informed by the ongoing evaluation of an analysis of the two year ICD Program experience that has being studied with data collected from students and teachers using questionnaires, international tests such as SAILS and iSkills, as well as with interviews. However, in this paper we are focusing on the most recent stage of data collection, which are the interviews with academic staff. The present analysis allows determining ICD's role in effectively supporting the development of an information culture and positively influencing teaching, learning and research practices in the university. Furthermore, academic staff insights help guide the program's further development, by pointing toward the need for future actions and strategies.

### 3.1 Acknowledging ICD and the ILDL

Teachers were asked if they knew their ILDL and the ICD initiative and what they could tell about them, specifically regarding the support they could have had in their academic endeavors. All interviewed teachers claimed to know both the ILDL and the ICD initiative, although they were not completely clear about its functions, as there is some confusion with other library functions such as acquisitions. In general, teachers who have benefitted from ICD's initiatives, both the interviewed academics and those who have mentioned such collaboration to interviewees, have stated that they have had good support in information seeking for academic purposes such as for complementing the bibliographic selection for their courses and for aspects related to their investigations. Moreover, they have had support from documents such as the SG in order to enrich different courses dealing with the topics of these guides, as well as from the ICD's courses in order to understand digital information services, and the requirements to establish an academic journal in one of the University's schools. Furthermore, one interviewee pointed out that they have known of the ILDL because of the initiative toward the development of online courses, where the support of the ILDL is seen as instrumental, because they are responsible for compiling and suggesting an entire digital bibliographic repertoire to support the complete course. In the words of the interviewee, this support has been very good and has saved the teacher's time, which they can then dedicate to developing other aspects of the online course, such as support materials, videos, activities, and exams.

### 3.2 Two Years of Library and ICD Improvements

Teachers were asked if they had noticed positive improvements in the SL, specifically in aspects related to ICD initiatives. Most interviewees pointed out that indeed there have been positive changes in the SL and particularly because of ICD initiatives, although one interviewee, while acknowledging a change, expressed the view that this change has not been a large leap from what SL's services were previously.

One interviewee pointed out the importance of some divulgation mechanisms that have been established by ICD. These mechanisms have helped teachers keep up to date about new acquisitions in the form of the SB and the SG, limit the scope of a course's topic, and learn about updated information products that are available. Another initiative pointed out by most interviewees is the extension of better and more complete ICD courses, which have helped academics with the tools for conducting research. Furthermore, they highlighted that there has been more publicity and reach in the past two years, specifically invitations to courses, demonstrations of new resources and services. Moreover, a wider reach has been acknowledged thanks to the ILDL, specifically in supporting academia through new services, the aforementioned demos that have given academic staff the opportunity to explore resources that were otherwise unknown for them, as well as the availability of more capable library staff for supporting teachers, and a more extensive linkage between the SL and academics. One interviewee claimed that all of this has been discussed among school directors as very positive experiences.

### 3.3 ICD in Students

Teachers were asked if they could see the influence of any of the library and ICD improvements in their students. Regarding this matter, teachers were somewhat conservative of their assessment of students' IC. Although they pointed out that they have seen an improvement in their students' handling of information sources for academic purposes, they stated that there is still a long way to go. They see that students' research has been enriched in the past years, by making use of printed documents and some are entering the digital platforms that are available in the University. According to the teachers, the latter generations have an information behavior that can be characterized by a more extensive use of digital information platforms such as AD. However, most of them tend to ask less about where they could seek information for doing an assignment, and they tend to be more professional in the overall qualities of the assignments they deliver, taking more care than previous generations in citing their information sources. One of the interviewees went so far as to point out that there has been a difference in generations of students over the past two years, but that if they compare them to students from ten or 15 years ago, they find a notorious difference in their final projects for the courses, although they acknowledged that there is still plenty of room for improvement. One suggestion was for teachers to take more initiative as the institutional efforts that have been patent in initiatives such as embedding IC in the academic curriculum for all courses from all the disciplines that are part of the academic offer of the University. This particular teacher recounted one experience they had regarding how to embed IC in their courses. Teachers would include as part of the final exam an activity where students must bring a scientific article about an application of their academic discipline, with certain characteristics. The teacher then asks questions that ensure the students have read through and really studied the article they located. Many of the interviewees stated that the key to improving students' use of information is for teachers to promote them in class, and give students the guideline that they must indicate the sources they cite in their assignments. These interviewees actually pointed out that they have seen more students visiting the library than in previous generations when it was even 'taboo' to do so. Furthermore, the case of the online courses is interesting because students who are enrolled in this learning modality are finding that the entire course bibliography is digital, so they are already immersed in that medium from the start of the semester, and they use digital information resources for their assignments as well.

### 3.4 The Role of ICD and ILDL in the Institution

Teachers were asked about their opinion on the role of the ICD initiative in the institution in order to support the development of the EDEC IC and to influence teaching, learning, and research practices. The answers to this question were diverse, as well as the proposed specifics of ICD and ILDL in the institution and for developing the EDEC in question. In general, teachers see that the role must be to remain in close support for them and students. One interviewee claimed that there must be closer collaboration with teachers, especially with those that go to the library infrequently, or do not go at all, or do not contact the ILDL, this collaboration entails providing updated resources and helping the

teacher with time consuming activities such as studying the course's curriculum to suggest appropriate bibliographic items. Moreover, they stated that teachers tend to remain at a comfort state of having all the resources they think they need for their courses, and every semester they just repeat the same resources. However, the majority would not know to whom they have to turn to in the library for help, nor that ICD initiatives are there for them, so there is still a great deal of promotion and outreach to do. Another teacher pointed out that there is a great deal of responsibility on the part of academia for developing the EDEC IC, and that ICD has facilitated elements toward walking this route. They see that the role of ICD and the ILDL is to keep providing teachers with tools to be updated information-wise, such as the SG, SB and courses. However, they think that there is work to do in academia and that there is a major issue in their discipline, because there are some teachers who are very traditional regarding their information use, and this attitude is transferred to their students when they give them assignments to solve with traditional printed documents. In consequence, they are convinced that they have to encourage teachers to invite students to boost the use of digital documents. Interviewees also highlighted the importance that IC is an initiative present in P2020 and that it has been embedded curriculum-wide, so it is a priority to boost it. The "professionalization of the use of information" is of strategic importance, as it is a distinctive element in the formation of the University graduates. Furthermore, they highlighted that the work of the ILDL, which did not exist in the University three years ago, has in little time accomplished a positive impact in academia, and the results are seen as permeating toward better students.

## 4 Concluding Remarks and Future Actions

ICD has been showing potential for facilitating, developing, and strengthening IC in CETYS Universidad, both by supporting the development of basic IC competences and for those more complex. ILDL are working on developing courses, flyers and tutorials, SG and SCSG. The SCSG should help in lowering the barriers of entry for arguably the most challenging academic activities, such as scientific publishing [7]. Regarding basic IC competences, there is still work to do to overcome common challenges among students and teachers, such as the language barrier and the limited use of the subscribed AD and sources produced in the institution, thus achieving a more conscious use of the Internet as a source of information in the community. Through the many ICD initiatives, among them the training sessions, the community has to realize that ICD is a means to enhance teaching and learning. Moreover, its grounding on AR, the holistic cycle, axes structure, and complementary initiatives such as flyers, tutorials and innovative information products result in powerful guidelines and means to contribute in the development of IC in CETYS Universidad. This brief analysis after ICD's first two years is useful for the institution and it is offered as a reflection that might support the improvement of national and international experiences regarding the practical area of implementing information literacy programs in higher education institutions. Moreover, we have highlighted the role of academic libraries as an educational partner in the academic environment, and it is our hope that this idea becomes an important part of the professional discussions around developing information

literacy programs for educational institutions. Regarding future actions, interviewed teachers were asked for their opinions on where the ICD efforts should be dedicated and a brief summary is provided in the following paragraphs.

**Better Reach Students and Classrooms.** Not all students visit the library although they know it is there. If you visit it, you can see SG and SB but there is "not an echo of it in the classrooms"; if teachers do not socialize the information about the available resources they do not know they are there. Many times teachers do not have the time or capacity to inform students about all these resources. Hence, there must be a more direct approach for reaching students.

**The Challenge of Materializing or Boosting Initiatives.** The support that the ILDL have given to teachers for present and future projects is seen as valuable and necessary, and academia should dedicate more efforts in materializing or boosting the initiatives for which the ILDL have been providing support.

**The Need for a Library Reconceptualization in the Institution.** Interviewees pointed out the challenge that part of the community has a stale and outdated concept of the library. This concept dictates that the library is four walls, a study cubicle, a locker room, an archive, or a place to connect to the Internet to check social media sites. There should be a general understanding that a library unfolds into a wider and friendlier concept including technology and digital libraries, AD, and research platforms. Students have the obligation to go in person to the library physical space to make the most of their day in the University and do their assignments, and this might limit their perspectives on what is a library. Because in spite of the efforts these interviewed teachers have done to explain what a digital library is, some students do not quite grasp the idea that they can work, study, investigate and enhance the work they do while they are outside campus. Furthermore, according to one interviewee, this 'new concept of library' must imply that the library is part of academia and an academic department in the University, and not an administrative one, as it has been both organizationally and conceptually for the community. If this dimension is realized, the processes of linkage and support between library and academia would arrive at a level where more than speaking about a library, it would be a department that is seen as a common academic development endeavor, and this would entail that librarians are part of the 'same academic team'. The teacher who suggested this topic felt that efforts such as ICD will accomplish this proper integration.

**The Divide between Digital Proficiency and Resistance toward Reading.** One teacher highlighted an issue that they are seeing with much concern. While they see current students use technology easily, they also detect a resistance toward 'deep and critical reading', which, in turn, generates functional illiterates and is also a problem for the library, as it lowers its usage. This issue makes it difficult to develop an IC, because some students are satisfied with just listening to the teacher's lectures. This conflicts with the learning model, which dictates that the teacher is a facilitator and students need to expand their understanding independently. A teacher suggested that the new concept of the library can tackle the importance of reading, as well as all layers and qualities of reading, and being informed, and having an IC may perhaps alleviate this issue.

**More Extensive Promotion and Divulgation of the Library and IC.** Teachers claimed that the library has many things, but we have not achieved a state where everything there is to know about resources is socialized in the learning community at large, rather than just for those faithful to the library or the 'nerds' or studious. Suggestions provided by teachers were to use more emails and social media for promotion. Furthermore, something related to this section was the recommendation to create easier mechanisms for teachers to be able to update resources for their courses, an area where the ILDL outreach is very important.

**More Research and Scientific Communication Support.** The institution is moving faster toward the research realm, an arena that is currently dominated by a relatively small number of CETYS scholars. This area is included in P2020. It has been pushed by the University Rectory, is patent in the hiring of new academic staff with research experience, and by newly found and more extensive collaborations with academics from other institutions. Hence, there is a need and thus an area of opportunity for having better support in using information, to seek information, references and resources for conducting research according to the institutional research agendas. Furthermore, one of the obstacles for teachers to do this themselves seems to be the lack of research experience for some and time constraints for others, in order to find and learn how to use resources for themselves.

## References

1. Machin-Mastromatteo, J.D., Lau, J., Virkus, S.: Participatory action research and information literacy: revising an old new hope for research and practice. In: Kurbanoğlu, S., Grassian, E., Mizrachi, D., Catts, R., Špiranec, S. (eds.) ECIL 2013. CCIS, vol. 397, pp. 48–53. Springer, Heidelberg (2013)
2. CETYS Universidad.: Plan de Desarrollo 2020. IENAC, Mexicali (2011)
3. Oliver, G.: Investigating information culture: a comparative case study research design and methods. Arch. Sci. **4**(3–4), 287–314 (2004)
4. Davenport, T.: Information Ecology. Oxford University Press, Oxford (1997)
5. Machin-Mastromatteo, J.D., Beltrán, O., Lau, J.: Piloting a holistic information culture program: the experience of CETYS universidad system of libraries. In: Kurbanoğlu, S., Špiranec, S., Grassian, E., Mizrachi, D., Catts, R. (eds.) ECIL 2014. CCIS, vol. 492, pp. 350–360. Springer, Heidelberg (2014)
6. Vezzosi, M.: Information literacy and action research: an overview and some reflections. New Libr. World **107**(7–8), 286–301 (2006)
7. Hill, C.: Improving information skills programs using action-research. In: Booker, D. (ed.) Concept, Challenge, Conundrum: From Library Skills to Information Literacy, Proceedings of the Fourth National Information Literacy Conference, pp. 139–146. Charles Sturt University Press, Adelaide (2000)
8. Pickering, N., Crow, S., Franklin, L.: Information Literacy and Information Literacy Skills Instruction: Applying Research to Practice in the 21st Century School Library, 3rd edn. Libraries Unlimited, Santa Barbara (2011)

# Scholarly Competencies

# Learning Scholarly Information Competencies in the Community of Practice: A Case Study of Polish Critical Pedagogy Researchers

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**Abstract.** The present paper presents the findings of research conducted in 2014/2015. The aim of the research was to understand how members of a particular academic community learn scholarly information competencies, wherein learning was perceived as a social and cultural phenomenon and, especially, as a practice. The research methodology was based on semi-structured interviews with individual members of the community and focus-group interviews. The community under study consisted of Polish critical pedagogy researchers. My investigations drew on Schatzki, Lave, and Wenger for the theoretical and philosophical underpinnings of the qualitative data analysis. The research showed that being a part of the community of practice offers multiple opportunities to learn scholarly information literacy. However, at the same time, being inside and co-creating a community does not necessarily entail new scholarly information competencies since the group may hinder the inclusion of new practices.

**Keywords:** Scholarly information literacy · Community of practice · Social learning · Poland

## 1 Introduction

Employees of higher-education institutions in Poland have to combine three groups of tasks: research, teaching, and administration. Therefore, researchers often claim that they spend too much time on tasks that are not connected with their research. The critique also targets the distribution of research funds and the lack of financial stability. The research evaluation system fails to adequately accommodate and appreciate the distinct character of various disciplines and groups of sciences. Moreover, this system disfavors the humanities and parts of the social sciences. This evaluation of higher-education institutions and individual researchers is based on bibliometric indicators, which – according to the academic community – tend to be increasingly fetishized. Emanuel Kulczycki points out that such a phenomenon is a kind of 'impactitis'– the Impact Factor Syndrome (the *punktoza* in Polish) [1].

In Poland, two bottom-up movements have been discussing the current situation in the higher-education sector. The first is the Citizens of Academia (Obywatele Nauki) and the other is the Crisis Committee of Polish Humanities (Komitet Kryzysowy


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Humanistyki Polskiej). These two organizations put forward different postulates. The former advocates strengthening the funding system to promote high-quality scholarship and the latter opts for reducing the proportion of grant-based funds in budgets for research to ensure a stable allocation of resources to all Polish higher-education institutions. The Committee declares that this step would help smaller institutions and less-prestigious disciplines survive the crisis.

The situation of Polish scholarship and research is the very interesting starting point for investigating the ways of learning in Poland's academic community. I have been interested primarily in social science and humanities scholars. My sample consists of three Polish critical pedagogy researchers, i.e., members of a small academic community.

The aim of the research is to understand how the members of that particular academic community learn scholarly information competencies.[1] Learning is perceived as a social and cultural phenomenon [2, 3] and, especially, as a practice. I formulate the following research questions: (1) How do the members of the community shape information practices bound up with their research activities (scholarly information literacy)? (2) How are information practices reproduced and transformed?

## 2 Theoretical Framework

Scholarly information competencies (literacy) are contextualized information practices [4, 8], that are embedded within research practices [5]. In academic communities, the contexts of information practices may be provided by a university as a workplace, the traditions of a given discipline, and the research modes and manners. Fry [5] pays special attention to the role of social relationships in constructing the patterns of the scholarly information practices.

Fry [5] locates scholarly information practices, e.g. the use of the digital information infrastructure, within the term 'research practices of scholarly communities.'

Talja et al. [6] emphasize who is a participant in a particular practice by using the term 'scholar's information practices.' This term has a similar meaning to the above-mentioned term, 'research practices of scholarly communities'. The authors of both cited works outline differences between information practices in various disciplines. Palmer et al. [7] use the term 'scholarly information behavior,' which signifies 'information activities involved in the research process.'

The research on scholarly information behavior in the library and in information science has a very long tradition. However, Palmer et al. [7] claim that the term 'information practices' is more appropriate to stress a "social aspect of scholarly activities and [is] purposeful" [p. 4], and, in this way, to define information behavior as a "practice within a discipline or field of study" [p. 6].

Scholarly information competencies are defined in two ways: (1) as a set of competencies that are the result of practicing, i.e. identifying, locating, evaluating, and using

[1] The present paper was written as a part of the project "Społeczne uczenie się kompetencji informacyjnych przez polskich pedagogów krytycznych: studium przypadku" financed by the Faculty of Education of the University of Lower Silesia, decision number 04/dok/WGW/2015.

information in appropriate ways; and (2) as practicing or an ability to practice, which is contextualized. The first definition refers to the "traditional" definition of information competencies as a set of cognitive skills and knowledge. The other definition refers to the scholarly practice itself [4].

The concept of social practice (in terms of Schatzki's practice theory) has informed my understanding of the nature of practice. Schatzki [10] defines practices as "structured spatial-temporal manifolds of action" [p. 1863]. He has observed that a practice consists of many activities and the number of these activities is countless [11]. Unintentional observers may not be able to interpret what they see when they do not know the social context or how the practice is organized. A lack of understanding also makes it impossible to make decisions concerning one's own actions that are linked to that practice [11]. Practices are organized by: (1) the understanding of actions that constitute the practice, (2) the rules and the norms, (3) the teleological-affective structuring, and (4) comprehension of how the meanings of activities are instituted and governed [11]. Schreiber [12] emphasizes that regulations, meanings, and norms are subject to ongoing negotiations, which are open to several parties. The negotiations are constantly suspended and re-opened.

In Schatzki's theory, social practices are situated. Schatzki uses the term 'social site' to designate: (1) the space of the activities, (2) the time, i.e. the location of actions in historical time (a particular moment, a historical context), and (3) the teleological location of the activities. Schatzki thereby stresses the threefold situatedness of the practice. The practice acts and is preserved in the memory of its participants. In this way, the practice is being established as a space for sociality [13].

Lloyd and his collaborators [14, 15] highlight the usefulness of Schatzki's practice theory in studies on learning information competencies. The theory helps us to understand how social life is constituted and changed through these practices.

In my opinion, the compatibility of Schatzki's theory with the social or the situated learning theories (in particular with the theory developed by Lave and Wenger [3]) is very important. I have used these theories for constructing the theoretical framework of my investigation.

Lave and Wenger's theory [3] is based on acknowledging the role that communities play in sustaining and transforming practices (with the emphasis on sustaining). The knowledge is located within the community, i.e. persons connected by a shared domain of interest. A community of practice differs from other communities because its members regularly engage in collective activities. The members let other members into the practices they participate in, and thus they interact with them. They are, therefore, practitioners who share practices. The knowledge is situated at the very center of the community of practice, and practitioners find themselves closer to or further away from that center. Lave and Wenger refer to the users as occupying two opposite positions, the newcomers and the old-timers, and to those who do not belong to a given community of practice as outsiders [9]. Learning depends on the engagement of the members of a community of practice in practices legitimized by that community. Lave and Wenger [3] assume that newcomers aspire to full participation in a practice that will result in them obtaining old-timer status. Thus, learning consists of the participants moving toward the center.

Wenger [16] claims that, to be recognized as a community member, individuals have to meet certain criteria. They have to (1) understand what the community finds relevant and how it produces a worldview, (2) be capable of engaging in activities with other community members, and (3) be able to use the community-produced shared repertoire of tools, methods, documents, procedures, vocabulary, and symbols inscribed in the history of learning in that community.

People may belong to diverse communities of practice and occupy various positions in them [3]. Wenger highlights a sense of identity, perceptions of the community, and self-perceptions in relation to the community [16].

Learning a practice involves developmental cycles that delineate a unique trajectory of learning. The cycles show that members join in the social practice of the community following a pattern of stages and, consequently, sequences of incidents are repeated in the participants' biographies [3].

Practices change when the community members come up with proposals for modifications and these proposals are accepted through negotiations [16]. However, good proposals may be rejected or, alternately, their implementation may require too much effort from the proponents or advocates of change.

In the community of practice perspective, learning is comprised of the following dimensions [16, 17]:

- Learning as a personal experience – individual and collective capacity to experience the world as a meaningful entity.
- Learning as a social practice – addressing various aspects of sustaining engagement in action.
- Learning as a social becoming (identity) – addressing oneself in relation to the community and moving toward the center of the community (i.e., learning).
- Learning as belonging – addressing the social order of the community, its activities, its values, and the conditions under which participation is acknowledged as competent.

Moreover, I also drew on Lipton and Bruce [4], who, in relation to situated learning theories, state that learning occurs when individuals engage in "authentic" practices. In this way, they stress its informal character. However, Lave and Wegner's concepts are also applied in research on practices in institutionally established communities (e.g. school classrooms, and worker teams). I believe that this is justified in two cases: (1) when the institutionally established group is at the same time a community of practice and (2) if the research encompasses the members of that group and aims to comprehend in what constellations the communities of practice operate.

## 3 Methods

I use an interpretative approach to study the social learning theories. I investigated a community consisting of a group of three critical pedagogy researchers who work at the same university. As a researcher, I am at the same time outside the group (its members define themselves as affiliated with critical research) and inside it (in another configuration we co-create a collaborative community).

I focus on the case study of one community to investigate its information practices in a more complex way. Therefore, the results of my research could not be generalized. However, they allow us to understand practicing, i.e. the learning of information competencies, in a context that is specific to this community (e.g. the Polish situation of humanities and social sciences and the culture of critical researchers).

I chose this particular research team because of its context of experiences. Stake [18] calls such a solution the "intrinsic case study." The advantage of using this approach is the possibility to meet Schatzki's understanding of social practices as practices that are situated.

The research methodology was based on semi-structured interviews with the three members of the community as well as three focus-group interviews. During the disposition interview, the three researchers were asked about research and information practices related to such activities as obtaining, collecting, and sharing information. As Krueger [19] shows, using a case study approach justifies a small number of respondents. Krueger calls such an approach the "mini-focus group."

The analysis consisted of three stages. (1) Relying on social practice theory and community of practice theory, I constructed analytical categories, considering especially the elements that organize practice, three aspects of "social sites" (Schatzki), and learning dimensions (Lave and Wenger). (2) I coded my data by the *a priori* technique (a deductive analysis) and added new categories to my coding grid as they emerged in the respondents' narratives (a deductive-inductive analysis). I used NVivo software. (3) I realized a description of scholarly information competencies and interpreted the situated and social learning of these competencies.

I translated excerpts from the respondents' narratives into English.

## 4 Learning as a Social Becoming and Belonging

The researcher-respondents defined their workplace as a location where the community came into being. The three of them started collaborating as a result of an institutional decision ("coercion"). The team members share interests and the perception of team-creation as a process that is still in progress in terms of both institutional arrangements and the development of research practices.

Despite their institutional embedment, the team members feel separate and autonomous in choosing both methods of work and partners with whom they might collaborate. They refer to the community of ideas, which facilitates collaboration or even enables it:

> Respondent 1: *No, at this moment, the college [university] doesn't dictate to us what to do. Opportunities and inspirations flow in from various places. […] The project…came from the outside. They [an NGO] feel a bond with the project, its social investment, and even its ideas.*

They connect their research practices very emphatically with the partners with whom they carry out their research. They are aware of this external influence:

> Respondent 2: *Why we do what we do does matter…. The specific rhythm of work in such NGO-related enterprises has its influence also on how you perceive a given issue….*

The respondents highlight the financial circumstances (e.g. low remuneration), that make them seek additional jobs. Overburdened, they have hardly any time for participating in information practices, including keeping up with the reading schedule they have set for themselves and that they consider essential to their personal development. The overload is also detrimental to the quality of their teaching as they are less dedicated to teaching and less enthusiastic in their approach to students.

Becoming a part of a community provides support particularly in the biographical moments when researchers are thrown in at the deep end, when they are expected to perform tasks they have not been prepared for. Teaching is such a task, as reported by my respondents. Their narratives repeatedly feature the moment of a first lecture/class, being forced to teach certain courses and subjects, a lack of institutional support in teaching, and the role of (collaborative) community in coping with such challenges.

Although my interest focuses on research practices, I cannot ignore this category of duties of the employees of Polish higher-education institutions in which they are involved daily. Teaching makes for a relevant context comprised in what Schatzki refers to as a "social site," i.e. social locatedness at a given place and time. It seems that these very biographical points integrate the relationships and build a space of support in a community of research practice.

## 5 Learning as a Personal Experience

The experiences of the community participants result from their personal biographical choices. They include, among others, experiences from scholarship (two researchers). Participation in other communities of practice, including communities at foreign universities, provides an important point of reference for describing the information practices of the community. An experience becomes a tool for describing practices, assessing practices, and constructing meanings for one's own information and research practices. It also provides a point of entry into discussions on institutional arrangements that obstruct effective research work at a university, i.e. the workplace. One of the issues is a lack of common space, without which daily contact and experience-sharing are difficult. Such observations reveal an endorsement of social learning and learning through building relationships among the members of a broader academic community. The researcher-respondents focused on the differences between workplace organization at their home institution and what they experienced when studying or working abroad. In particular, they spoke about a lack of explicit temporal and spatial demarcations of work performance. Everything takes place "outside" the institution, so to speak:

> Respondent 3: *Here, I come in at 9 a.m. and stay until 3 or 4 p.m., and that's the time when I read, analyze interviews, and whatnot…I write papers…I meet up with people and talk about that…. That's the thing we don't have…in Poland. […] On the one hand, culture, and, on the other, the infrastructure that promotes team work…even if it's not at the level of building a team. They often have projects over there that teams work on…or experiences such as that there's a kitchen where you can meet with people and chat with them about what you're working on.*

## 6 Learning as a Social Practice

The narratives described such information practices as:

- Using tools of document co-sharing and distance collaboration.
- Obtaining information (publications).
- Information management.
- Information sharing (sharing of the obtained resources).
- Dissemination of one's works.

The team uses distance tools for communication. The usefulness of these tools, however, is evaluated differently by the respective team members. The assessment of these tools ranges from (1) pointing out particular advantages of the software that enables them to stay in touch and work together until late at night, to (2) expressing negative emotions about the tools, which nevertheless does not eschew a reflection on the uses of these tools in their work. The researchers agree that the tools are a kind of prosthesis that helps them perform tasks they could not possibly execute at the workplace due to its infrastructure. The community members are involved in negotiations to recognize the usefulness of these tools:

> Respondent 2: *They keep persuading me all the time. I'm sort of a back number, I admit. I'm definitely out-of-date as regards…the know-how of such tools. […] It's a good thing that we keep talking about it; perhaps it'll help make things more effective.*

The community members are also involved in negotiations on including a shared model of bibliography management into their research practices. Two participants are advocates of bibliography managers while the third is definitely less enthusiastic and unconvinced whether the effort necessary to master that tool is a worthwhile investment. Their personal experiences situate them, to use Lave and Wenger's terminology, in different positions in their community of practice. The old-timers are experienced users of bibliography managers while the newcomer is aware of their advantages and therefore plans to join in the community's practice despite the negative attitude to these tools. The community's participants are differently situated in the negotiations, which shows who has the power to maintain the position of a given practice. These relationships are endorsed, and the newcomers who join in the practice are ready to change, motivated by the teleological character of the proposed practice – it serves certain ends and can be made more effective, as is the case here.

Paradoxically, the power-position in sustaining and transforming information practices seems to belong to those who are open to change. This openness is expressed in personal experience:

> Respondent 1: *I have some tools I use and, generally speaking, I'm…pretty satisfied with them. But, to be honest, I was once pretty satisfied with Word, and then I saw Scrivener, right? Once, I was glad that I had books on my shelf, and now I'm glad I have…Zotero. You know, things simply keep changing, and perhaps there're tools I have no idea about, or only got a glimpse of somewhere, and those tools would make my work much easier than it is now, but I wouldn't know about that.*

An openness to change does not mean abandoning the old-timer positions since the modernizers in the studied community included practices from the outside, i.e. practices they have developed in other communities of practice, e.g. communities that collaborate virtually on the Internet.

This domination, however, does not pertain to all information practices. The innovators accept changes concerning selected information practices, e.g. using bibliography-management tools and research-writing software, while at the same time they maintain the status of some other practices despite being aware that they need revision. This concerns, for example, adhering to the footnote-based text documentation style even though the name-date system now prevails in constructing references:

> Respondent 1: *It just makes me mad…I know you like the APA style, but me…well, the APA style irritates me and it is determined not only by its reference format. I'm used to using it, because I have noticed, sort of, its advantages, in the sense of standardization, right? And I've noticed the clear rules of that style, and it's really, I'd say, global, in that sense of regularity, but I use footnotes and I'm part of a community of set footnotes users, because my closest associates, people I collaborate with, are scholars who are enthusiasts of footnotes, so to speak.*

## 7 Discussion

A case study of only one community limits the interpretation of results. Such an approach does not allow us to generalize or to build a typology of information practices in the community of researchers. Despite this, I interpreted the respondents' answers about their scholarly information practices in terms of their particular biographical experiences and in the context of these practices. This is the main advantage of the case study approach described in the present paper.

Surveys, a method that is more popular among positivist researchers, would allow generalization and a comparison of information practices, as described in other works [7]. The limitation of surveys reveals the impossibility of considering biographical experiences in the analysis.

A higher number of samples would allow us to build a typology of scholarly information practices. However, it would be more difficult to understand particular practices in terms of biographical experiences.

## 8 Conclusion

The research showed that being a part of a community of practice offers multiple opportunities to learn scholarly information literacy, e.g. when members bring new competencies from another community in which they participate into the group. At the same time, being inside and co-creating a community does not necessarily entail new scholarly information competencies, since the group may hinder the inclusion of new practices. Practicing information literacy usually takes place in non-formal situations. Sharing identity and culture is a foundation of transforming practices, following changes in the environment.

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## References

1. Kulczycki, E.: Assessing Publications in the Humanities and Social Sciences: A Case of Parametric Evaluation in Poland (2015). https://www.academia.edu/12877616/Assessing_Publications_in_the_Humanities_and_Social_Sciences_a_Case_of_Parametric_Evaluation_in_Poland
2. Wenger, E.: Communities of Practice: Learning, Meaning, and Identity. Cambridge University Press, Cambridge (1998)
3. Lave, J., Wenger, E.: Situated Learning. Cambridge University Press, Cambridge (1991)
4. Lupton, M., Bruce, C.: Windows on information literacy worlds. In: Lloyd, A., Talja, S. (eds.) Practising Information Literacy, pp. 4–27. Centre for Information Studies, Wagga Wagga (2010)
5. Fry, J.: Scholarly research and information practices. Inf. Process. Manage. **42**(1), 299–316 (2006)
6. Talja, S., Savolainen, R., Maula, H.: Field differences in the use and perceived usefulness of scholarly mailing lists. Inf. Res. 10 (2004) http://www.informationr.net/ir/10-1/paper200.html
7. Palmer, C.L., Teffeau, L.C., Pirmann, C.M.: Scholarly Information Practices in the Online Environment: Themes from the Literature and Implications for Library Service Development. OCLC Research, Dublin (2009)
8. Talja, S.: Information sharing in academic communities. New Rev. Inf. Behav. Res. **3**, 143–159 (2002)
9. Wenger, E., McDermott, R., Snyder, W.M.: Cultivating Communities of Practice. Harvard Business School Press, Boston (2002)
10. Schatzki, T.R.: On organizations as they happen. Organ. Stud. **27**, 1863–1873 (2006)
11. Schatzki, T.R.: Introduction: Practice Theory. In: Schatzki, T.R., Savigny, E.V., Knorr-Cetina, K. (eds.) The Practice Turn in Contemporary Theory, pp. 10–23. Routlegde, London (2001)
12. Schreiber, T.: Information literacy, mobile technologies and study practices. In: Kurbanoğlu, S., Grassian, E., Mizrachi, D., Catts, R., Špiranec, S. (eds.) ECIL 2013. CCIS, vol. 397, pp. 317–323. Springer, Heidelberg (2013)
13. Kemmis, S., Wilkinson, J., Edwards-Groves, C., Hardy, I., Grootenboer, P., Bristol, L.: Changing Practices, Changing Education. Springer, Singapore (2014)
14. Lloyd, A., Bonner, A., Dawson-Rose, C.: The health information practices of people living with chronic health conditions. J. Libr. Inf. Sci. **46**(3), 207–216 (2014)
15. Lloyd, A.: Information literacy as a socially enacted practice. J. Doc. **68**(6), 772–783 (2012)
16. Wenger, E.: Communities of practice and social learning systems: the career of a concept. In: Blackmore, C. (ed.) Social Learning Systems and Communities of Practice, pp. 179–198. Springer, London (2010)
17. Illeris, K.: Trzy Wymiary Uczenia się. Wydawnictwo Naukowe DSWE TWP, Wrocław (2006)
18. Stake, R.E.: Case studies. In: Denzin, N.K., Lincoln, Y.S. (eds.) Handbook of Qualitative Research, pp. 236–247. Sage, Thousand Oaks (1994)
19. Onwuegbuzie, A.J., Dickinson, W.B., Leech, N.L., Zoran, A.G.: A qualitative framework for collecting and analyzing data in focus group research. Int. J. Qual. Methods **8**, 1–21 (2009)

# Creation and Implementation of Interactive Model for Training of Academic Authors: How to Publish Successfully Research Publications

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**Abstract.** Research reliability, innovation policy as requirements of program Horizon 2020 provoke processes of self-assessment, monitoring, result measurement including ethic and social impact. This article proposes matrix for competences' assessment and quality improvement of authors of research papers. The model offers interactive tools for: information search, evaluation, investigation and management of research reports. It integrates interactive tool for training of publishers, authors, students or successful publishing in internationally influential scholarly journals. The model is oriented towards the target groups of researchers – professors, associate professors, assistants, graduate students, research teams from educational and cultural institutions The methodology consists of: (1) interdisciplinary science metrics' modeling of the processes of distribution of research papers in scholar publications integrated in system of impact improvement of scientific publications; (2) informing, consulting, training of the target groups. The projected result is to obtain measurement and comparison of research based on the implementation of the model.

**Keywords:** Applied-science products · Impact factor · Indicators · Innovative strategy · Intelligent growth · Interactive model · Interactive training · Knowledge society · Redesign · Science-metrics

## 1 Introduction

Research reliability and innovation policy provided by the program Horizon 2020 requirements are aimed at the integration of the processes and their self-assessment, monitoring, and result measurement, together with the ethical and social impact – direct and indirect on the economy and society. The topic of this paper focuses on activity, efficiency and visibility of publications from Bulgarian researchers and their capacity to publish successfully using an interactive module for training of academic authors. It is not just modern. It is currently more than urgently needed. Elaboration of science metric models, considering the process of creation of research results is an advanced path in fast development within the world of science. Availability of this type of functioning system is urgently required in Bulgaria. The factors that make publications from


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Bulgarian researchers "happen" or not happen, and make them popular and visible are various – a big part of their success in getting published is subjective and largely vulnerable and not essential. It is a matter of will and agreed regulations. A science metric model functions to synchronize many indicators and parameters, interconnects them, and allows research of self-organized dynamic systems providing planned results[1]. Hence the importance of the great task – building up a science-proven, easily accessible, attractive system for improvement of the products of Bulgarian research publications, and the human power – the Bulgarian scientists.

## 2 The State of the Art of the Problem in Bulgaria and Hypothesis

The number of scientific journals and books and open access internet resources constantly increase. Browsing and access tools to reach huge scientific information rapidly modernize, transforming information literacy into a constant educational process as far as strategies for scientific search, retrieval and supply of reliable information are concerned. There are many possible means, methods and competencies for search and knowledge of innovations and the newest trends and opportunities based on information technologies. Changes in the form, in the manner of publishing, and in methods of impact evaluation of scientific publications in Bulgaria during the last 25 years provoke different analytics. Actually, to a high degree, digitization correlates to the *business models* and *market behavior* of the *publishers* regarding the means of production, distribution, cooperation, training and ownership. Changing ***business models***[2] under the condition of a digital economy and market is a difficult process in small countries with an underdeveloped information infrastructure, weak market for information products, and lack of governmental support.

Therefore the *intermediary and collaborative role* of research institutes, scientific publishers, universities and research libraries are necessary, not only for procurement of licensed access to scientific information resources, but also for development of the competences of qualified users and librarian-mediators [1] themselves. This is even more so the case not only during the process of information retrieval. It is also important for the effective popularization of scientific results and ideas of the researchers, by publishing with the most renowned and visible publishers (from an information point of view), with proven influence in the scientific world, including open access publications. In this connection, rankings of the universities based on the proportion of funds dedicated for research, the visibility (and citing) of the publications, the efficiency of the published results, and their application in practice, seem to appear of first importance.

Scientists from the Bulgarian Academy of Sciences (BAS), and Bulgarian universities like the State University of Library Studies and Information Technologies

[1] An example of the use of such a model is STAR METRICS, USA, which measures the impact and outcome of investment in research, innovation and competitiveness [2]. Within Europe, 2020 Euevalnet platform is used (European RTD Evaluation Network, 1997) [3], which allows sharing of information and best practices regarding methodology, use of indicators and impact analytics of the research.

[2] See also [5–7].

(SULSIT), the University of National and World Economy (UNWE), and Sofia University "St. Kliment Ohridski," make efforts to explain, adapt, classify, and recommend strategies for successful publication activity in the scientific sector. In reality, however, there is a big gap and lack of clear criteria for redesign of academic publications/journals. Scientific titles are awarded to Bulgarian researchers and professors based on an evaluation of the impact of journals in which they publish their scientific results.

The Ministry of Education and Science, as part of the project "*Science 2 Business*", Operative Program "*Human Resources Development"*, Fund for Scientific Research, has a persistent policy of increasing the impact of Bulgarian publications. The Ministry offers support in eight sessions for scientific authors to publish in journals with an impact factor, and also supports the actions of Bulgarian publishers to join the impact factor journals. Nevertheless, Bulgaria needs to switch from descriptive-analytical to result oriented, and easy transformative model of Bulgarian scholar journals and skills and competencies of the Bulgarian authors of academic publications.

## 3 Practical Models

There is a need to create in this field dynamic methodologies and models driving to new ways and formulated approaches which will enable publisher's efficiency, fully covering the scientific achievements and tangible benefit. The authors of this paper find that the *implementation of interactive applications, training and modelling of the standards* will meet this need. The **main goal** is to create a ***new working model*** for covering the *impact indicators* in the research fields of the Bulgarian academic publications where Bulgarian authors publish. Therefore the article proposes a ***matrix for competences' assessment and improvement*** of the authors of research papers.

The ***model*** evaluates and offers interactive tools for: information search, investigation and management and for carrying out of research reports. It integrates an ***interactive tool*** for training publishers, authors, and students for successful publishing in influential Bulgarian and foreign scholar journals, demonstrating the ways in which scientific works, articles, dissertations, monographs, research announcements, and other items of high quality are published. The **task** is to stimulate research in conformity with requirements for sustainable growth, digitization and with the European cultural and educational policies for the presentation of cultural and historical scientific heritage, with worldwide impact.

The ***model*** is oriented towards the target groups of researchers – professors and associate professors, assistants, graduate students, and research teams from educational and cultural institutions – who may freely take advantage of the easy interactive tools with vast coverage.

The **methodology** covers two main directions:

1. The field of interdisciplinary science metrics' modeling of the processes of distribution of research papers in the scholar publications, integrated in a system of improvement of the impact of scientific publications;
2. The field of informing, consulting, and training in theory and practice of the target groups.

For the achievement of the applied research goals there are several steps in order to fulfill the tasks in the framework of the project for redesign of research publications and improvement of the science metric knowledge and analytics' skills of the authors, and to attain a higher impact for Bulgarian science.

The research team considers that one of the most important tasks is to run ***Enquiries*** with scope of the conditions, competencies, modeling and needed knowledge to publish in worldwide recognized research publications – executed in the traditional way – field enquiry with printed version, iPad and online format, and, respectively – development of questionnaires in traditional and online versions. As part of this task a questionnaire was developed for users from the group of scientific publishers and research entities in Bulgaria that publish research publications and/or conference proceedings, research papers and other forms of series of scientific publications. The questionnaire included tested image, with eventual impact factor and impact ranking. Main groups of questions are in the fields of:

1. Statute and subject coverage of the research publications as well as the referencing methodology;
2. Level of awareness of the Bulgarian publishers and/or university scientific management about the criteria for referencing scientific publications, including the presence of ISSN (print and online); ways of selecting members of Editorial Boards; instructions for manuscripts' shaping; own, national and international publishers and bibliographic standards, including availability of instructions and guides for scientific script editing;
3. Issues connected to future collaboration in order to meet criteria for inclusion of the respective scientific publications in worldwide known reference databases, including preferences about education forms; what would be the educational themes, with what duration, and in which format.

The ***Questionnaire*** constructed in this way supplies objective data for the intentions, the knowledge and the opportunities that Bulgarian publishers and research teams are able to create for providing scientific products (journals and papers) visible in world research platforms like *Elsevier*'s *SCOPUS* and *Web of Science/InCites of Thomson Reuters*. The ***Questionnaire*** also supplies objective data regarding the skill potential of Bulgarian researchers to manage information, and the analytical tools to create successful research teams, to handle references, to do indexing, to make bibliographic descriptions and lists, and to track the process of submission, publication and distribution.

The ***model*** itself is built on the bases of:

- The conducted investigations of models and best practices of science metric research in Europe and in Bulgaria for achievement of impact factor and high values of indicators, derivative from impact factor publishing for the Bulgarian publications;
- The state of the art of academic publication information competence of the Bulgarian publishing authors;
- And observation of the applied indicators for scientific impact (where available).

The ***model*** aims to encourage and motivate Bulgarian publishers to redesign in conformity with the new paradigm of Europe 2020 for smart, sustainable and inclusive growth [4], and strongly EU committed to measure, evaluate and monitor the results from the research and innovative activities of the member states. The efforts of the research team are focused on introducing "*assessment of the interventions based on the results, impact and needs which should be met. The focuses of the assessment are the needs, the results and the impact from any intervention*" [3].

The ***model*** for training academic authors includes:

1. Interactive tests, guides and consultation for research intelligence via: finding experts in the respective field of research; development of skills for analyzing author's output; training awareness of indicators like: Category Normalized Citation Impact, Highly Cited, Top and Hot Papers, Impact Relative to World, International Collaborations, Journal Normalized Citation Impact, h-index, and more
2. Interactive training of authors for image retrieving, managing of Graphical Abstracts and Orcid registration, test training on End-note web
3. Acquaintance with Editing Services and training of Language Editing, handling of Open Access and Copyright management
4. Interactive submission of papers on a test basis, using ScholarOne; paper tracking, social network impact handling

The **expected result** is to obtain measurement of the research and to compare the expected impact on the scientific results with the results actually achieved, based on implementation of the model.

## 4 Sustainability of Results

The established training section is part of the *Educational Module for Publishers, Authors and Students*. The workshops and courses contribute to acquiring new knowledge and competences in the field of publishing of qualitative products with impact factor and with high reputation. The elaboration of guides, fully compatible with the most recent research for successful sustainable publishing of periodicals and books with impact factor and successful publishing of Bulgarian authors in impact factor publications brings new level of presentation of Bulgarian science worldwide. The creation of scientific products as a result of the research and investigation work of the project – monographs, brochures, articles, reports and proceedings; as well as elaboration of the pilot project "*Interactive application for redesign of research publications to obtain impact factor and interactive application for the development of skills for authors to publish in journals with impact factor and to handle information analytical instruments*", secure live return path for analysis and monitoring and their integration on the

website of the project, based on the research platform of SULSIT[3], mobilizing efforts, according the opinion of the authors to deliver a serious basis for future sustainable results in the field of knowledge transfer and applicability of the results achieved by Bulgarian scientists at national, European and World scale. All these activities create and broaden the research potential and competences and justify a large basis for meeting many of the criteria and the indicators for smart growth, part of the Operative Program "Science and Education for Smart Growth" (OPSG) – the most important program for development of research in Bulgaria till 2020.

Last but not least – the live network of the users of the applications and the platform is supposed to serve as a natural progressively growing factor for dissemination of the results and for the improvement of the team members' work. The R&D and the scientific-applied results will draw the contribution to economic growth and competitiveness.

The project creates the conditions for successful integration of Bulgarian science into the Innovation Union of the EC. There is potential for scientific growth of the team while developing new educational content which is added to the educational programs, as well as new education-methodological approaches applied during the PhD-student workshop. There are expectations that according to the results achieved by the project precious knowledge and skills will be transferred for the creation of interactive impact models of the consumers of scientific products. The competences to deliver webinars and virtual workshops will open new opportunities; PhD students will develop their ability to present a lecture to the public. Theory and practice in academic analytics and management meet during the applied seminar of Deputy Rectors. A Round table for discussion of the future use of results from the project where academic institutions and representatives of the Bulgarian Ministry of Education and Science participate, elaborates the basis for new environment and motivation.

## 5 Conclusions

The creation and implementation of an Interactive Model for Training of Academic Authors How to Publish Successfully Research Publications is oriented towards knowledge transfer and applicability of the results while publishing publications with high

[3] SULSIT is the organization that executes the project and secures the necessary conditions for its successful result. The capacity of the scientific team in the scientific fields of the project is the strongest one in Bulgaria, because it combines the research and the scientific-applied contribution of the habilitated colleagues in the field of science metrics and information sciences and policies, with their international reputation justified by formal and non-formal groups from all over the world – universities, associations, networks etc. Representatives of Thomson Reuters, Elsevier, Springer, Emerald and other foreign publishers with titles with impact factor active in the Bulgarian market are in long-term dialog with Prof. Dsc Yankova, Prof. DSc Denchev, Prof. Dr. Peteva, Assoc. Prof. Dr. Vasileva, Assoc. Prof. Dr. Stancheva. In this way current information about new products in the field of academic publishing and the science metrics is maintained. It is planned to organize scientific consultations within the colleagues from the Faculty of Library Studies and Cultural Heritage, to receive instructions regarding development of European policies in the field of science and innovation, as well as from MES, Directorate "Science" and from the Representative Office of the EC in Bulgaria.

impact, and while preparing Bulgarian authors to publish successfully in publications with impact factor. It answers the educational, information needs and requirements of the standardization provoked by the reforms in progress in the R&D sector and the sector of academic education in Bulgaria as a member of the EU, as well as the newest methodologies of evaluation and modern web-based tools for authorship development. In harmonization with the policies of the EU and procuring innovative environment the project offers in a practical and elegant way the transfer of knowhow in a remote independent regime mode. The Guides, the consultation and training module, the platform for two-way path communication make this transfer easy. The Bulgarian R&D society and publishers, editors, managers, professors and scientists will all make use of the project results so that a huge efficiency of its rollout will be achieved – that is, highly influential publications and increased publishing activity. This efficiency will be speeded up and will be multiplied due to the shortening of methods of synthesizing cumulated knowledge, and the waste of time and efforts while searching for information occasionally, and without well defining the goals. The qualification of the researchers has improved in many aspects – from understanding how the scientific results are measured, to training of skills for choosing and writing, considering the needs of scientific impact journals, adopting habits and instruments which increase the efficiency of scientific results, and distributing them within the most influential journals for the participants' respective field of interest. The interactive applications, the educational and consulting module, and the intelligent reactive platform, create an innovative environment of exchange of scientific results, technologies, research, and publications, and at the same time increase the values of important indicators for smart growth and impact. For example, applications to the publishers and the authors include options to stimulate cooperation, which in turn, will increase the number of mutual publications with impact factor – one of the indicators for intelligent growth.

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## References

1. Business Models. Notes-MBA (2010). http://vivekgujar.blogspot.com/
2. EC.: Europe 2020. A Strategy for Smart, Sustainable and Inclusive Growth: Communication from the Commission. COM (2010) 2020 final. p. 39, Brussels (2010). http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52010DC2020&from=EN
3. EC.: Evaluation Standards (2002). http://ec.europa.eu/smart-regulation/evaluation/docs/standards_c_2002_5267_final_en.pdf
4. How to Describe and Create a Business Model. In: The Digital Executive Experiments in – Digital, Business, Investing, and Accelerated Learning (2011). http://www.harbott.com/2011/10/05/how-to-describe-and-create-a-business-model/

5. STAR METRICS [SR] Science and Technology for America's Reinvestment Measuring the Effects of Research on Innovation, Competitiveness and Science (2009). https://www.starmetrics.nih.gov/
6. Yankova, I., Dentchev, S., Peteva, I., Vasileva, R., Dimitrova, Tsv.: Sustainable tools and business models in support of research and publication activity of science research. In: Modern Dimensions of the European Educational and Scientific Space: Bulgarian-Maltese Cultural Relations. International Traveling Seminar, Valletta, Malta, 1–8 June 2015, pp. 5–8, Za bukvite – O pismeneh, Sofia (2015)
7. Yankova, I., Vasileva, R.: Libraries in the information society and knowledge management. Science **3**, 33–41 (2010). (in Bulgarian)

# Information Literacy, Libraries and Librarians

# Knowledge, Skills and Attitudes of Librarians in Developing Library Users' Information Literacy

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**Abstract.** The objective of this study was to explore how Estonian librarians assess their information literacy (IL) and which knowledge, skills and attitudes they consider important in facilitating the development of IL of library users. The research strategy chosen was a multiple case study. Document analysis, semi-structured interviews, and expert interviews were the main data collection methods. The study results revealed that librarians needed knowledge and skills in pedagogy and andragogy, instructional design, information technology, foreign languages, marketing, information sources and databases as well as on the learning domain. They also highlighted social skills and found that personal characteristics and attitudes of librarians were very important in facilitating IL. The study participants expressed the view that all librarians and information professionals must be able to advise users individually to facilitate their IL, but not all should be required to deliver courses and lectures for a group of students or library users.

**Keywords:** Information literacy · Librarian · Information professional · Vocational schools · Higher education institutions · Universities · Competencies · Teaching · Facilitating · Training

## 1 Introduction

Rapid changes in the academic and information environment constantly raise new requirements for the competence of many professions including the library and information profession. The library and information profession is "a dynamic, ever-changing profession, as meeting user expectations requires adjustments to new needs with emergent technologies and embracing other external factors that impact the twenty-first-century workforce" [1, p. 64].

The objective of this study was to explore how Estonian librarians assess their information literacy and what knowledge, skills and attitudes they consider important in facilitating the development of information literacy of library users.

The central research question of our study was: what knowledge, skills and attitudes do librarians need to facilitate the development of information literacy of library users in vocational and higher education institutions?

In order to find an answer to the central research question we formulated the following sub-questions: How do librarians define information literacy? How do


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librarians enhance information literacy of library users? What knowledge, skills and attitudes do librarians need to facilitate the development of information literacy of library users? Do librarians have the necessary knowledge, skills and attitudes to facilitate the development of information literacy of library users? How could librarians acquire or enhance the necessary knowledge, skills and attitudes to facilitate the development of information literacy of library users? Do all librarians need to be able to facilitate the development of information literacy of library users?

This paper briefly reviews the existing literature on the topic and reports the results of the study.

## 2 Competencies for Librarians

Discussions about relevant competencies for librarians are not new. There are many articles in the library literature on core competencies for librarians and information professionals in general and on competencies for specific types of libraries or for specific library jobs. For example, publications discuss competencies for academic librarians [2–7], public librarians [8, 9], school librarians [10], health or medical librarians [11–13], law librarians [14, 15], electronic resources librarians [16], reference librarians [17, 18], metadata librarians [19], acquisitions librarians [20], science collections librarians [21] or librarian 2.0 [22–24].

In the higher education context there are many discussions about the role of the library and the literature of librarianship presents a complex picture of how library can support university education [25–30].

Doskatsch [26] elaborated on the following requirements for the librarians involved in the teaching and learning process: to engage in critical reflection and move from a library-centred view of information literacy towards viewing information literacy as a holistic educational outcome based on transferable concepts and skills; to understand the institution's teaching and learning framework, educational policy and strategy, terminology and the context; to have good negotiation and conflict management skills; to understand different learning styles and teaching methods; to understand students' academic requirements and learning support resources in traditional and digital environment; to have a considerable knowledge and experience with information systems and information technology to support students' learning; to have a collaboration skills to work with faculty in using active learning methods; to have competencies to design, develop, deliver and evaluate information literacy programmes in traditional and digital environment and integrate information literacy into the curriculum.

Kirk [31] has indicated specific elements essential for the success of academic librarians. These skills cluster into the three main categories of design, delivery and evaluation. The teaching librarian also needs deep knowledge of specific subject fields.

Peacock [27, p. 13] notes that "complex role demands more than sound pedagogical knowledge, advanced teaching skills and an ability to develop and deliver effective learning experiences. It also requires that the teaching librarian functions as an educational professional; that is, as one who can engage in educational debate and decision-making processes, influence policy, forge strategic alliances and demonstrate diplomatic sensitivity."

Peacock [28, p. 27] urged academic librarians to position themselves as key educators in the educational environment, and acquire an educational competence and professional confidence equal to that of their academic peers. Peacock argues that the relative inequality of librarians and academics prevents library professionals from fully integrating information literacy into curricula. Peacock suggests developing a new generation of librarian educators, retrained as 'learning facilitators' and forging campus-wide 'alliances' to ensure that librarians and libraries to overcome their marginalisation.

Bruce [32] notes that in the last decade we have seen continued and increased focus on the important contribution that libraries have to learning, in public, school, academic, and special libraries.

Virkus [33] found that there were different views about the role of librarians as teachers in the process of facilitating the development of information-related competencies. She prefers to use the term 'information-related competencies' instead of 'information literacy' [34]. Several senior managers and academics supported this idea, some were against it. Several academics found this idea excellent and worthy of attention but also clearly indicated that it would be an exception rather than the accepted practice. Several senior managers and academics saw the library first and foremost as a service, resource or support centre even if they did acknowledge the role of librarians in the process of facilitating information literacy. However, comments from several senior managers and academics revealed that they did not believe that librarians should have a teaching role within the university. Several senior managers and academics found this idea interesting, but hesitated as to whether it should be a general practice. The views of librarians also differed with regards to the teaching role. Several librarians did not believe that teaching should be their responsibility. One librarian expressed very clearly that she did not want to be a teacher and if she did then she had taken a teaching qualification. However, several librarians still indicated that quite often they had to take the role of the teacher or tutor when students came to the library and asked for academic advice. Several librarians expressed the view that librarians can take on a teaching role and were pondering how to develop their pedagogical knowledge and skills. Students also had different views regarding librarians as teachers. Some of them thought that librarians can be teachers, some of them did not expect that role from librarians and others had no clear position on that. Several librarians saw the role of the librarian more as a consultant and as an active member of the course development team. It seemed that misunderstandings of different actors' roles and responsibilities in academia might create counterproductive behaviours and might misdirect design of the programmes for information literacy [33].

Several authors have asked how many librarians are qualified for roles as teachers or facilitators [26, 29, 35]. Elmborg [36] believes that librarians are not prepared for these changing roles and suggests that library and information science education should better address this need.

Calzada Prado and Marzal [37] analysed main professional competency standards and courses currently offered in accredited graduate programmes in the United States, Canada, United Kingdom, and Australia. Results suggest that although some relevant competencies have been included by professional associations in their competency standards for all types of information professionals, instructional competencies have

not received much attention in graduate educational programmes other than in concentrations or tracks targeted at future school or academic librarians.

Thus, with this background we initiated this study.

## 3 Research Methods and Procedures

The research strategy we used in this study was a multiple case study within a post-positive paradigm. Several researchers suggest that a case study is a preferred strategy when 'how' or 'why' questions are being posed, when a phenomenon is complex and includes contemporary sets of events, when the researcher has little control over events and in-depth investigation is required, or when a phenomenon cannot be studied outside the context in which it occurs and there has been little or no previous research on the topic [38–41]. Denscombe [41, p. 31] notes: "Relationships and processes within social settings tend to be interconnected and interrelated. To understand one thing it is necessary to understand many others and, crucially, how the various parts are linked" and the case study strategy is suggested in those settings.

The case study is a holistic research strategy that combines several data collection methods [42]. However, the case study strategy does not dictate strictly which methods must be used [41, p. 32]. The main advantages of the case study research are: it provides in-depth and rich information of complex social situations; can explain complex causal links in real-life interventions; encourages the use of multiple methods to provide a richer picture of the phenomenon than would any single method; it often provides light on sensitive things that are difficult to study in other ways [38, 41, 43, 44]. Thus, a case study research strategy met the requirements of this study.

Yin [38, p. 46] notes that multiple-case study designs have increased in research methodology and highlights the point that multiple-case designs have distinct advantages in comparison to single-case designs. Following the suggestions of Herriott and Firestone [45], he notes that "the evidence from multiple cases is often considered more compelling, and the overall study is therefore regarded as being more robust." Yin [38, p. 53] believes that most multiple-case designs are likely to be stronger than single-case designs and "the analytic benefits from having two (or more) cases may be substantial."

However, Yin notes [38, p. 47] that the conduct of a multiple-case study can require extensive resources and time often beyond the means of single student or independent research investigator. Therefore, the decision to undertake multiple-case studies cannot be taken lightly and every case should serve a specific purpose within the overall scope of inquiry.

Our main data collection methods in this study were semi-structured interviews and document analysis. We interviewed fifteen librarians and five experts from eight libraries of vocational and higher education institutions in Estonia. The experts were persons with library and information science background and with thorough understanding and extensive expertise in the field of information literacy education.

Documentary information is relevant to every case study topic and we used it in this research "to corroborate and augment evidence from other sources" [38, p. 87]. The range of documents we collected in this case study included the following: organizational strategy documents and any other official or unofficial documents related to

information literacy available in the organizational homepages on the web or in case study institutions; library guides; booklets; and resource packs related to information literacy training. Document analysis proved to be a useful method that provided us with additional background information about case study institutions and helped us to compare interview data with information contained in documents.

We collected the data from March to June 2014 and used a content analysis method in data analysis.

## 4 Results and Discussion

The concept of information literacy was central for this study and therefore it was important that we examine how study participants perceived and understood this central concept. The interview results revealed that, while interviewed librarians preferred different definitions of information literacy, the most favoured definitions originated from the American Library Association (ALA) [46] and the Chartered Institute of Library and Information Professionals (CILIP) [47].

The results of the study indicated that librarians assessed their information literacy on the level of good. In order to facilitate the development of information literacy of the library user librarians used group and individual training, consultations, and developed instructional materials. The integration of information literacy in the curriculum proved to be insufficient and difficult. However, the positive attitude of academic staff towards information literacy was mentioned by several interviewees. The obstacle was a lack of marketing expertise among librarians: the librarians felt that they are not able to promote information literacy successfully and therefore the students and academics do not recognize the need for information literacy training. It was also found that there is no uniform standard to harmonize information literacy training for vocational and higher education students.

In order to carry out training for library users on information literacy the following knowledge and skills were highlighted: pedagogical and andragogical knowledge and skills, including teaching skills; knowledge on different teaching methods and training structure; presentation skills; proficiency on information technology; extensive and deep knowledge of the learning domain; knowledge of various sources of information, skills of foreign languages; knowledge of marketing and study systems; interpersonal skills; critical thinking skills; knowledge and understanding of different target groups; professional expertise in information science; ability to cooperate with faculties; knowledge on the web-based and e-learning environment; academic literacy; counselling skills; and possession of the terminology of the taught specialties. They also added the knowledge on copyright.

The interviewees also indicated the knowledge and skills that are needed for the development of information literacy related instructional materials for library users: good foreign languages and Estonian language skills, knowledge of digital environments and knowledge domains, professional expertise in information science, good knowledge of different databases, andragogical knowledge and skills, knowledge of library classification and systems as well on target groups.

The study results revealed that personal characteristics and attitudes of librarians were also important: for example, openness, learner-centred attitude, patience, self-confidence, friendliness and kindness, motivation, sense of humour, and curiosity.

The interviewees found that pedagogical and andragogical competencies and marketing are the areas that needed further enhancement.

The main opportunities to improve the knowledge and skills were various training courses, self-study, and support of colleagues. It was also noted that the training provided sometimes little new information and was not always need driven.

The study participants expressed the view that all librarians and information professionals must be able to advise users individually to facilitate their information literacy but courses and lectures for a group of students or library users should not be required from all; these require special knowledge and skills as well as personal qualities and attitudes that all librarians do not have. The development of such skills, however, requires very high motivation and not all people can be good presenters and teachers.

This study confirmed several previous findings. For example, integration of information literacy in the curriculum is insufficient and difficult [28, 33]. The teaching role of librarian demands sound pedagogical knowledge, advanced teaching skills, an ability to develop and deliver effective learning experiences, and deep knowledge of specific subject fields [27, 28, 33]. Similar to Virkus [33], our research results indicated the positive attitude of academic staff towards information literacy and the view that the information literacy instructions should not be required from all librarians.

On the basis of this study we made the following suggestions for vocational schools, applied higher education institutions, and universities in Estonia: (a) professional training institutions should explore more carefully the training needs of library and information professionals in order to offer need-based training; (b) library and information science schools should include relevant pedagogical knowledge and skills into the curricula in order to prepare future librarians with relevant competencies to facilitate the information literacy of students and library users; (c) the library and information professionals should express their training needs more explicitly to the training providers; (d) librarians of the investigated institutions should collaborate with their organization's marketing and communications department in order to get more visibility and promote information literacy to the relevant target groups; (e) librarians should continue to enhance cooperation with faculties, and (f) the library management should explain the importance of the integration of information literacy into the curriculum and the benefits of information literacy in learning and teaching to the top management of the institution.

## 5 Conclusions

Our study results revealed that librarians preferred different definitions of information literacy but the most favored definitions originated from the ALA and the CILIP. Librarians assessed their information literacy on the level of good and the main forms of facilitating the development of information literacy of the library user were group and individual training, consultations, and the development of instructional

materials. Although academics were positive towards information literacy, its integration in the curriculum proved to be insufficient and difficult.

Librarians found that they needed knowledge and skills in pedagogy and andragogy, instructional design, information technology, foreign languages, marketing, information sources and databases as well as on the learning domains. They also needed social skills and found that personal characteristics and attitudes of librarians were very important in facilitating information literacy.

Librarians improved their information literacy facilitation competencies in various training courses, via self-study, and through the support of colleagues. The study participants expressed the view that all librarians and information professionals must be able to advise users individually to facilitate their information literacy but not librarians should be required to teach courses and lectures for a group of students or library users.

## References

1. Bishop, B.W., Cadle, A.W., Grubesic, T.H.: job analyses of emerging information pro fessions: a survey validation of the american library association's map and geospatial information round table (MAGIRT) core competencies to inform geographic information librarianship (GIL) curriculum. Libr. Q. **85**(1), 64–84 (2015)
2. Grealy, D., Greenman, B.A.: Set new standard for academe. Inf. Outlook **2**(8), 7–22 (1998)
3. Giesecke, J., McNeil, B.: Core competencies and the learning organization. Libr. Adm. Manag. **13**(3), 158–166 (1999)
4. McNeil, B., Giesecke, J.: Core competencies for libraries and library staff. In: Avery, E.F., Dahlin, T.C., Carver, D.A. (eds.) Staff Development: a Practical Guide, pp. 49–62. American Library Association, Chicago (2001)
5. Dole, W.V., Hurych, J.M., Liebst, A.: Assessment: a core competency for library leaders. Libr. Adm. Manag. **19**(3), 125–132 (2005)
6. Tanloet, P., Tuamsuk, K.: Core competencies for information professionals of Thai academic libraries in the next decade (A.D. 2010–2019). Int. Inf. Libr. Rev. **43**(3), 122–129 (2011)
7. Soutter, J.L.: Academic librarian competency as defined in the library and information science journal literature of 2001–2005 and 2011. Partnership: Can. J. Libr. Inf. Pract. Res. **8** (1), 1–19 (2013)
8. Immroth, B.: Improving children's services: competencies for librarians serving children in public libraries. Pub. Libr. **28**(3), 166–169 (1989)
9. Levett, J.: Key competencies and public librarians: shaping a new curriculum. APLIS **6**(2), 53–57 (1993)
10. Tan, S., Gorman, G., Singh, D.: Information literacy competencies among school librarians in Malaysia. Libri **62**(1), 98–107 (2012)
11. Lewis, S.: Competencies for health librarians. HLA News **1**, 8–9 (2010)
12. Ullah, M., Anwar, M.: Developing competencies for medical librarians in Pakistan. Health Inf. Libr. J. **30**(1), 59–71 (2013)
13. Lawton, A., Burns, J.: A review of competencies needed for health librarians - a comparison of Irish and international practice. Health Inf. Libr. J. **32**(2), 84–94 (2015)
14. Hazelton, P.A.: Law libraries as special libraries: an educational model. Libr. Trends **42**(2), 319–341 (1993)

15. Todd, K.M.: Competencies of law librarianship: reference, research, and patron services. Leg. Ref. Serv. Q. **26**(1–2), 7–22 (2007)
16. Hartnett, E.: NASIG's core competencies for electronic resources librarians revisited: an analysis of job advertisement trends, 2000–2012. J. Acad. Librarianship **40**(3/4), 247–258 (2014)
17. Saunders, L.: Identifying core reference competencies from an employers' perspective: implications for instruction. Coll. Res. Libr. **73**(4), 390–404 (2012)
18. Saunders, L., et al.: Culture and competencies: a multi-country examination of reference service competencies. Libri: Int. J. Libr. Inf. Serv. **63**(1), 33–46 (2013)
19. Han, M., Hswe, P.: The evolving role of the metadata librarian. Libr. Resour. Tech. Serv. **54** (3), 129–141 (2010)
20. Fisher, W.: Core competencies for the acquisitions librarian. Libr. Collect. Acquis. Tech. Serv. **25**, 179–190 (2001)
21. Leach, M.R.: Collection development competencies for science and technology libraries. Sci. Technol. Libr. **28**(1/2), 11–22 (2008)
22. Cohen, L.: A librarian's 2.0 manifesto (2006). http://liblogs.albany.edu/library20/2006/11/a_librarians_20_manifesto.html
23. Stephens, D., Hamblin, Y.: Employability skills: are UK LIM departments meeting employment needs? The results of a survey of employment agencies identifies gaps in UK LIM curricula in the UK. New Libr. World **107**(224/1225), 218–227 (2006)
24. Peltier-Davis, C.: Web 2.0, library 2.0, library user 2.0, librarian 2.0: innovative services for sustainable libraries. Comput. Libr. **29**(10), 16–21 (2009)
25. Breivik, P.S.: Student Learning in the Information Age. Oryx Press, Phoenix (1998)
26. Doskatsch, I.: Perceptions and perplexities of the faculty-librarian partnership: an Australian perspective. Ref. Serv. Rev. **31**(2), 111–121 (2003)
27. Peacock, J.: Teaching skills for teaching librarians: postcards from the edge of the educational paradigm. In: COMLA Seminar 2000: User Education for User Empowerment. Christchurch 19–20 October 2000. http://eprints.qut.edu.au/720/1/COMLA-2000_Final-paper1.pdf
28. Peacock, J.: Teaching skills for teaching librarians: postcards from the edge of the educational paradigm. Aust. Acad. Res. Libr. **32**(1), 26–40 (2001)
29. Brophy, P.: The Library in the Twenty-First Century: New Services for the Information Age. Library Association Publishing, London (2001)
30. Virkus, S., Metsar, S.: General introduction to the role of the library for university education. Liber. Q. **14**(3/4), 8–16 (2004)
31. Kirk, T.G.: Bibliographic instruction, library education, and the role of the academic librarian. Champaign, Illinois, Illinois University at Urbana-Champaign, Graduate School of Library and Information Science, pp. 97–112 (1995)
32. Bruce, C.: Information literacy programs and research: reflections on 'information literacy programs and research: an international review. Aust. Libr. J. **60**(4), 334–338 (2011)
33. Virkus, S.: Development of information-related competencies in european higher open and distance learning: an exploration of contextual factors, Ph.D. thesis, Manchester Metropolitan University, Manchester (2011)
34. Virkus, S.: Information literacy in Europe: a literature review. Inf. Res. **8**(4), paper no. 159 (2003). http://informationr.net/ir/8-4/paper159.html
35. Asher, C.: Separate but equal: librarians, academics and information literacy. Aust. Acad. Res. Libr. **34**(1), 52–55 (2003)
36. Elmborg, J.K.: Critical information literacy: implications for instructional practice. J. Acad. Librarianship **32**(2), 192–199 (2006)

37. Calzada Prado, J.C., Marzal, M.A.: Library and information professionals as knowledge engagement specialists. theories, competencies and current educational possibilities in accredited graduate programmes. Inf. Res. **18**(3) (2013). http://www.informationr.net/ir/18-3/colis/paperC12.html#.UulE2LRc-f4
38. Yin, R.K.: Case Study Research: Design and Methods, 3rd edn. Sage, London (2003)
39. Creswell, J.W.: Qualitative Inquiry and Research Design: Choosing Among Five Traditions. Sage, Thousand Oaks (1998)
40. Robson, C.: Real World Research: a Resource for Social Scientists and Practitioner-Resea rchers, 2nd edn. Blackwell, Oxford (2002)
41. Denscombe, M.: The Good Research Guide for Small-Scale Research Projects, 2nd edn. Open University Press, Maidenhead (2003)
42. Eisenhardt, K.M.: Building theories from case study research. Acad. Manag. Rev. **14**(4), 522–550 (1989)
43. Stake, R.E.: The Art of Case Study Research. Sage, London (1995)
44. Simons, H.: The paradox of case study. Camb. J. Educ. **26**(2), 225–240 (1996)
45. Herriott, R.E., Firestone, W.A.: Multisite qualitative policy research: optimizing description and generalizability. Educ. Res. **12**, 14–19 (1983)
46. ALA: American Library Association Presidential Committee on Information Literacy. Final Report. American Library Association, Chicago (1989)
47. CILIP: Information Literacy – Definition. http://www.cilip.org.uk/cilip/advocacy-campaigns-awards/advocacy-campaigns/information-literacy/information-literacy

# Building an Information Literacy Program for High School Students of Greece in Close Cooperation with a Local Special Library

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**Abstract.** This paper investigates the context in which a special library of academic standards could contribute to the work of Secondary Education teachers towards the strengthening of their students' information skills as a preparation for their smoother transition to University-Level research environment. We describe the collaboration of the scientific library of Eugenides Foundation with two different nearby public schools, for the creation of a project on astronomy. Concerning our research methods, we followed the model of action research, as we needed active participation and dynamic reflection of the learners during the learning process. Despite the various limitations, the outcomes of the whole effort were very positive and led us to the conclusion that close collaboration between high school teachers and the librarians even of an Off-Site library can build on students' low level information skills in order to reach a high level learning experience.

**Keywords:** Information literacy · Greek secondary education · Active learning · Astronomy projects · Participatory action research

## 1 Introduction

In recent years there have been several surveys in Greece that attempt to explore the status of Information Literacy (IL) skills of students in the different levels of education. One survey was conducted among undergraduate students of astronomy in Greece [1] and revealed the gaps in undergraduate students' information skills. For example, "[…] they adopt a relatively unsophisticated, simplistic approach to searching and limited or no use of Boolean operators or other advanced searching techniques, such as the method of truncation. They tend to use the same techniques even in databases like Astrophysics Data System (ADS), although they could achieve far more interesting and better results by using the numerous alternative options it offers." Summing up, that study revealed


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the need of undergraduate students of astronomy for an IL program with emphasis on basic research skills. That is to say, undergraduates lacked the basic competences that they should already have acquired when finishing high school.

It seems that while this problem was noticed at the university level, students' poor acquisition of even basic IL skills was mainly due to the lack of organized school libraries in Greece. "Most public schools have no libraries, or their libraries are not Well-Organized […] School libraries have not thrived in Greece for several reasons […] they have been regarded as redundant in a centralized, Teacher-Centred system, where teaching is limited to a single textbook" [2]. However, the last few years, the Greek Ministry of Education has shifted towards introducing "Student-Centred methods of teaching, such as the project method in the first grade of Lyceum, which presupposes papers and written assignments and the development of information literacy skills" [2].

All these data, in addition to the fact that the Astronomy course has been withdrawn from Greek schools, motivated us to study the conditions under which a collaborative working relationship between High-School teachers and academic librarians can be developed in order to design an Astronomy project that will incorporate teaching for the advancement of students' IL skills. *Our objectives were*: to detect the level of students' competences and their information needs; to examine how a reflective approach can contribute to the design of an IL program tailored to students' information needs; and to develop students' skills related to the use of some advanced information research tools in order to prepare them for their smoother transition to a University-Level research environment.

The Off-Site library in our case study was the scientific library of the Eugenides Foundation which is fully connected with its academic environment and specializes in various subject areas of physical sciences, including astronomy. In the context of our research, this library collaborated with two different nearby public schools in the creation of a Small-Scale Project-Based course on astronomy. As astronomy is a course that is not taught in high school, the only way we could work on this subject was through the "Project Course" and the course known as "Science Club," which are offered to students of the first and second grades of Lyceum. These are special, not obligatory courses, in the students' official curriculum in which they have to run a Research-Based project throughout the school year. Following the guidelines of these courses, we had certain advantages, as they support the group work, suggest the avoidance of Textbook-Based instructions and, instead, they urge students to select their sources and their methodology. Although the two courses share common characteristics, there were certain *differences* that we had to take into account. For instance, the "Project-Course" lasted six months (October 2014 – March 2015), while the Science Club lasted the half time (January 2015 – March 2015), the students of Science Club worked beyond school hours and, further, they did not get a grade for their work.

The target groups of our case study were the 18 students of the first school that selected the Six-Month Astronomy "Project-Course" and the 12 students of the second school that selected the Three-Month Science Club with the same subject, which was "Detection of Exoplanets."

It is easily understood that during our process we encountered numerous difficulties, primarily time limitations. According to the operational School-System regulations, we

could move the students out of the school facilities to the library's premises for a maximum of three times during the academic year for the "Project-Course" and only once for the Science Club. For that reason, we also scheduled three visits by the librarians to each school. Additionally, every lesson could last only one and a half hours.

Studying the various educational methodologies in combination with our limitations and the fact that students' needs had to be detected continuously throughout the whole procedure, we were led to adopt the method of Participatory Action Research. We used this methodology with a *constructivist viewpoint* that allowed us to cover the need for active participation and also for dynamic reflection of the learners – i.e., the students – during the learning process.

## 2 Literature Review

The body of IL literature gave us a lot of evidence of the importance placed on the collaboration between secondary and advanced level educational institutions for the development of IL programs for High-School students. As Lonsdale [3] mentions, "[…] the literature appeared to confirm what was initially conjectured: that a logical progression of information skills from secondary education to the tertiary sectors would be appropriate, and that this could be facilitated through Cross-Sectoral activity." The same author also mentions that collaboration offers a range of benefits for the students including the enhanced performance at school and the exposure of students to the larger resources of the university sector.

The literature review also gave us a range of examples of partnerships between higher education institutions and local public schools towards the development of high school students' information skills [4, 5].

The literature review concerning the methodology of our study showed us that this project seemed to fit well in the model of Action Research. As Denscombe [6] states, we could say that action research is a strategy for social research rather than a specific method. It is concerned with the aims and the design of the research but does not specify any constraints when it comes to the means that might be adopted by the action researcher for data collection. Denscombe, as well as other authors, refers also to the four defining characteristics of action research, which are the following: It is *Practical*. It deals with Real-World issues. *Change* in action research is regarded as an integral part of research. The idea here is that research should not only be used to gain a better understanding of the problems that arise in everyday practice, but actually set out to alter things. It follows a *Cyclical process.* Research involves a feedback loop in which initial findings generate possibilities for change that are then implemented and evaluated as a prelude to further investigation. Stephen Kemmis, (as cited in [7]) has developed a simple model of the cyclical nature of the typical action research process. Each cycle has four steps: observe, plan, act, and reflect. It is built on *Participation*. Practitioners are the crucial people in the research process. Their participation is active, not passive. "Put it simply, action research is 'learning by doing' – a group of people identifies a problem, do something to resolve it, see how successful their efforts were, and, if not satisfied, try again." [7].

With all these characteristics "[…] action research appears to be a valuable, even if highly demanding approach, suitable for librarians who aim to connect their teaching activity to educational research and to improve their own practice through reflection" [8].

## 3 Research Methods

We divided our general task into three subtasks, each of which students were asked to accomplish and present separately. Although the Science Club course had to be completed in half the time (three months), we created a plan for both courses, as follows: after completing the *first subtask*, students were acquainted with basic information about our Sun, as well as the structure and operation of our Solar system. The *second subtask* aimed to lead the students to develop a basic knowledge about Spectra and Light's properties. By completing the first two subtasks, students had acquired the necessary knowledge to comprehend the methods for the detection of exoplanets, which was their *third subtask* of the project. Finally, they used one of these methods they found in order to gain the experience of using real measurements for the detection of exoplanets.

As mentioned in the literature review, one basic feature of action research is the "participatory" method. In our case, two educators and three librarians were involved to observe students' strategies and to assess their learning outcomes. Besides, the students themselves were also participants in our project. Another basic principle of this method is the iterative loops and cycle of steps. The research is part of a continuous cycle of development and the findings feedback directly into practice. This was the exact methodology on which our working plan was based. Furthermore, according always to the principles of action research, we could not design a detailed plan before we start the research. On the contrary, we had to explore the actions and the knowledge of our participants so that the data extracted from this exploration would guide our strategy. As it is understood, the IL skills were instructed as they were needed, according to the students' needs over the course of the project.

As a consequence, we needed an on-going evaluation of students' needs. In that direction, we collected all the necessary data through diverse methods, including in situ *observation*, *questionnaires*, *interviews*, as well as *analysis and assessment of the Subtasks* of each group of students.

We developed our research activities as follows. As a first step of the procedure, teachers asked their students to find information by working in groups in order to present their first subtask about our Sun and Solar system but with no other help. So, at the very beginning, students created a *PowerPoint* in order to present what they had comprehended, as well as *to present and justify* the resources and the strategies they adopted for the completion of this first task. This way, during our first meeting, which took place at school, every group of students gave us a demonstration of how they proceeded in order to carry out their first research. After the demonstration, we asked each group to assess their own work and we also asked their classmates to help the group on this assessment. A number of weaknesses emerged from this process. These weaknesses constituted the first material on which we formed the program with the main themes of each of our next seminars.

As far as it concerns the procedures students followed for this task, all groups worked on the Web. We also delivered *a questionnaire* to the students, targeting mainly to the gathering of complimentary information on the sources they generally use. This questionnaire gave us exactly what we expected according to the literature, concerning the searching attitude of the So-Called "*Google generation*." All students reported *Google or Wikipedia* as their preferred source over books or encyclopedias in printed format.

We should point out the importance, in our procedure, of the presentation of each group's work combined with Self-Assessment and assessment by their classmates. It is easily understood how the discussion that followed proved to be very important for us to get a *first insight* into the research skill levels students already had and into the methodology they generally follow. That is why this procedure formed a method that we adopted at every subtask in order to register any differences and possible *signs of improvement* in students' research methodology during our courses. Additionally, this method contributed not only to the detection of the students' skill levels but also to the *smoother teaching of IL themes*. In a lot of cases, discussions gave us the opportunity to elicit the desired knowledge from students. The whole procedure gave students the opportunity to reflect on their previous knowledge and procedures and to recognize their own learning needs.

We must also mention that, for obvious reasons, at the end of every meeting the librarians had the task to present an overview and a list of the main issues discussed. This was an effort to give the students any additional information that would *complement every IL theme*, and help them understand the worth of the skills acquired.

Particularly during the work in the library, students had the opportunity to use its printed material (books and journals) as well as its digital resources and databases under the librarians' supervision and indirect consultation. Every time students visited the library for their subtasks they worked with the library's material in order to find additional information to what they had located on the Web. This way they were able to compare and cross-check their data by using various kinds of resources.

It is worth mentioning at that point that students were not acquainted with the ways a library organizes its material or the features of tools one can use to locate information in books and journals. But, despite that, we have to mention that in the library, our focus was on the research process and the actual use of printed and digital resources, not on the detailed learning of their features. That is why we presented just the basic ways in which we can use each information tool only at the beginning of the procedure, leaving space for students to test and try these tools actively and creatively during their research process.

At the third stage of their project, students had the opportunity to come into contact, for the first time in their school life, with a real scientific database. Their task was to search for articles concerning the detection methods of exoplanets by exploring the *specialized database ADS*, which is the most significant source of information for the professional astronomers and physics researchers. Through certain exercises they carried out in groups, students had the opportunity to experience themselves the use of this powerful tool and explore its features and its wealth of information. *The four exercises* they had to accomplish, guided them to locate information by using certain features such as the "title" in combination with the "author" field, by using "Boolean operators,"

the "code" of an article or of the journal in which it has been published. After locating the articles, students had to download them, read them, and answer in certain questions relevant to the detection method they were referred to.

## 4 Selected IL Themes and Main Outcomes

Shortage of time in combination with the students' weaknesses led us to select and formulate the main IL themes of our seminars. Below, we summarize the list of the eight themes we emphasized, *organized in a hierarchy*. This means that we worked more and repeatedly with themes placed higher on our list. Moreover, we also designed the connection among our selected themes and other IL skills in order to find ways of boosting students towards them whenever we had the chance and the time to do it (Fig. 1).

***Selected IL themes***

1. **Selection of information according to the focus of the assignment**
2. Initialization of the research
   - References and citations
3. **Cross-Checking of information**
   - Avoidance of dubious or out of date information
   - Evaluation criteria for the resources
   - Usage of information in various types and formats
   - Advanced search tools usage
4. **Plagiarism and Copyright**
   - References and citations
5. **Proper synthesis and structure of the assignment**
6. **Selection of information matching the age and educational level of the students**
   - Comprehension of information
7. **Usage of audiovisual material in presentations**
   - Comprehension of information
   - Advanced Google search tools usage
8. **Usage of various bibliographic styles for references**
9. **Usage of ADS**
   - Peer reviewed and refereed articles
   - References and citations
   - Advanced search tools usage

**Fig. 1.** Selected IL themes

According to the aforementioned themes, we can refer to the following outcomes:

**1.** Students exhibited weakness in the selection of suitable information towards their *final target*. Being used to the Well-Known Copy-Paste method, their main concern was to gather an abundance of information that proved to be irrelevant or unnecessary and use it in their projects. So, our contribution in that case ought to be to assist the students in gaining an understanding of the importance of focus of their assignments. For example, in the case of the assignment where students had to describe the planets and the Sun of our solar system, they gradually got the idea that they had to focus just

on data that would help them understand the conditions for the creation of similar formations in other areas of the universe as their final focus was the detection of exoplanets. Thus, we needed to work on that, in every subtask assigned. Moreover, it gave us the opportunity to talk about the useful *Reference Material* for the initialization of a research, and how it helps us continue by using its references.

**2.** It was quite interesting seeing students being taken by surprise, when realizing that they were presenting data not scientifically accurate or data that have changed throughout the development of scientific research. These examples, and the *exposure of students to a variety of printed and digital sources*, helped them comprehend the usefulness of information *cross-checking*, and the usage of certain criteria for the *evaluation of Web-derived data*. On the contrary, there are several signs that make us suspicious about whether the students will embrace the information cross-checking and adopt it in their academic life. According to their answers, the only reason that prevents them from extended research in many sources and real information cross-checking is shortage of time. According to what the majority also declared, the existence of an updated and well-organized library in their schools would motivate them in this direction. But since this is not the case in Greece it is doubtful whether they, themselves, would bother finding extra resources apart from Web.

**3.** One of the most intriguing parts of our seminars was that of plagiarism and bibliographic references. Students had just a slight idea of copyright issues and how they could use appropriate referencing in order to show respect for others' intellectual property. This was made immediately apparent from their first assignments which lacked complete lists of references. Additionally, even though students borrowed several books from the library during the project and got photocopies of articles of printed journals at home, they ended up mainly using the Internet resources because copying and pasting information was easier. The positive aspect, though, is that they also added the printed material they used to their final bibliography, since it helped them cross-check their information and gave them many ideas.

**4.** All the initial presentations lacked in cohesion and proper structure. The repeated conversations starting from the table of contents usage and analysis helped students clarify how they can select pieces of information from various resources and combine them in order to structure new knowledge in a logical synthesis.

**5.** In many cases, the audience (classmates) stated that they had taken or understood little from the presentations. This evidence gave us the opportunity to insist on the selection of *information matching the age and educational level* of high school students or, alternatively, on the *simplification of complicated and advanced information*. This last point was the most essential because students should *fully comprehend* what they studied in order to be able to explain it in their own simple words.

**6.** Although students were familiar with technology and used a variety of features to create impressive presentations, their initial efforts were characterized by long texts that bored their classmates. During the procedure, they discovered the strength of the image and motion and finally they ended up using *animated images, comics and videos* to create amazing presentations. This issue gave us the opportunity to explore *advanced Google search tools*. It is interesting that although our participants felt confident when using Google, they were missing important information about the right

usage of its tools. They were also unaware of the great amount of information *that is not searchable through search engines*. Moreover, by encouraging students to use this audiovisual material, we pushed them *to better comprehend* the information they needed to transfer to their classmates.

**7.** It is worth mentioning that it was the first time students came across various bibliographic styles for their references. But, as it was not among our priorities, we presented them to students only once and we gave them a booklet with various examples. This unfortunately had the result that, even if the final assignments did include all the information sources, these were not properly recorded based on a reference style.

**8.** The whole procedure with ADS gave students the opportunity to listen for the first time about the differences between magazines and scientific journals, the importance of peer reviewed and refereed articles, or the advanced, Boolean search, and the field limitation of databases. They had the opportunity to comprehend the importance of citations and how they can distinguish the most significant authors of a subject field.

## 5 Evaluation

The ongoing evaluation of our outcomes emerged from various sources, such as the *observation* of students' seeking behavior, the persistent *exchange of opinions* among educators and librarians, as well as the *thoughts of students* themselves. We took into consideration and compared all data derived from these sources. Above all, we mostly took into account the *gradual progress of our students' assignments*, which was the genuine evidence? of the real comprehension of what they had been taught. We can come to a conclusion by listening to their teachers' opinion, since they reported that they would *give a grade* between 8 and 10 to the students' initial assignments but a grade between 18 and 20 to their final ones.

During the last meeting we also delivered a *questionnaire* to students and we asked them to *evaluate themselves before and after the seminars* on a 7-Point Likert-type scale, regarding eight different information literacy competencies from the main themes on which we worked. The students' answers showed noteworthy improvement in all of the themes, but mainly on the following aspects: the usage of references based on a specific bibliographic style (citation styles), the study of scientific journals, the proper structure of their assignment, and the infringement of copyright, which were the aspects they had minimal previous experience (Fig. 2).

The questionnaire also included four questions concerning the difficulty of the ADS. When asked about how difficult they found the ADS, most of the students stated that the system was "a little difficult" (neither simple nor very difficult). What feature complicated them most were, first, the ADS codes and its general environment, the usage of Boolean operators and, last, the original language of the texts (English). See Fig. 3, below.

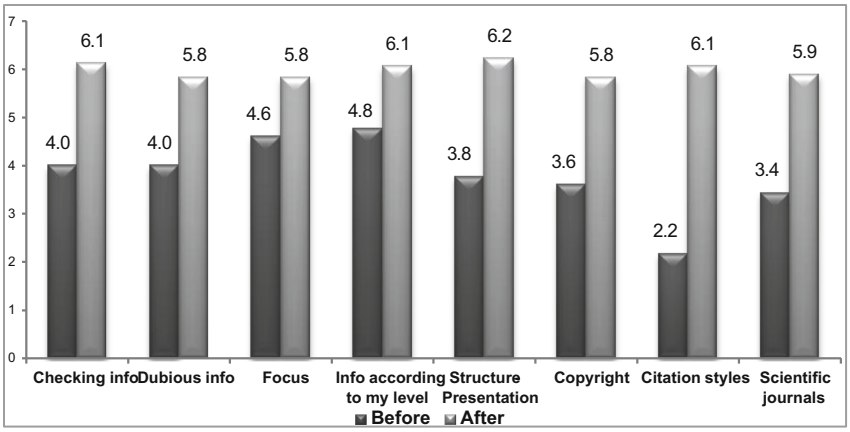


**Fig. 2.** Average of students' self-assessment per question, before and after the seminars on a 7-point Likert-Type scale.

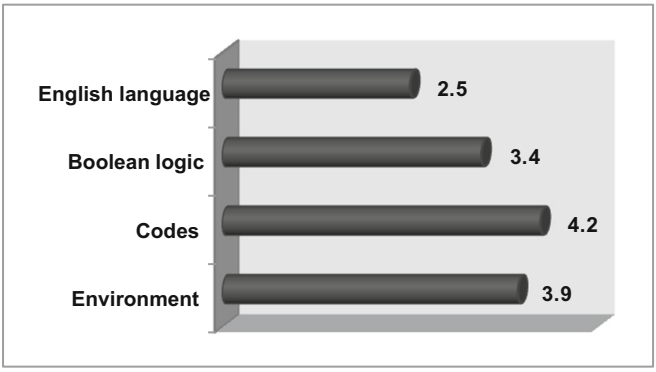


**Fig. 3.** Average of difficulty per ADS feature on a 7-Point Likert-Type scale.

## 6 Conclusions

We believe we achieved a lot through our study and we made the first steps of building basic 21st century skills for our participating students. Throughout the project, they were actively engaged in critical thinking and acquired proficiencies to explore a topic further. They demonstrated teamwork, they selected appropriate information towards their inquiry focus, and they learned how to use information ethically. Besides the students' benefit, we have to point out the experience librarians and teachers gained through the exchange of opinions and close cooperation. Specifically, librarians gained further experience regarding the transmission of higher-order thinking skills to the students whereas teachers experienced the importance of providing the students with supplementary information literacy skills.

Certainly, since we faced many limitations, with lack of time being the greatest one, we were unable to cover the whole range of IL themes and provide students with information equivalent to a full seminar's. But, we do trust that students will, at least occasionally, bring to mind and use the majority of information we selected to provide them. This belief is reinforced by the fact that students experienced and participated in knowledge acquisition, which has been proven as the best way of learning comprehension. Furthermore, Participating Action Research proved to be a suitable approach. It was a tool, which in many cases led students to grasp and better understand main IL principles, as shown in the casual answers to their questions and in the ideas that they generated.

The differences between the students of the two institutions were negligible and are mainly related to the differences between the two courses. On one hand students working on the "Project Course" had to work harder, in order to get a good grade and, on the other hand, students of the "Science Club" chose themselves to study beyond school time because *they liked it*, and *they had already some knowledge on astronomy*. At the same time they knew that *they would not be graded*. These reasons helped students properly accomplish their assignments in less time. That leads us to the conclusion that interferences concerning IL topics can produce equal results irregardless of the target group of the research when it is reflective, flexible and based upon the group's needs.

In general, despite the difficulties they faced, for example, the English language of the resources or the awkward environment of databases, the students showed impressive cooperation. They operated easily under these new circumstances and they presented very interesting and well-structured works.

Finally, we could say that the results of all this effort are very positive. All in all, we could conclude that the close cooperation between teachers and a special library of academic standards can convert the students' low level information skills in a High-Level learning experience.

## References

1. Brindesi, H., Monopoli, M., Kapidakis, S.: Information seeking and searching habits of greek physicists and astronomers: a case study of undergraduate students. Procedia Soc. Behav. Sci. **73**, 785–793 (2013)
2. Malliari, A., et al.: Information literacy skills of greek high-school students: results of an empirical survey. Qual. Quant. Methods Libr. **1**, 271–281 (2014)
3. Lonsdale, R., Armstrong, C.: The role of the university library in supporting information literacy in UK secondary schools. Aslib Proc. New Inf. Perspect. **58**(6), 553–569 (2006)
4. Gresham, K., Van Tassel, D.: Expanding the learning community: an academic library outreach program to high schools. Ref. Libr. **67**(68), 161–173 (1999)
5. Carlito, M.: Urban academic library outreach to secondary school students and teachers. Urban Libr. J. **15**(2), 1–10 (2009)
6. Denscombe, M.: The Good Research Guide: For Small-scale Social Research Projects, 2nd edn. McGraw-Hill Open University Press, Maidenhead (2003)

7. O'Brien, R.: An overview of the methodological approach of action research. In: Richardson, R. (ed.) Theory and Practice of Action Research. Universidade Federal da Paraíba, João Pessoa (2001) http://www.web.ca/~robrien/papers/arfinal.html
8. Vezzosi, M.: Information iteracy and action research: an overview and some reflections. New Libr. World **107**, 286–301 (2006)

# Public Libraries and Their Roles Within the Context of e-Government Literacy

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**Abstract.** Advancements in management approaches introduced the e-government model through developing information technologies. Additionally, roles of public libraries and librarians were identified in order to increase e-government use. Furthermore, trainings on e-government literacy become a significant part of public library services provided with traditional services. This study aims to reveal how roles and responsibilities of public libraries and librarians are conceptually defined and evaluated in the scope of e-government literacy. In this regard, similar cases are also examined and evaluated. According to results obtained from the literature review and statistics, it is emphasized that public libraries and librarians in Turkey can play an active role in order to provide efficient use of e-government services. It is also recommended in the study that public libraries should be well structured between the government and the society to which they belong.

**Keywords:** e-Government · e-Government literacy · Public libraries · Public librarians · Turkey · LIS programs

## 1 Introduction

Changes in managerial perspectives and innovative initiatives have led to significant transformations in enterprise governance structures. In this context, citizen-centric approaches have appeared in management processes of enterprises and governmental organizations. As one of the reflections of citizen-centric approaches, e-Government applications have been implemented by the governments in order to provide efficient and high quality services offered by all governmental organizations. Additionally, e-government has been described and studied conceptually not only in the management field but also in the library and information science (LIS) field. In this regard, the American Library Association (ALA) defined e-government as "the use of technology, particularly the Internet, as a means to deliver government services and to facilitate the interaction of the public with government entities" [1]. This point of view reflects the fact that libraries and other cultural memory institutions and organizations widely embrace technology and innovations, and have social responsibilities about public services. It is also known that many public library users benefit from online public services owing to the Internet access that is offered by public libraries. It has been stated in the literature


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that one of the social roles of public libraries is to provide citizens with access to and education regarding e-government services [2]. Starting from this point of view, it is mentioned that public libraries are not only Internet access points, but they are also centers to access e-government services and guidance centers for citizens. They also have positive effects in terms of the development of e-government services [3]. In this regard, it is possible to claim that public libraries constitute important transition points between citizens and governments.

Among the cultural memory institutions, public libraries have vital roles to become lifelong learning centers of the societies they belong. In order achieve this role, many education and orientation programs are offered by public libraries such as information literacy education programs. In parallel with these programs, these institutions also provide accessing and usage of e-government applications and awareness raising activities that can also be described as "e-government literacy skills". In light of this information, this study illustrates the profile of public libraries in order to fulfill requirements about the use of e-government services. Additionally, this study aims to draw a sample roadmap for Turkey by describing current efforts on the part of public libraries. In this respect, roles and responsibilities of public libraries related to providing e-government literacy programs are discussed theoretically according to a literature review. Plus, e-government literacy related services offered by public libraries in Turkey are evaluated in comparison to similar institutions around the world, and reflections of these services are analyzed through the use of official internet and e-government usage statistics. At the end of the study, recommendations are presented regarding improvements for e-government literacy services.

## 2 Public Libraries and e-Government

e-Government is defined as a model developed for more rapid, continuous and reliable implementation of information and workflow between government and citizens with technologic platforms and infrastructures [4]. This concept is perceived as a transformative process which radically alters services, rather than creating innovations in public services [5]. In this framework, provision of access to e-government services and related trainings are described among the social roles of public libraries as a bridge between governments and citizens [2]. Accordingly, it is mentioned that public libraries are not only Internet access points, but they are also centers of guidance regarding e-government services for citizens. Hence it is possible to say that they have positive impacts on the development of e-government services [3]. Thanks to advancements in online services, public libraries – traditionally information retrieval points of civics, social studies and basic health fields – become charming centers by providing access to e-government services for several public organizations [6]. It is also stated that guidance requirements of citizens about the use of e-government services increase with improvements in e-government services [7]. In addition to the guidance requirements, public libraries are potentially leading organizations with their roles, such as providing required facilities and access to e-government services in secure and authenticated ways for citizens.

Although public libraries have vital roles in e-government services, it is not possible to say that they can cover all these services easily. In this regard, it is emphasized that decreases in budgets and working hours and insufficient staff employments are factors that negatively affect the service quality of such organizations [8]. In the studies carried out, some requirements are stated to be necessary for public libraries to provide e-government services and related trainings. These requirements are determined as the following:

- Financial requirements: Increasing the bandwidth of libraries, need for more personnel, new hardware and software needs;
- Service requirements: Developing the library service offerings within the frame of e-government necessities and training the personnel;
- Personnel requirements: Providing e-government service personnel in the libraries with computer skills and enabling them to experience digital literacy processes;
- Building related requirements: Providing the infrastructures for developing Wi-Fi connections, printing capacities and transforming the buildings into access points [8].

Beyond these requirements, Jaeger and Fleischman [3] reported that citizens, even if they are wise users, have guidance needs for the use of e-government services such as tax declarations, petitions and online applications. On the other hand ALA explained that, in contrast to previous years with the increase in unemployment rates in 2009 and 2010, more people in America benefited from library services in looking for a job or making online job applications. ALA also stated that these users' levels of expertise are in insufficient regarding the use of online services and computers. Therefore, ALA published a guide titled "Public libraries and e-government services" to support public libraries in providing better e-government strategies and user services for public libraries [1]. Moreover, the literature includes published information regarding funding and technology accessibility statistics in the context of public libraries. The statistics quoted from surveys titled "E-Government & Public Libraries" and "The 2011–2012 Public Library Funding & Technology Access survey" are as follows:

- 82.4 % of public libraries report that providing access to government websites and services is important
- 91.8 % of public libraries help people understand and use government websites
- 96.6 % of public libraries help people apply for e-government services
- 70.7 % of public libraries help people complete e-government forms [8, 9].

Public libraries are the organizations that have responsibilities about the organization, dissemination and preservation of public knowledge, and the memory of the society. New roles and opportunities have emerged for public libraries with the presentation of administrative services in digital environments. E-government training programs are also introduced via public libraries as a new role and opportunity. At this point, it is important to mention that public libraries could be reliable guiding institutions in e-government service processes even though the citizens have Internet connection in their houses [2]. Another study included in the literature infers that e-government training processes that will be provided in public libraries might include topics about e-government related web resources (significant links, reference websites, instructions and

so on) and computer and Internet literacy training processes [10]. Today, it is commonly expressed that public libraries have important and necessary roles in terms of developing information literacy and digital literacy skills of users. Along with changing and improving conditions, in this regard, basic information literacy processes and digital literacy are regarded as significant tools for services provided by public libraries [11]. On the other hand, in the twenty-first century, libraries are evaluated as life-long learning centers which provide services not only to students but also to all kinds of learners. In addition to improvements in e-government services, public libraries have new responsibilities in terms of providing such services or support for citizens to access these services. Accordingly, it is possible to say that public libraries have significant roles in terms of adaptation of the citizens to e-government processes and their efficient usage of such services. Transition of administrative services in physical environments to online environments is a process that reflects a gap between the people who have and do not have Internet access. In this regard public libraries can be considered a connection point that provides access to e-government services for all citizens [12].

## 3 Public Libraries, Internet and e-Government Usage Related Conditions in Turkey and in Europe

Internet access is one of the significant factors related to usage of e-government services by citizens. In this scope, information and communication technologies used by almost every information service provided in public libraries are also important components of public libraries related to their infrastructure. It would not be wrong to say that according to the above-mentioned information, Internet facilities as one of the infrastructure components are also prevailing factors for public libraries. Recent statistics in Turkey indicate that there are 9,137 computers in public libraries in the country. While 62 % of computers (5,649) are open to users, 38 % of them (3,488) are for administrative purposes only. In addition, these statistics indicate that all the public libraries have Internet connectivity [13]. On the other hand, a report titled "Household Information Technologies Usage Research", indicates that 60.2 % of households in Turkey had Internet access in April 2014, while only 49.1 % had Internet access in the same month of 2013. The report also reflects that 40 % of the households do not have an Internet connection. Among the households which do not have an Internet connection, 42.8 % stated that they do not have an Internet connection because they do not need to use it, and 31.9 % stated that they do not have it due to the high price of Internet services. According to the statistics published, individuals who used the Internet within a twelve-month period from April 2013 to March 2014, used it in order to contact with public institutions/organizations for personal purposes 53.3 % of the time. It is also a remarkable fact that the rate of getting information from websites belonging to public institutions ranks in first place with a percentage of 51.2 among household Internet usage purposes [14]. Considering the international conditions, Eurostat statistics reflects that 78 % of households in the European Union had Internet connections in 2014, while 22 % do not. It is understood that 35 % of the households do not have Internet connections because of the lack of skills, while 24 % of them do not have Internet connections due to the high

price of Internet services. On the other hand, these statistics indicate that one of the most popular Internet usage purposes in these countries is for e-government services at the rate of 41 % [15].

## 4 The Roles of Public Librarians in e-Government Services

With the developments in information and communication technologies, the official services which are now presented in digital environments have led to the emergence of requirements for guidelines that reflect how citizens can use such services. The public libraries, which can be used by their communities have become the institutions which play significant roles in terms of training citizens in this process. In light of this point of view, the public libraries in e-government processes are defined as the democratic structures in terms of citizens' collaboration and participation in administration [16]. The e-government trainings that can be provided by public libraries will be efficient for the citizens in terms of public literacy, citizen awareness, and the process of participating in administration. Therefore, the related roles of public librarians have great importance. The librarians who will give these trainings on the e-government process are expected to have computer literacy, public literacy, and digital literacy skills. In this regard, one recommendation is that courses related to e-government literacy and related literacies should be covered by LIS program curricula. Plus, it is also expected that the inclusion of information policies and public information management related courses into these programs will increase the experts' approaches in this subject [17]. The significance of these services provided by public libraries will increase as e-government services become widespread and as many official tasks are performed in online environments.

In addition to the technological benefits provided to citizens by public libraries, the need for expert librarians will increase. Furthermore, the basic training presented to the citizens in this process is also important. Additionally, the guidance that expert librarians can provide about e-government processes will increase the efficiency of e-government use by the citizens.

## 5 Conclusion and Recommendations

Public libraries are considered trustworthy organizations that serve societies. These institutions not only provide Internet access, but also provide guidance services for citizens. Moreover, they have important roles and responsibilities in e-government training. Statistics and published reports also reflect that public libraries which provide services to all of society without discrimination have vital roles to play in terms of efficient use of e-government services, as well as providing internet access to citizens who do not have internet access for various reasons. It is also a predictable fact that public libraries and their librarians, with their active roles in society, can increase the awareness and efficient use of e-government services. In this regard, a well-planned e-government training program will be an essential milestone in order to provide efficiency between citizens and the government. Additionally, public libraries providing services for all citizens will reduce the effects of the digital divide on societies via e-government literacy

training developed by these institutions. Beyond the traditional public library services, training programs and reference services will also contribute to creation of new vision and new perspectives. Accordingly, it is possible to list the recommendations as follows:

- Awareness-raising studies related to e-government literacy can be carried out in public libraries, depending on the changes in technological conditions.
- The required technological infrastructure of public libraries should be developed and updated at regular time intervals.
- Public librarians should be provided with in-service training related to e-government processes.
- Courses that will equip future information professionals with e-government-based basic management, e-government information systems, and basic citizenship rights should be embedded in LIS education programs.

## References

1. ALA: Library e-Government Services. http://www.ala.org/advocacy/advleg/federallegislation/govinfo/egovernment/egovtoolkit
2. Bertot, J.C., Jaeger, P.T., Langa, L.A., Mcclure, C.R.: Public access computing and internet access in public libraries: the role of public libraries in e-Government and emergency situations. First Monday **11**(9) (2006)
3. Jaeger, P.T., Fleischman, K.R.: Public Libraries, Values, Trust, and e-Government. Information Technology and Libraries. Rowman & Littlefield, Plymouth (2007)
4. Eroğlu, Ş.: e-Devlet Kapsaminda Kurumsal Bilgi Sistemlerinin Değerlendirilmesi: İçişleri Bakanliği Örneği.: Unpublished Master Thesis. Hacettepe University, Ankara (2013)
5. Deloitte Research: At the Dawn of e-Government: The Citizen as Customer (2000). http://www.egov.vic.gov.au/pdfs/e-government.pdf
6. Becker, S., Crandall, M.D., Fisher, K.E., Kinney, B. Landry, C., Rocha, A.: Opportunity for All: How the American Public Benefits from Internet Access at U.S. Libraries. (IMLS-2010-RES-01). Institute of Museum and Library Services, Washington, D.C. (2010)
7. Gibson, A.N., Bertot, J.C., McClure, C.R.: Emerging role of public librarians as e-Government providers. In: Proceedings of the 42nd Hawaii International Conference on System Science, pp. 1–10. IEEE Computer Society, Los Alamitos (2009)
8. Public Libraries and Internet: e-Government and Public Libraries. http://www.plinternetsurvey.org/analysis/public-libraries-and-e-government
9. Bertot, J.C., McDermott, A., Lincoln, R., Real, B., Peterson, K.: 2011–2012 Public Library Funding & Technology Access Survey: Survey Findings & Report. University of Maryland College Park Information Policy & Access Center, College Park, MD (2012)
10. Jaeger, P.T., Bertot, J.C.: e-Government education in public libraries: new service roles and expanding social responsibilities. J. Educ. Libr. Inf. Sci. **50**(1), 40–50 (2009)
11. Harding, J.: Introduction to Information Literacy in the Public Library. http://lis6010blog.blogspot.com/2009/07/information-literacy-and-publiclibrary.html
12. Bertot, J.C., Jaeger, P.T., ve McClure, C.M.: Citizen centered e-Government services: benefits, costs and research needs. In: 9th Annual International Digital Government Research, Montreal, Canada, pp. 137–142 (2008)
13. Kütüphan-e Türkiye: Genel Bilgi. http://www.kutuphaneturkiye.org.tr/genel-bilgi/
14. TÜİK. http://www.tuik.gov.tr/PreHaberBultenleri.do?id=16198

15. European Commission: Lifeonline. https://ec.europa.eu/digital-agenda/sites/digital-agenda/files/scoreboard_life_online.pdf
16. Kranich, N.: Civic partnerships: the role of libraries in promoting civic engagement. Resour. Sharing Inf. Netw. **18**(2), 89–103 (2005)
17. Gathegi, J.N., Burke, D.E.: Convergence of information and law: a comparative study between i-Schools and other ALISE schools. J. Educ. Libr. Inf. Sci. **49**(1), 1–22 (2008)

# Information Literacy in Different Context

# Understanding the Field of Critical Information Literacy: A Descriptive Analysis of Scientific Articles

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**Abstract.** The purpose of this paper is to contribute to the understanding of critical perspectives in information literacy whose importance has been recognized by a number of authors in the field. This paper is a preliminary report on a research project that aims to describe the field of critical information literacy (CIL) based on a comprehensive descriptive statistical analysis of the qualities of CIL literature. The analysis was undertaken on a sample of 102 full-text scientific and professional articles. The sample was created based on a preliminary analysis of Google Scholar, SCOPUS and WOS databases. The authors present findings on the established authorship, publication and research patterns in the field.

**Keywords:** Critical information literacy · Qualitative · Quantitative · Literature analysis · Scientific articles · Preliminary report

## 1 Introduction

The concept of critical information literacy (CIL) achieved a status of a distinctive theoretical contribution to the body of knowledge that deals with information literacy (IL). Many authors [1–5], as this paper will also show, have pointed out the importance of critical perspectives in IL. CIL insights propose a major reorientation in the conceptual basis of IL. CIL emphasizes the importance of relational, reflective and transformative approaches to IL education [1, 4, 5]. CIL has mainly been understood as an external conceptual contribution of critical theory and pedagogy to IL so herein we research it as a subfield of IL. Its importance is seen if we consider that the critiques offered partly stimulated the revision of the influential American College and Research Library Association's (ACRL) *Information literacy competency standards for higher education.* The calls for the integration of critical perspectives and for remodeling of IL programs are many, but assessment of their reach is still unavailable and the true influence and nature of this rising subfield has not been thoroughly researched. This paper presents findings of a statistical descriptive literature analysis that attempts to reveal the established author, publication and research patterns in the CIL subfield. This


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study is a part of a larger research project and presents an analysis of core scientific and professional articles in the subfield.

In this study we wish to see how the core of the CIL subfield has developed until today to see the consistency of publishing. The activity in the field explains how the interest in the field has developed and whether a maintained interest was established [6].

Authorship patterns are of particular interest since they will show how large the field really is, and which countries and institutions contribute the most to it. The structure of the field may also be revealed by looking at the types of work published. Certain fields are heavily research based, others, like information literacy, originated as a need of professional communities. The kind of research undertaken in this study can reveal whether the articles about CIL pertain predominantly to libraries as an organizational setting.

As the field of IL, as an educational concept, depends on the practical application of its theories, CIL stands before a task to prove its applicability. Critical approaches to IL could too quickly be dismissed as inapplicable, so it is one of our research goals to show how many contributions concretely offer methodical solutions.

Finally, descriptive insights into how the problems that CIL elicited have been approached and studied present a basis for a systematic evaluation of the field and the advances it proposes. In addition, it could also reveal the gaps and opportunities for its further development.

## 2 Methodology

A comprehensive analysis intended in our research project is being achieved by combining the quantitative and qualitative methods for literature assessment. More precisely, this means that we combine bibliometric analyses on one hand, and deductive content analyses on the other. "By considering all the documents published in an area of research it is possible to determine how they are distributed according to different variables" [6]. Our research project began in March 2015 when we created the sample. Sample creation was the main way of ensuring a comprehensive account of the literature qualities. The bibliographic data was retrieved from three different databases, namely, Google Scholar (GS), Scopus[1] and WOS (Web of Science). The data was retrieved using the same search input for all textual fields in all three databases with a non-defined temporal span:

"critical information literacy" OR "critical library instruction".

In the scope of the research project, we are interested in contributions that mention similar concepts in combination like "critical pedagogy" and "critical literacy", but for this study we limited the scope, because this allowed us to ensure that all retrieved contributions referred to and recognized the conceptual contribution of critical theory and pedagogy to IL. As a contribution of this kind we recognize critical information

[1] The basis for analysis was GS data because it encompassed all WOS and the majority of Scopus search entries. Added entries from Scopus make up for 4.6 % of the analyzed search entries.

literacy and critical library instruction as two phrases referring to a closely related theoretical standpoint.

We retrieved 805 search result entries which had to be treated to remove duplicate entries, bad links and non-article[2] contributions since using GS as a basis for literature analysis comes with certain limitations [7]. The GS data was retrieved using the "Harzing's Publish or Perish" [7] software which connects with the GS database and presents the data in an approachable and exportable form.

Based on a preliminary analysis of the retrieved data we employed a complex scheme of exclusion and inclusion criteria in three phases. In the first phase we excluded 66.34 % of duplicates, non-article contribution types, retrieved search entries that did not mention the researched concepts, contributions that mentioned the concepts only in their references as well as those where the phrases appear in citing articles and those where the word "critical" was used to emphasize importance and did not refer to a specific type of judgment or analysis. In the second phase we excluded 11.55 % of non-English articles[3] and those that we could not access. In the third phase we arrived at a number of 178 (22.11 %) scientific and professional articles from which we excluded those mentioning the phrases with the frequency less than three to limit the analysis to core CIL articles. Articles were automatically included if they mention the researched concepts in their titles, abstracts or keywords or if the researched phrases frequency was equal or greater than three. To those articles we added 22 relevant book chapters[4] that were included in the retrieved database data arriving at a final number of 102 (12.67 %) analyzed retrieved searched entries. The measure of splitting these articles in two sets (those with frequency less than three and frequency equal or greater than three 3) was introduced because we recognized a qualitative difference in those two sets which will be analyzed in later phases of the research project, along with a third set of articles that mention the researched phrases only in their references. This decision constitutes the findings presented here as a preliminary report.

Data analyses were carried out from March to June 2015 using MS Excel and MAXQDA, a software for qualitative data analysis.

The quantitative part of the study employs a bibliometrical approach which was done by applying statistical and mathematical calculations, graphically represented to show the basic output trends. This analysis revealed:

- a temporal evolution of published articles
- the most published authors in the field and author productivity
- the institutions and countries with the most author contributions
- journal productivity patterns

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[2] GS data consisted of different types of documents like editorials, tag archives, bibliographies, biltens, blogs, etc. Our study focuses on scientific and proffesional articles published in journals or as book chapters.

[3] The language criterion was introduced later in the study, as the last measure of exclusion, since 92.42 % of search results were in English. Only 3.6 % non-English articles were excluded based on language criteria, while the rest was excluded based on other criteria.

[4] Published in Accardi, Drabinski, Kumbier (eds.): *Critical library instruction - Theories and Methods*, and Gregory, Higgins (eds.): *Information literacy and social justice - Radical Proffesional Praxis*.

- the prevalence of contribution types (conference papers, journal articles or book chapters)

A qualitative analysis of the sample was done by attributing relevant categories to each analyzed article which resulted in:

- an analysis of the most prevalent article categories (original scientific article, scientific review, preliminary report, professional article, professional review)
- a classification of articles based on the Reference Services Review[5] contribution taxonomy (viewpoint, conceptual paper, research paper, case study, general review, literature review, technical paper)
- a keyword analysis
- a deductive content analysis that uses categories previously established for such research in the field of Library and Information Sciences (LIS) [8] to investigate the social level the articles refer to, the investigation type they undertake (empirical or non-empirical), applied research strategies, as well as whether contributions employ a qualitative or a quantitative approach and are practice or theory oriented.

### 2.1 Referring to CIL as a Subfield of IL

By refering to CIL as a subfield of IL we express our hypothesis that it functions as a distinctive theoretical contribution of critical theory and pedagogy to IL. This report will contribute to the understanding of which methodological approach is suitable to research the relationship of CIL and IL. There is no real data available, but this hypothesis has been made by looking at the number of search results retrieved from researched databases. About 40 % of the search results in GS on IL mention the word "critical". More reliable sources like SCOPUS (31 %) and even WoS (10 %), which has a very small coverage of CIL, has a relevant number of contributions refering to the critical in IL, not just from a critical pedagogy perspective, but others like psychology and different subject areas in social and computer sciences. This made us conclude that IL always had an inherent criticality and that these critical perspectives have not yet been thoroughly researched while the need for this endeavour is also being highlighted by the influence of CIL articles.

## 3 Findings

In this chapter we present findings of quantitative and qualitative analyses in the same order as stated above.

With a non-defined temporal span retrieved articles span over 20 years, with the first recognized article by Gene Burdenuk in 1997 called *Living and learning in the global village.* [2] We present the development of the two recognized sets of documents, and a summative line to cover the whole publication output trend. A steady

[5] Reference Services Review was chosen as one of the most productive journals in the IL field.

growth in the number of articles can be observed, although the interest in the field was not constant. In 2001 a first spike in publication is followed by a discrepancy between the analyzed sets. After 2004 an indication of exponential growth appears. This trend is interrupted after 2006, when James Elmborg wrote his highly cited article [1] which became a common point of departure in CIL debates and analyses. In the next four years, another discrepancy between the sets appears. We believe that this can be explained by the impact of Elmborg's article, because the number of articles that mention the phrases only once or twice rose rapidly, while the core of the field maintained its steady growth. In years 2010 and 2013 we can see two moments where a high influx of articles was made by publication of two editorial books that primarily deal with CIL themes. The sharp decline at the end of the graphs is expected, since our analysis was done in March 2015 and does not cover the whole year (Fig.1).

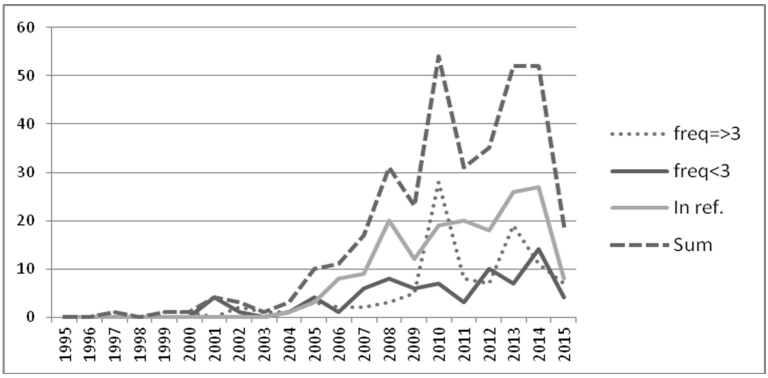


**Fig. 1.** Temporal evolution of articles in the CIL subfield

### 3.1 Authorship Patterns

There are 109 unique authors in the researched set of articles. One author published the highest number of six articles (Heidi Jacobs), while two authors each published four articles (Alison Hicks, Troy Swanson). On the other hand, 17.43 % of authors published two articles, while 79.82 % published only one article.

### 3.2 Institutions and Countries

In the analyzed set 69 institutions were associated with 109 unique authors. The highest number of articles come from American universities, which is also reflected in the domination of English speaking countries (Table 1).

**Table 1.** Prevalence of top universities and countries

| University | % | Country | N | % |
|---|---|---|---|---|
| State University of New York | 8.27 | USA | 75 | 73.53 |
| California State University | 3.67 | Canada | 13 | 12.75 |
| City University of New York | 3.67 | UK | 6 | 5.88 |
| Simmons College | 3.67 | Australia | 5 | 4.90 |
| University of Windsor | 3.67 | Bosnia and Herzegovina | 1 | 0.98 |
| El Centro College | 2.75 | Croatia | 1 | 0.98 |
| New York City College of Technology | 2.75 | New Zealand | 1 | 0.98 |
| University of Alaska Southeast | 2.75 | | | |
| University of Colorado | 2.75 | | | |
| N = 69 | | Total | 102 | 100.00 |

### 3.3 Journal Productivity and Other Sources of Contributions

Half of the journals produced only one article which points to a low productivity in the field. An interesting finding is that along with *The Journal of Academic Librarianship*, as one of the most important journals in IL and LIS, we find the highest productivity in the journal *Behavioral & Social Sciences Librarian* which is the highest contributor of research papers (mainly case studies) in the analyzed set.

Book chapters mainly come from the editorial book by Accardi, Drabinski and Kumbier: *Critical library instruction - Theories and methods*. A third of the analyzed set of articles is a book chapter by type which shows that the productivity is not entirely journal based (Table 2).

The article production does not fit the normal distribution according to the Bradford's law since the number of articles in the second and the third recognized zones does not achieve expected values as shown in Fig. 2.

### 3.4 Qualitative Analyses

To introduce a distinction between scientific and professional papers we first distributed the articles according to the established classification of contributions in science (Table 3).

Half of the analyzed set (54.9 %) were professional papers or reviews which shows there is an even amount of scientific and professional contributions. There were 11.76 % original scientific papers that present new findings, are reproducible and explain the applied research methodology. We recognized 33.33 % of scientific reviews which are mostly conceptual papers based on a literature review. Comparatively, Reference Services Review classification[6] reserves the category of the Literature review for those papers that provide selective or comprehensive reviews with annotations or insights from main contributors, while the conceptual paper also develops

[6] Definitions for each type of contributions are available online.

**Table 2.** Journal productivity and contribution type prevalence

| Journal name | N | % | Contribution type | N | % |
|---|---|---|---|---|---|
| Behavioral & Social Sciences Librarian | 5 | 8.47 | Journal article | 59 | 57.84 |
| The Journal of Academic Librarianship | 5 | 8.47 | Book chapter | 31 | 30.39 |
| Communications in Information Literacy | 3 | 5.08 | Conference paper | 12 | 11.76 |
| Library Philosophy and Practice | 3 | 5.08 | | | |
| Portal: Libraries and the Academy | 3 | 5.08 | | | |
| Urban Library Journal | 3 | 5.08 | | | |
| Community College Journal of Research and Practice | 2 | 3.39 | | | |
| In the Library with the Lead Pipe | 2 | 3.39 | | | |
| Library Trends | 2 | 3.39 | | | |
| Others (N of articles = 1) | 31 | 52.54 | | | |
| Total | | 100.00 | Total | 102 | 100.00 |

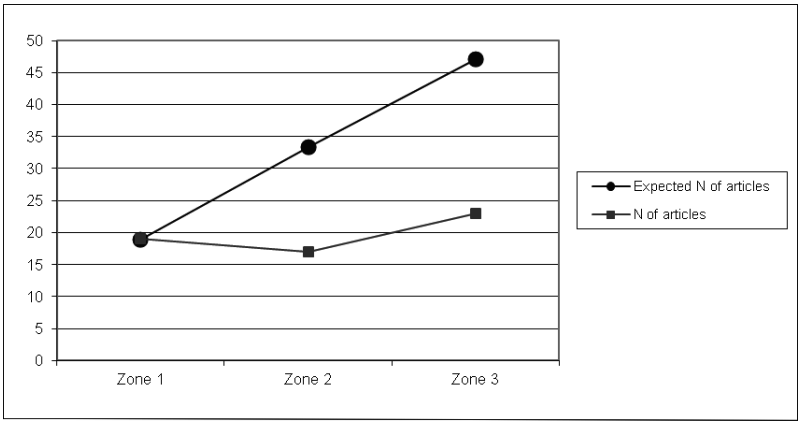


**Fig. 2.** Discrepancy between expected and the real N of articles

hypotheses, covers philosophical discussions and comparative studies of other's work and thinking. Since this is an overlap in definitions we treated the category of Literature review as referring to those articles who employ a reproducible methodology for literature assessment, although no such studies were found. All the other papers that offer selective literature reviews for the purpose of their conceptual analyses were distributed in the Conceptual paper and General review categories (Table 4).

Keyword density analysis shows expected concepts as the most prevalent ones. Most of them pertain to education, but there are also high counts of the words *social*,

**Table 3.** Article classification by two different criteria

| Article classification | N | % | Ref. Serv. Rev. classification | N | % |
|---|---|---|---|---|---|
| Original scientific paper | 12 | 11.76 | Conceptual paper | 39 | 38.24 |
| Scientific review | 34 | 33.33 | General review | 34 | 33.33 |
| Preliminary report | 0 | 0.00 | Case study | 17 | 16.67 |
| Professional paper | 51 | 50.00 | Research paper | 9 | 8.82 |
| Professional review | 5 | 4.90 | Viewpoint | 3 | 2.94 |
| | | | Technical paper | 0 | 0.00 |
| | | | Literature review | 0 | 0.00 |
| Total | 102 | 100.00 | Total | 102 | 100.00 |

**Table 4.** Density of keywords with highest word-occurrence values

| All papers | | Papers with auth. kw. | | Density of auth. kw. | |
|---|---|---|---|---|---|
| Word | % | Word | % | Word | % |
| Information | 2.61 | Information | 2.85 | Information | 11.90 |
| Literacy | 1.46 | Literacy | 1.31 | Literacy | 11.25 |
| Students | 1.05 | Students | 1.01 | Critical | 9.65 |
| Critical | 0.87 | Critical | 0.96 | Learning | 2.89 |
| Library | 0.81 | Library | 0.88 | Pedagogy | 2.89 |
| Research | 0.67 | Research | 0.60 | Instruction | 2.57 |
| Learning | 0.49 | Learning | 0.54 | Theory | 1.61 |
| Education | 0.49 | Social | 0.50 | Political | 1.61 |
| Social | 0.45 | Education | 0.47 | Librarianship | 0.97 |
| Librarians | 0.42 | Librarians | 0.42 | Library | 0.97 |
| Knowledge | 0.38 | Libraries | 0.36 | Thinking | 0.97 |
| Libraries | 0.36 | Political | 0.36 | Google | 0.97 |
| Instruction | 0.28 | Theory | 0.34 | Open | 0.97 |
| Academic | 0.27 | Academic | 0.32 | Science | 0.97 |
| Work | 0.26 | Faculty | 0.32 | Social | 0.97 |
| N = 34807 | | N = 16238 | | N = 141 | |

*critical* and *political*. Only 27.45 % of articles had author-assigned keywords. In comparison we observe that there is a high consistency between keywords in those papers, word-occurrences in author-assigned keywords and in all analyzed articles.

**Deductive Content Analyses.** Our findings show that 84.31 % of articles come from the LIS subject area, while there is 15.69 % non-LIS articles that mainly come from areas of Education or Politics.

Toumaala et al. [8] presented an interesting analysis of the social level to which the articles refer. We adopted this analysis and found that in the analyzed set 88.24 % of

articles pertain to the *organizational* social level, while a smaller number refers to the *societal* (7.84 %) and *individual* levels (3.92 %).

Only 12.75 % of contributions are empirical, and all of them employ descriptive qualitative analyses using surveys, content or discourse analysis as their research strategies. The rest of non-empirical articles are mostly conceptual (56.18 %) while 25.84 % give methodical insights and 17.98 % report on current theoretical understandings in the field.

## 4 Discussion

From the data we can see that the consistency of publication fluctuates between low and high periods of productivity, while the general productivity of the field is lower than it is common according to calculations of the expected number of articles. The bulk of the activity in the field is a result of a high number of articles that refer to the concept, which poses the question whether this recognition of the concept's value corresponds with actual engagement in CIL research and practice. Furthermore, there is a small number of constant contributors to the field and indications that the field is growing rather slowly. Although it has been 20 years the subfield has not achieved the state of exponential growth. These issues might be addressed if interested authors would gather around a place of publication, like an international peer-reviewed journal thematically oriented exclusively on CIL. Although journals with similar scope exist, the data shows their influence on the CIL field has still not been established. In addition to that, a smaller number of conference papers in the analyzed set points to the opportunity to organize more events that would stimulate engagement and the communication of knowledge and experiences from CIL based research and practice, but that could also create a space where the criterion of applicability would not inhibit public presentation and reporting on theoretical issues in (C)IL.

Articles are mostly published by a single American author and most of them contribute with only one article to the field. This dominance implies that more reports are needed that come from diverse (for example European, Asian) educational and socio-political contexts.

On a similar note about diversity we point out that 88.24 % of articles pertain to an organizational setting (mainly libraries) and 84.31 % of articles come from LIS. Furthermore, several variations of keywords referring to libraries exist in the top 15 of analyzed word-occurrences and professional papers are the most common type of contributions in the subfield. In his recent book, Whitworth [9] has pointed out the need to go beyond the library (and library instruction) to investigate different outlooks on (C)IL issues. As Whitworth has warned, we agree that authors writing in the CIL subfield should be aware not to contribute to the "institutionalisation of a monologic view of the subject" [9].

The last point of our discussion refers to practice oriented contributions in the analyzed set. Although there is only a moderate count of methodical papers it is necessary to consider that conceptual papers also give suggestions with regard to applying CIL in practice. The prevalence of research papers and case studies shows that

the subfield would benefit from more such studies which test the developed hypotheses in conceptual papers.

## 5 Conclusion

A growing number of CIL contributions appeared after the year 2006 when James Elmborg published his nowadays highly cited article on the implications of critical perspectives for IL instructional practices. Even though the number of CIL contributions has grown with the passage of time we have shown that the general author and journal productivity on CIL is lower than expected. The data also points to a twofold issue of diversity in the field. On one hand, there is a lack of non-American contributors and perspectives on CIL theory, research and practice. On the other, most of the analyzed articles are focused on libraries and library instruction which points to the need to consider different outlooks on CIL. The current data shows that CIL functions more like a subset of contributions then a coherent subfield of IL. Still, further research is needed to understand the nature of IL's criticality and in what ways it has been intertwined with critical theory and pedagogy over the years starting from the 1970s when the concept was formed. Inductive thematic analysis of both CIL and other variations of understanding IL's criticality are needed because they will show their theoretical origin, since *being critical* (of information, society, reality; a reflective type of judgement or analysis) is not a novelty in IL conceptualizations.

For some time, IL literature has been showing an inclination to become a theory of education and the data shows it is time to move out of the safe-zone of librarianship. A theoretical appreciation of such an IL will move the theory towards its adulthood and give it strength through self-awareness to impose its centrality in educational policy. We believe that the next big issue in (C)IL has to be the resolution whether to treat IL as a critical theory of education is a pretence or its future.

## References

1. Elmborg, J.: Critical information literacy: implications for instructional practice. J. Acad. Librariansh. **32**(2), 192–199 (2006)
2. Burdenuk, G.: Living and learning in the global village. In: Lighthall, L., Haycock, K. (eds.) Information Rich, but Knowledge Poor?, pp. 109–117. IASL, Seattle (1997)
3. Holschuh, M.S.: Librarians as disciplinary discourse mediators using genre theory to move toward critical information literacy. Portal Libr. Acad. **5**(3), 297–311 (2005)
4. Whitworth, A.: The reflective information literacy educator. Nordic J. Inf. Lit. High. Educ. **4** (1), 38–55 (2012)
5. Jacobs, H.: Information literacy and reflective pedagogical practice. J. Acad. Librariansh. **34** (3), 256–262 (2008)
6. Andrés, A.: Measuring Academic Research. Chandos, Oxford (2009)
7. Harzing, A.W., van der Wal, R.: Google scholar: a new data source for citation analysis. Ethics Sci. Environ. Polit. **8**(1), 62–71 (2008)

8. Tuomaala, O., Järvelin, K., Vakkari, P.: Evolution of library and information science, 1965–2005. J. ASIS&T **65**(7), 1446–1462 (2014)
9. Whitworth, A.: Radical Information Literacy: Reclaiming the Political Heart of the IL Movement. Chandos, Oxford (2014)

# How Do Home Educating Families' Experiences of Information Literacy Relate to Existing Models?

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**Abstract.** In this paper the researcher discusses the findings of a small research project which explored the information literacy experiences of five home educating families and shows how these findings can be related to existing research on information literacy. The research was constructivist with a grounded approach to data analysis and involved in-depth interviews with family groups. This paper suggests that models of information literacy that focus on the situated and the transformative have resonance for the experiences of home educating families.

**Keywords:** Information literacy · Information practices · Home education

## 1 Introduction

Home education in the United Kingdom is a growing phenomenon [1] and is a potentially interesting information literacy landscape to explore as research from an educational perspective suggests that it offers different information experiences from school based learning [2]. Kunzman and Gaither [3] argue that home education has much to teach us about education generally and this argument can then be extended to information literacy. Research in this area can therefore be seen as a response to Tuominen et al. [4] suggestion that we need to understand how information literacy works in new environments.

## 2 Literature Review

This research takes the communicative approach in framing information literacy as a social practice [4]. It follows Lloyd's work [5] in interpreting information literacy as a meta-practice that only exists in its particular context. This approach informs much of the current study as it is concerned with the participants' constructions of their information literacy practices in a previously underexplored landscape. Lupton and Bruce's [6] argument that information literacy has three perspectives: the generic (skills based); the situated (socially constructed) and the transformative, was also useful for this work. This third perspective contains within it the generic and situated but extends this to a model of information literacy as a critical practice. In this way they consider information


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literacy to have the potential to empower individuals and groups and challenge existing power relations.

Home education is legal in all of the United Kingdom and home educators have considerable freedom particularly in relation to some other European countries [7]. In England and Wales, parents and carers have a duty to provide their children with a suitable education but there is no indication of what this "suitable education" is, and they do not have to register or prove that they are providing such an education [8]. This status has been criticised [9] but is fiercely defended by many home educators [10]. As there is no system of registration there are no reliable figures about the number of home educated children in England and estimates vary between 45,250 and 150,000 [11]. However there is general agreement that this figure has risen consistently since the 1970's [3]. There is also no reliable information about the demographics of home educators although research suggests they are a diverse group [12]. The reasons families choose to home educate are equally numerous but include religious or ideological reasons as well as unhappiness with the school curriculum, bullying, and school refusal [1, 13].

There is an increasing literature on home education in the UK. However a considerable proportion of this is written by and for home educators [14–16]. Kunzman and Gaither's [3] systematic review of the emerging literature shows that most research is from the United States and much of it is advocacy based with little or no large scale quantitative research. There is then, limited research on the kinds of learning that home educators engage in. What is known is that there is a continuum of learning styles from a structured programme similar to that followed by schools to an education without a timetable, curriculum or fixed outcomes [17]. The latter style is the focus of much home education research and is often known in the UK as autonomous education. Nevertheless, as Arora's [18] research shows, many families do follow structured programmes and so it is important not to typify all home educators as autonomous. There is however evidence that over time families tend to move from structured to unstructured learning [2, 19]. There is also little certainty about the educational outcomes for home educated children. Three North American studies written from outside the home educating community demonstrate this giving a varied picture of academic outcomes [20–22] which suggests more complexity than the positive outcomes found by researchers closer to home educating communities [23].

Thomas and Pattison [2] never use the term information literacy but look at home educated families' information practices as part of their study of informal learning. The children are self-directed learners; *"they don't take in information they put it together… pull it apart again."* Conversational learning and good information seeking skills play a central role and informal learning is seen as akin to new knowledge formation. Parents mediate knowledge but the parent-child relationship is one of co-learning as well as apprenticeship. Thomas and Pattison [17, p. 152] argue that a community of practice provides a useful way to understand how home educated children learn and they conclude that "o*ur research challenges the view of learning as a separate, definable, deliberate activity and suggests that learning itself needs to be problematized in a very radical manner."* This has much in common with Lloyd's description of how workplace information literacy challenges the neatness of formal academic models.

Safran [24, p. 245] writes of home educating parents as a community of practice through the *"joint enterprise of educating their children, mutually engaging and developing a shared repertoire."* She does not use concepts related to information literacy but explores the different ways parents identify as home educators, making particular note of how becoming a home educator is an apprenticeship and a transformative experience. Thomas and Pattinson, and Safran both draw on Wenger's [25] definition of a community of practice as people with a common interest who learn together how to do it better, with a shared identity, shared activities and shared tools. It is this definition that is used in the discussion section of this paper.

## 3 Methodology and Methods

This research was intended to follow the principles of constructivist grounded theory [26] as an inductive method that moves towards the generation of theory through a process of coding. Charmaz's significant break from earlier grounded theorists is her adoption of a constructivist perspective. However the limited nature of this research project means it should be seen as grounded analysis rather than grounded theory [27] particularly because it was not possible to reach theoretical saturation. The researcher then recognises her own role in the process of the "mutual shaping" of the participants' constructions of their own information literacy practices [28]. The interview and the research therefore become a "negotiated text" where all are involved in the "meaning making process" [29]. The research also has an affinity with child centred [30] and feminist research methods [31] which emphasise the importance of giving a voice to the participants as well as adapting a reflexive stance as a researcher.

Participants were recruited through an Internet mailing list and visits to local groups. The recruitment process was slow but reached a tipping point when an early participant shared her positive experience of being interviewed. The home educating community has been identified as difficult for researchers to access [3, 11] and so it represents a considerable privilege to have gained access to these families' lives. The research consisted of four in-depth interviews with individual home educating mothers and their children aged between eight and seventeen and one interview with a mother by herself. The interviews lasted between sixty and ninety minutes. The researcher prepared question prompts inspired by Bruce's questions in her seminal work [32], and each interview moved from narrative through discussion to reflection [26]. However each interview assumed a very different shape as the researcher and participants constructed meanings together. The most productive question for all interviews was the concluding one; "*is there anything else you want to tell me*?" The success of this question demonstrated that some of the other questions were unsatisfactory possibly either too technical or too tangential. This is further demonstrated by how the mother in one interview adapted and elaborated on the researcher's questions to help her children answer them.

The decision to interview parents and children together was a decision determined by the ethics of working with children. However it became fundamental to shaping research outcomes showing how families construct information literacy together. As Barbour [33] argues, focus groups or group interviews show how knowledge is

constructed within that group; they do not necessarily show individual subjective experience. A different interview method would have produced different results; a child interviewed with her family is different from a child interviewed alone [34]. The complexities of using group interviews should not be underestimated, but as the family rather than the individual lies at the heart of this research, it is fitting that this is mirrored by the research method.

The interview transcripts were the texts used for analysis. The researcher followed the process of analysis outlined by Charmaz [26] moving from initial to focused codes and then to categories with constant comparison a significant part of the research. The process of coding was challenging. It was difficult to leave behind the participants' voices to move to a more theoretical level. Beyond this, negotiating a reflexive understanding of the subjective and situated position of the researcher [35] in shaping the analysis was a significant undertaking. Three major themes emerged from the analysis and these are discussed below. The relationships between these themes are not however fully realised in this current project.

## 4 Findings

### 4.1 Digital Minds: Central Importance of Digital Information

All the families saw computers, primarily the Internet, as central to their information landscapes. The young people in particular saw using the Internet as so ubiquitous that it resisted definition*; "I don't really know because I use it [the Internet] all the time. I use it for socialising, for research; I use it for gaming, for absolutely everything" (Eleanor).* This does not mean that families did not use other information sources; more in-depth discussion showed books were also very important; however the first association was between the Internet and information.

The Internet seemed in particular to mediate the home education experiences of these families (perhaps unsurprisingly as they were recruited through a mailing list). There was evidence that the mothers saw themselves as part of an online community of home educators. They were all active users of the Internet; they planned, organised and shared their experiences as home educators using a range of Internet tools. They then mediated this knowledge to their children. The young people displayed pride in their experience of using technology and expressed the belief that home education provided valuable opportunities for digital learning. Mia remembered using computers at school; "w*e were told to use the website and we'd just guess, click on something funny and then do anything else."* The parents were more ambivalent in their attitudes to the Internet and defined an interesting set of oppositions; it both saved time and wasted it, it was easy to use but needed to be carefully taught, it provided a wealth of information but also information overload. Three out of the five mothers expressed concerns; Siobhan commented *"that's the other thing if it isn't on the Internet they can't be bothered."*

The ubiquity of the Internet meant that the families initially found it difficult to talk about the digital aspects of their information literacy. Emma, a mother expressed this when talking about information seeking; *"Libraries are a step back [from the Internet] …usually it's very difficult to find information in a library."* However within the narra-

tive of the interviews there was a point when most of the children started to recognise that their use of the Internet was not natural and involved conscious strategies. All the children even the youngest were able to talk about a range of strategies they had learnt to employ. These strategies seemed to have been developed within the individual families learnt by observation and explicit teaching as well as by experimentation, as Siobhan comments *"my oldest daughter now I think is navigating the Internet in a way that I think is as good as I can…. she's just watched me do it lots of times and has experimented herself"*. There was then evidence that families constructed their digital literacies; *"so that for us that became the way to do it"* (Joanne) and shared their practices. Within the world of the interview the young people therefore moved to a conscious recognition of their digital literacies.

### 4.2 Information Literacy in the Wild: Challenging the Skills Model

The concept of information literacy as information skills was a useful frame for the participants and researcher in the interviews and within this discussion of skills, information seeking dominated. The participants drew on ideas of expertise and critical skills to conceptualise their experiences and to demonstrate that they were information literate. This reliance on an information skills model possibly reflects the difficulty of talking about information literacy. This is demonstrated by the researcher re-framing her own questions as skills-based at moments in the interviews where there was a struggle to make meaning even though she had no intention to test the participants' information skills.

However each interview also saw the skills model challenged. While participants highlighted information skills that are necessary and useful they also all drew on their experiences of "*tick[ing] boxes"* (Siobhan) or *"play[ing] the system"* (Emma). All the families interviewed told of information literacy experiences that were outside of this skills approach. The concept of hidden learning; *"we learn things when we don't know it"* (Mia), was an important part of how the families conceptualised their experiences; "*you'll think they're doing nothing very much and suddenly they'll come out with something they've learnt from somewhere and you'll think where have they got that from?"* (Karen).

This is seen in how the mothers discuss teaching their children; there is an emphasis on a natural process rather than formal teaching. The young people are provided with opportunities to be information literate rather than formally taught. With this comes a tension between whether home education should be seen as hard work or as *"nothing much really"* (Eleanor) both for the young people and for the parents. This was expressed by Karen as *"you're constantly clutching at straws trying to find something they'll like and they're interested in"* which captures how the mothers seem to work hard to provide learning opportunities that are then seen as natural. Serendipity and chance assumed an important place in these families' information experiences. A holistic approach to information practices where the emphasis was on putting things together and following on was common across the families; *"It's made me realise that you do gather stuff from so many different places"* (Siobhan). It was clearly important for these families to construct their experiences in this way, putting an emphasis on the holistic and the natural rather

than on prescribed learning. Karen summarised her experiences of home education; *"it comes so natural if you carry on with it."*

These practices were seen as different from school-based information practices; *"we don't go home we carry on through our lives*" (Joanne). The information experiences of home educating families were perceived as being like life rather than based on artificial exercises. Learning was done in context with an interest in Harry Potter or a visit to a museum as the catalysts for further experience. The family who followed the national curriculum seemed to draw from school-based practices more; *"I do [work] books and if I don't know the answer I look it up on Wikipedia and then I just put in the answer"* (Orla). But even within this family these practices were challenged: "w*hereas I believed everything the school was doing and I didn't really have an issue with the schools suddenly I find actually that they think differently now" (*Emma).

In all the families there was a strong emphasis on the child as confident and independent in learning and information literacy; *"It's all about really them finding out stuff"* (Karen). Both parents and children narrate experiences where the child is a confident researcher, *"pretty quickly they can work out that this isn't right that they're not getting the information that they want"* (Joanne); who is responsible for their own information needs, *"the things that she's interested in we spend hours doing"* (Siobhan). There was also recognition of an information world away from formal education. There was an emphasis on the practical and the real whether cooking, ice-skating or dress making. For example, Joanne expressed the importance of embodiment *"she uses expression her whole body is one big expressive thing that she uses everyday"* to her children's information experiences. The exploration of information literacy in the wild was strongest in the autonomous families but all emphasised literacies as a practice for life rather than just education.

### 4.3 Doing It Together: The Importance of Collaborative Information Practices

Within each interview there was evidence that the young people's information literacy experiences were mediated by different groups; experts and families and the wider community. This is of course only a loose classification based on five families but it provides a frame for their experience. Experts such as teachers or tutors were the least significant of these groups. The two young people who were studying post sixteen had moved to college and those who had studied or were planning to study GCSE's were likely to use tutors. The role of the tutors however seemed to be to tick the boxes and they were not given a significant role within the interviews.

The mother was the main home educator in all these families and fathers played an interesting role, often seeming to act as a bridge between the outside world of the expert or tutor and the internal family information literacy practices. The father draws on a different body of knowledge from outside the home and brings this back to the family. Karen commented *"when I don't know I used to say ask daddy because he knows a lot more or if we're in the house it's let's look it up, I don't know the answer"*. The role of the mother in the family's information practices was far more ambiguous and often seemed to be obscured and downplayed. She is not undervalued; her role is in the background. She creates opportunities and facilitates rather than leads. There is an emphasis

on partnership *"we'll see how that goes, we'll get on with that now"* (Emma) or as mentioned above on the child as the leader. This is exemplified by two children reacting with humour at the idea that their mother could help them with their work. However the mother does mediate her children's information experiences. One manifestation of this was around issues of control, censorship and privacy. This part of the discussion was sometimes framed with humour, possibly signifying an underlying tension. While attitudes varied from no censorship through to a concern for age-appropriate material, all the families discussed similar practices, particularly in terms of digital technology. Proximity was an essential feature of Internet use while the children were young: *"till you were about fourteen you sat down in the room with us so we could have some idea of what she was doing"* (Sarah). There was a move away from these shared practices to more privacy as young people got older and the mother's role was renegotiated.

As mentioned above siblings also mediate information for each other. This involves working together, sharing knowledge and teaching each other. This was viewed positively by the young people: *"I like it especially when we have help from each other"* (Mia). For many of the young people other figures such as aunts, uncles, grandparents or family friends played an important role. Different families have different practices but their information literacy is inherently social.

Beyond the family, participants talk about their information practices as part of a home educating community or communities. However while the children learn from each other; "*they've got you know things that they'll tell them and show them. It's really good then, different levels, ages, experiences"* (Karen) and socialise together, their relationships were not demonstrably significant in terms of information literacy. The home education community was more significant for the mothers in person and online. There was evidence of a strong community; *"I think I've just I've realised how much I draw on it recently and it's…like do you choose to be part of it or not"* (Siobhan) with evidence of apprenticeship; *"a home edder told me when I first started"* (Karen). The mothers also sought out those who shared the same philosophical position *"you need to find out who thinks like you"* (Emma) and discussed how they had been changed by home educating; *"so yeah for me I've changed completely and I love it"* (Joanne).

There is also evidence within the interviews of a collaborative meaning making process where the interviewer and the participants construct their understanding of information literacy together. In this way within the interview Eleanor moves from seeing herself as independent in her information literacies to recognising the significance of others; *"pretty much by myself… My granddad, that's a good point my granddad actually is a big figure"*.

## 5 Discussion

### 5.1 Information Skills Model Versus Holistic and Potentially Transformative Information Practices

There is a powerful narrative within existing research that home educated children are independent learners adept at handling information [2, 14, 16]. The young people in these interviews have similar constructions of themselves as confident and information

literate. However this was not a stable construction. On reflection they expressed more uncertainty and talked about their difficulties as well as recognising the collaborative nature of their learning and information use. The interviews therefore became a place where the children could reflect on their information literacy.

Lupton and Bruce's [6] GeST model of information literacy offers one way to interpret information literacy in the context of home educating families. In this way the young people move from seeing information literacy as natural to recognising the skills they use to finally feeling that their information literacy is collaborative. There was then evidence that information literacies were socially constructed both within each family and within the home educating community. This sense of information literacy as socially constructed was however difficult to express and the skills model was also useful as a way to frame their experiences.

The third and outer layer of Lupton and Bruce's model is the transformative, and this potentially also provides a way to view these home educating families' information literacies. There was a tendency for the home educators in this study to favourably contrast their information literacy practices to school practices. This approach could be framed as a challenge to the orthodoxy of information literacy in education. We can see this played out if we look at the role of gender in these families; the mothers are responsible for the hidden holistic information literacy while the fathers are responsible for the more knowledge-based strand. This is an area that would merit further research as this is only a tentative finding.

### 5.2 Communities of Practice as Way to Understand Home Educating Families' Information Literacies

Lloyd [5] uses communities of practice to understand workplace information literacy and this study suggests that they are equally resonant for home educating families. There was evidence that both individual families and the home educating mothers could be seen as communities of practice. Identifying the families as a community of practice can help us to understand information literacy in the context of home education. The families are involved in the joint enterprise of learning and the families all shared agreed ways of working established over time, whether this was how to search on the Internet or how to choose a book to read. This potentially helps us understand the ambiguity of mothers as teachers and not teachers by showing how the information literacy relationship is co-learning as well as an apprenticeship. The concept of the family as a community of practice can also help us understand how home educating mothers control and mediate information for their children. This is exemplified by the two oldest children in the study who as they got older moved outside their families' community of practice. Equally if we see the mothers as part of their own community of practice we can understand their information literacy in the context of them learning how to be home educators. The mothers engage in a range of shared information practices developing a strong identity as "home edders" and seeing the act of home educating as transformative. This transformation includes a measurable difference in their interactions with information through the process of educating their children.

## 6 Conclusion

The research provides rich detail about the information literacy experiences of these particular families but its findings are clearly local and limited. Nevertheless it is an exploration of information literacy experiences in a previously unstudied domain and makes parallels between the experiences of these families and existing concepts of information literacy. It can be therefore be seen to add to our understanding of information literacy as a sociocultural practice and to offer findings that may resonate with home educating families. It also suggests that further information literacy research with home educating families would be beneficial.

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## References

1. Morton, R.: Home education: constructions of choice. Int. Electron. J. Elementary Educ. **3**, 45–56 (2010). http://www.iejee.com/index/makale/134/home-education-constructions-of-choice
2. Thomas, A., Pattinson, H.: How Children Learn at Home. Continuum, London (2007)
3. Kunzman, R., Gaither, M.: Homeschooling: a comprehensive survey of the research. Other Educ. **2**(1), 4–59 (2013)
4. Tuominen, K., Savolainen, R., Talija, S.: Information literacy as a sociotechnical practice. Library **75**(3), 329–345 (2005)
5. Lloyd, A.: Learning to put out the red stuff: becoming information literate through discursive practice. Library Q. **77**(2), 181–198 (2007)
6. Lupton, M., Bruce, C.: Windows on information literacy worlds: generic, situated and transformative perspectives. In: Lloyd, A., Talija, S. (eds.) Practising Information Literacy: Bringing Theories of Learning, Practice and Information Literacy Together, pp. 4–27. CIS, Wagga Wagga (2010)
7. Blok, H., Sjoerd, K.: Inspection of home education in European countries. Eur. J. Educ. **46**(1), 138–152 (2011)
8. Monk, D.: Problematising home education: challenging 'Parental Rights' and 'Socialisation'. Leg. Stud. **24**, 568–598 (2004)
9. Badman, G.: Report to the Secretary of State on the Review of Elective Home Education in the United Kingdom. HMSO, London (2009)
10. Select Committee on Children, Schools and Families: The Review of Elective Home Education. HMSO, London (2009)
11. Hopwood, V., O'Neill, L., Castro, G., Hodgson, B.: The Prevalence of Home Education in England: A Feasibility Study. York Consulting Ltd for the Department of Education and Skills, Nottingham (2007)
12. Rothermel, P.: Setting the record straight: interviews with a hundred British home educating families. J. Unschooling Altern. Learn. **5**(10), 20–57 (2011)
13. Gabb, S.: Homeschooling: a British perspective. In: Cooper, B. (ed.) Homeschooling in Full View: A Reader, pp. 199–219. Information Age Publishing, Charlotte (2005)
14. Dowty, T.: Free Range Education: How Home Education Works. Hawthorn, Stroud (2000)

15. Fortune-Wood, J.: Doing It Their Way: Home-Based Education and Autonomous Learning. Educational Heretics, Nottingham (2000)
16. Meighan, R.: Learning from Home-Based Education: An Education Now Special Report. Education Now, Ticknall, UK (1992)
17. Thomas, A., Pattison, H.: Informal home education: philosophical aspirations put into practice. Stud. Philos. Educ. **32**(2), 141–154 (2012)
18. Arora, T.: Research Report on Home Education in Kirklees. University of Sheffield, UK (2002)
19. Hanna, L.: Homeschooling education longitudinal study of methods, materials, and curricula. Educ. Urban Soc. **44**(5), 609–631 (2011)
20. Martin-Chang, S., Gould, O., Meuse, R.: The impact of schooling on academic achievement: evidence from homeschooled and traditionally schooled students. Can. J. Behav. Sci./Revue Canadienne des Sciences du Comportement **43**(3), 195–202 (2011)
21. Pennings, R., Seel, J., Neven Van Pely, D., Sikkink, D., Weins, K.: Cardus Education Survey. Cardus, Hamilton, Ontario (2010)
22. Cogan, M.F.: Exploring academic outcomes of homeschooled students. J. Coll. Admission **208**, 18–25 (2010)
23. Ray, B.: Academic achievement and demographic traits of homeschool students: a nationwide study. Acad. Leadersh. J. **8**(1), 17–42 (2010)
24. Safran, L.: Exploring Identity Change and Communities of Practice Among Long Term Home Educating Parents. Ph.D.Thesis The Open University, UK (2008)
25. Wenger, E.: Communities of Practice: Learning, Meaning, and Identity. Cambridge University Press, Cambridge (1998)
26. Charmaz, K.: Constructing Grounded Theory: A Practical Guide Through Qualitative Analysis. Sage, London (2006)
27. Herring, J.: Year 12 students' use of information literacy skills: a constructivist grounded analysis. In: Lloyd, A., Talija, S. (eds.) Practising Information Literacy: Bringing Theories of Learning, Practice and Information Literacy Together, pp. 143–166. CIS, Wagga Wagga (2010)
28. Guba, E., Lincoln, Y.: Naturalistic Inquiry. Sage, London (1985)
29. Holstein, J., Gubrium, J.: The Active Interview. Sage, London (1995)
30. Dell Clark, C.: In a Younger Voice: Doing Child-Centered Qualitative Research. Oxford University Press, Oxford (2011)
31. Doucet, A., Mauthner, N.: Knowing responsibly: ethics, feminist epistemologies and methodologies. In: Miller, T., Birch, M., Mauthner, M., Jessop, J. (eds.) Ethics in Qualitative Research, 2nd edn, pp. 123–145. Sage, London (2002)
32. Bruce, C.: The Seven Faces of Information Literacy. AusLib, Adelaide (1997)
33. Barbour, R.S.: Doing Focus Groups. Sage, London (2007)
34. Lewis, R.: Recruiting parents and children into a research project: a qualitative exploration of families' decision-making processes. Int. J. Soc. Res. Methodol. **12**(5), 405–419 (2009)
35. Mauthner, N., Doucet, A.: Reflexive accounts and accounts of reflexivity in qualitative data analysis. Sociology **37**(3), 413–431 (2003)

# Prismatic Realities: Multidisciplinary and Interdisciplinary Cultures and Implications for Information Literacy in Visual Studies: The Case of History of Photography

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**Abstract.** The specialized field of history of photography (HP) is continually evolving, and its capability to use an historical image as explanatory lens, challenges students navigating the scholarly literature, with implications for information literacy and scholarly communication. How is HP constructed, or mediated via different disciplinary perspectives? Within the domain of visual studies, finding the best way to introduce users to the disciplinary cultures that animate HP is imperative for helping them appreciate the complexity and influence on scholarly communication within the wider scope of visual studies and literacy. Too often the first recourse is fine arts literature and not the richly layered literature appearing in other disciplines—therefore this diagrammatic, and graphical presentation is proposed to inform their information needs and strategies. Predicated upon a definitional conceptual model of disciplinary culture and disciplinary formation informing information literacy, this presentation can be applicable to other humanities disciplinary instruction.

**Keywords:** Disciplines · History of photography · Interdisciplinary · Multidisciplinary · Visual literacy/studies

## 1 Introduction

Users intent on searching and triaging pertinent research in visual studies, specifically history of photography, find a plethora of research transcending the perceived boundaries of historical photography; if directed to known sources for art history, they lose sight of the wider, richer research originating from disciplinarily-based sources. This discussion brings together concern for visual literacy in HP via various possible disciplinary configurations producing HP. Instead of thinking within the boundaries of art history, the user is invited to embrace broader, richer approaches to visual literacy. Recently, history of art and visual studies, as two contending domains of knowledge, have locked horns generating a nexus of intellectually enterprising and innovative perspectives on the visual, whether considered fine art or the mundane. This intellectual


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confluence produces a spectrum of disciplinary approaches to HP. Its richness can expressed as (Fig. 1).

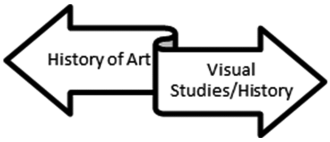


**Fig. 1.** Competing/interpenetrating domains

Both fields are in contention, yet complementary, interpenetrating respective domains. HP and its literature flow from both, incorporating other disciplinary alignments.

## 2 History of Photography, a Disciplinary Enigma for Visual Literacy?

What is HP? Is it an aesthetic and mediating force through which artistic subjects and aesthetic concerns are pursued or, is it a medium through which the past may be explored in all its rich variety? [1] HP is many things, a filter through which one perceives the world, either aesthetically or by which one explores and interprets phenomena. Too often students and researchers refer to well-known databases – *Bibliography of the History of Art - BHA/RILA*, *Art Index*, or *Art Bibliographies Modern*, to access their information needs. Users need to appreciate how knowledge is *packaged* via various disciplines to better navigate and appropriate scholarship. Awareness of disciplinary cultures and how they *package* knowledge is instrumental to more nuanced literacy open to configurations of disciplines, sub-disciplines, or multi-disciplines. Nowhere is this nuanced more than HP, as it emanates from art history and visual studies.

Among discrete fields within the humanities, HP is usually identified with art history. Like older established fields in art history such as painting and sculpture, photography has emerged to occupy a position in art history as a legitimate field of scholarly endeavor [2]. Since the middle of the 1980's photography has become a vibrant and compelling object for investigation among art historians, especially among other scholars intent upon understanding photography as a phenomenon as well as a process, focusing the aesthetic and the documentary [3]. Social historians, especially, are among those interested in using photography to understand the past, especially photographs as evidential documentation, offering valuable approaches to appropriating the past. Whether human events or inanimate objects, historical photographs constitute an open window, capable of utilizing photography as another approach in their methodological toolbox [4]. Often the aesthetic and the use of photographic evidence meld to enrich the history of photography as a field.

Since its inception in the early 19$^{th}$ century, HP emphasized aesthetics and the nature of the photographic process, focusing on theoretical achievements as well as

key figures [5, 6]. Gaining ground in the 1970s and accelerating since the mid-1980s, HP is recognized by the College Art Association as a bone fide scholarly field [7, 8], and historians have laid the foundational narrative [9]. Major theoretical insights, protean subjects and epistemologies can be examined via various disciplinary approaches to situate photography within a historical context [10].

As an object of research or as a filter of past phenomena, photography is mediated [11]. The photograph represents a nearly protean resource, when used in historical research, and provides as many epistemological concerns and problems as effective and valuable insights into the past [12]. Discussions abound concerning the use of photography, specifically, the photograph by historians attempting to understand past phenomena [13], fixing most methodological discussion when visual phenomena is central or complements historical research techniques. As these epistemological discussions undergird this field, it assumes a richer dimension where theoretical, methodological importation from other disciplinary traditions meld, creating a vibrant specialization. Transcending art history, HP is informed by other disciplinary insights, furthering the field's capacity to incorporate diverse perspectives. [14, 15]. For this reason, users need to mesh their information needs via an appreciation for disciplinary cultures, casting their inquiries beyond the art historical to capture rich scholarship.

## 3 Disciplinary Morphologies and Information/Visual Literacy

Introducing users to disciplines and their respective approaches to research sensitizes them to different approaches to research. Different disciplinary approaches influence the object of research, influencing what the user may find among disciplines focusing on that object. Methodologies prescribed by different disciplinary configurations affect research, conventions of writing, and nomenclature. A disciplinary approach may enhance or detract from the effectiveness of their own research. For visual literacy, disciplinary configurations become a lens through which the user may see/discover new knowledge amongst disciplinary morphologies (See Fig. 2).

Acknowledging that there may be more than one disciplinary approach informs information/visual literacy [17]. Depending upon the intellectual context of the subject being investigated, photography, or the photograph as historical artifact, assumes a multi-layered, definitional ambivalent position within historical scholarship and offers critical insight, deploying theoretical, innovative, and effective techniques borrowed from other disciplinary traditions and orientations. History of photography can be displayed schematically as a field of specialization open to intellectual latitude and methodological flexibility (Fig. 3).

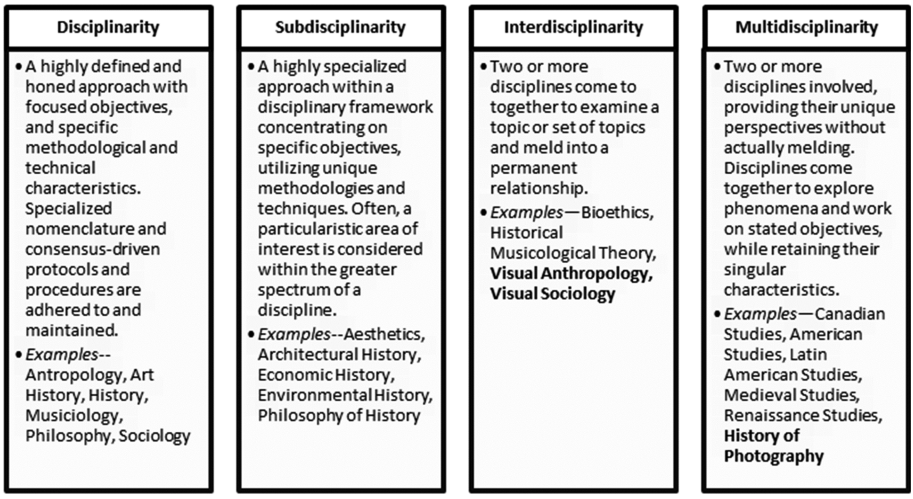


**Fig. 2.** Typology of disciplinary morphologies [16]

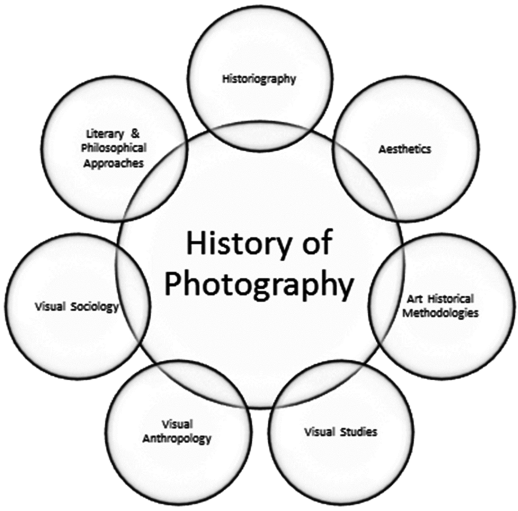


**Fig. 3.** Representative composition of HP

Art historical narrative has encompassed other approaches emanating from historical scholarship, embracing literary and philosophical insights and perspectives from such sub-disciplines as visual anthropology and visual sociology. For the user, it constitutes an intellectually dynamic field of inquiry. As fluid as historical treatments of photography may be, other disciplinary permutations and insights, or methodological importations do conform to critical approaches generally honed by accepted historical practice [18, 19]. Whether interdisciplinary or multidisciplinary, judicious historical analysis, narrative, and use of primary sources animates historical studies of photography.

## 4 Bringing Users to Disciplinary Cultures, or the Prismatic Effect on Information/Visual Literacy

Users should appreciate how disciplines form and how they adhere to methodologies, theories, and/or protocols specific to them. This paper uses the following working definition: "Visual literacy refers to the ability to "read" an image, much like the way we "read" language. This form of literacy requires an awareness of "visual rhetoric"— the ways that visual images communicate meaning. Visual rhetoric does not only include specific concepts of design or aesthetic theory. It also describes how images reflect, communicate, and even shape cultural meaning. Visual literacy involves all the processes of knowing and responding to visual images as well as the ideas that inform the construction or manipulation of cultural images," together with appreciation for disciplinary, the full richness of scholarship enables users to better articulate their needs and produce efficacious research [20].

## 5 General Process for Users Retrieving Articles with Awareness of Disciplinary Approaches

For this discussion three databases are used: *ArtbibliographiesModern* identifiable as an art history and photography source, *Web of Science*, a general database, and *America: History and Life,* a specialized history oriented utility that can be triaged and analyzed. Target years are 1984–2014 and randomly selected popular subjects are used to examine a spectrum of possible illustrations in HP necessary to understand the characteristics of HP among databases: *Art or Aesthetic, Social or Society, Urban or City, War or Military, Gender or Women.*

(A) Users are directed to a conceptual and definitional model of disciplinary formation which animates analysis of information gathered from specific databases crossing a number of disciplinary formations and informed by analysis of disciplinary formation.
(B) Disciplinary characteristics of HP within visual literacy/studies, explores intellectual structure within scholarly communication, and includes other disciplinary influences within the contextualized nature of disciplinary cultures, since the field is multidisciplinary and interdisciplinary. Characteristics are then identified for disciplinary alignments, such as anthropology geography, history, sociology, as well as art historical, literary, or philosophical fields, and sub-disciplinary formations as visual anthropology or visual sociology.
(C) Diagrammatic and graphical illustrations elucidate visual studies/literacy via HP, helping students understand the nature of the aesthetic frame through which photography may be analyzed is transcended or complemented via other disciplinary influences.
(D) Complementing disciplinary cultures, the flagship journal *History of Photography* serves as an intellectual frame for analysis of other journals not identified with photography revealing heretofore innovative research crossing many disciplines,

methodologies, and techniques, exploding the art historical perspective, and embracing other traditions and disciplinary influences, highlighting the need for awareness of disciplinary differences for visual literacy.

Result: Users are effectively sensitized to the larger spectrum of disciplinary formations animating HP, in turn, animating visual studies, and visual history.

Searching for articles in HP requires moving among different general and specialized databases. Users become aware of different disciplinary methodologies, techniques, theories, employed by disciplinary formations (Fig. 4).

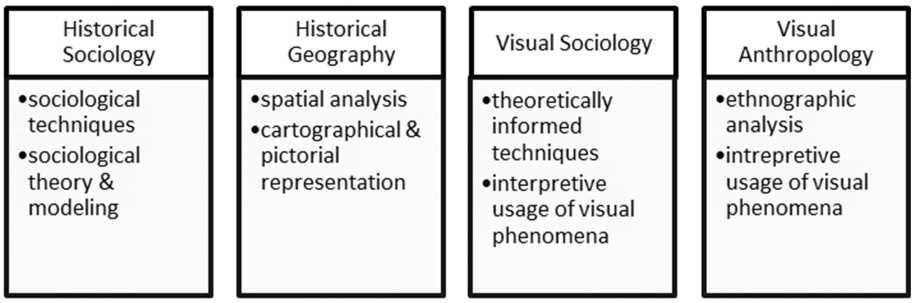


**Fig. 4.** Possible disciplinary tools of analysis

Users learn to appreciate myriad disciplinary approaches–deployment of these tools, affects the phenomena, producing *disciplinarily-based results,* and the rich intellectual constellations affecting visual studies and HP.

Different databases yield different results using these keywords among peer-reviewed disciplinary-based journals (Figs. 5 and 6).

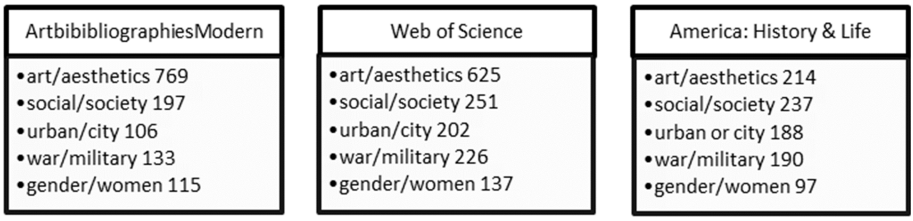


**Fig. 5.** Comparison of database keyword yields

Larger or smaller numbers of entries are retrieved—but, disciplinary alignments may vary greatly, offering a richer spectrum of historical research. Critical is the similarity in keywords recognized by each database, yielding different results due to disciplinary definitions that may not correspond across the disciplines. Journals privilege different approaches, methodologies, theories, and techniques which affect HP as the object of research–the user assumes responsibility for comprehending the diversity of scholarship informing HP.

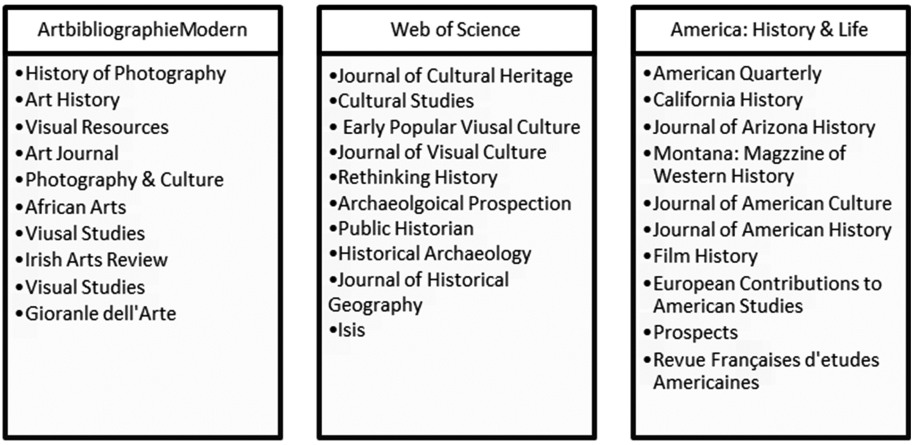


**Fig. 6.** Database yields for selective keyword terms

Informed by importation of theories, methodological innovations, and techniques in HD forms a confluence of multidisciplinary, if not interdisciplinary, activity beyond well-delineated boundaries of art historical practice. Journals in art history or photography are oriented by aesthetically-driven examination, but social contextualization broadens research. Sexuality, or ethnicity, poverty, or industrialization, may meld with concerns for urban or economic or political issues. Epistemological originality, complemented by historically grounded interpretive analysis, assumes greater influence, especially within visual studies [21, 22].

Users may find multidisciplinary or interdisciplinary journals like *American Quarterly*, and *Journal of Popular Culture* that focus photography within the context of emerging theoretical and methodological interpretations evident in popular cultural studies. Also appearing are anthropological or sociological theoretical techniques applied to these studies in multidisciplinary journals, where several disciplinary orientations may examine photography. Animating this literature are concerns for historiographical analysis, situating primary sources with photographic evidence. Theoretical discussion of the problematic nature of photography as a guide to the past is left to the more theoretical and historiographical oriented methodological articles that are found in *Visual Resources*, and *Rethinking History*. Generally, these discussions are contained within the pages of multidisciplinary journals, where the concerns for theoretical innovation and methodological approaches are explored.

Using Web of Science disciplinary categories further illustrates the process. The user navigates among these disciplinary cultures exploring myriad approaches–one possible approach or tool among other disciplinary options may influence, amplify, or even distort the object of research. Epistemologically rich, understanding disciplinary orientation informs the users' research process (Table 1).

Users learn that different disciplinary formations exert influence on the object of research by using methods, theoretical approaches, technical tools like statistics, or sociological modeling. Using any disciplinary approach affects what the user finds, therefore by reading articles in different disciplines, the constellation of disciplinary morphologies of

different nomenclature, results, etc. becomes apparent—*this prismatic affect situates visual studies and history of photography within non-art history scholarship.*

**Table 1.** Disciplinary categories and author's illustrative examples of disciplinary influences

| Heading level | Example |
|---|---|
| ART | Primarily aesthetically focused |
| HISTORY | Historical narrative & historiographical, primary sources |
| HUMANITIES MULTIDISCIPLINARY | Diverse approaches, i.e. literary, semiotics, etc. |
| LITERATURE | Literary theory & text/visual linkages |
| ARCHAEOLOGY | Visual & historical interpretation, & mediation of evidence focused |
| HISTORY PHILOSOPHY OF SCIENCE | Visual representation & of scientific research and communication |
| ANTHROPOLOGY | Visual interpretation & mediation of culture systems, ethnographic evidence |
| ARCHITECTURE | Interpretative, theory & architectural representation of built environments |
| CULTURAL STUDIES | Synthetic methodologies & interdisciplinary |
| AREA STUDIES | Multidisciplinary & region or country focused |
| FILM RADIO TELEVISION | Historical, media studies of cultural products & theoretical |
| LITERATURE ROMANCE | Literary theory & literary analysis |
| PHILOSOPHY | Aesthetics & analytical |
| ASIAN STUDIES | Multidisciplinary, aesthetics, & historical |
| COMMUNICATION | Media analysis, representation, & theoretical |
| HISTORY OF SOCIAL SCIENCES | Scientific communication analysis |
| FOLKLORE | Visual & ethnographic representation |
| GEOGRAPHY | Spatial & historical analysis |
| SOCIAL SCIENCES INTERDISCIPLINARY | Synthetic approaches & problem-focused |
| SOCIOLOGY | Modeling, statistical analysis, & theory |

## 6 Through the Looking Glass, or *History of Photography* as Lens

As contrast, the journal *History of Photography* reflects professional scholarly perspectives for historians of photography. As official disciplinary organ, *"History of Photography* is an international quarterly devoted to the history, practice and theory of photography. It intends to address all aspects of the medium, treating the processes, circulation, functions, and reception of photography in all its aspects, including documentary, popular and polemical work as well as fine art photography. The goal of the journal is to be inclusive and interdisciplinary in nature, welcoming all scholarly approaches, whether archival, historical, and art historical, anthropological, sociological or theoretical. It is intended also to embrace world photography, ranging from Europe and the Americas to the Far East" [23] (Fig. 7).

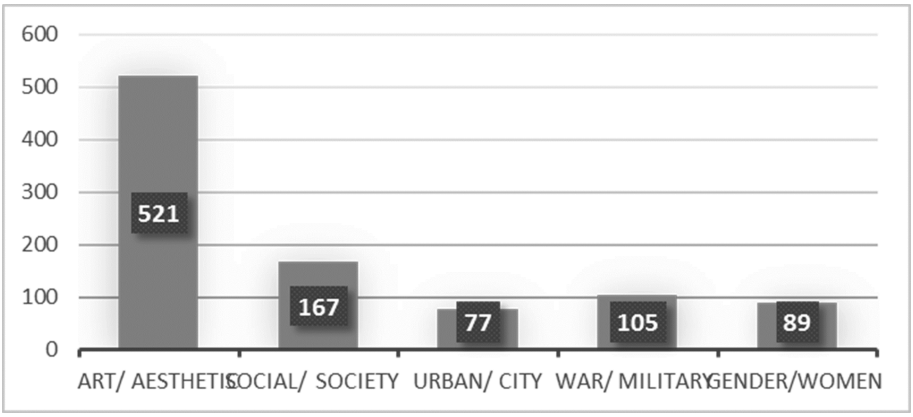


**Fig. 7.** *History of Photography's* illustrative subject emphasis

Since *History of Photography* privileges the aesthetic, users need to understand that for such topics as war and mass media, representation of other cultures, studies of mediation and sexuality and gender, criminality or, poverty, they need to broaden their thinking and consider other disciplinary perspectives. Because photography's protean nature remains truthful to representation of the research subject historians are turning to the photograph and photography as both subject and process. Although the professional scholarly journal *History of Photography* is a natural home for this specialization, scholarship is found outside art history publications complementing the journal *History of Photograph*; ubiquitous as photography is, its history is equally spread among the disciplines and their respective journals.

## 7 Concluding Observations

Exposure to a conceptual and definitional model of disciplinarity, exposes users to multi-disciplinarities and inter-disciplinarities for HP, visual studies/learning. Diagrammatic and graphical illustrations serve to elucidate visual studies/literacy via HP, helping users

understand the nature of the aesthetic frame through which photography may be analyzed is transcended or complemented, via other disciplinary influences, further sensitizing users to disciplinary cultures. Using illustrative examples gathered from specific databases crossing a number of disciplinary formations and informed by historiographical analysis of disciplinary formation explores the intellectual structure within scholarly communication. Users discern identifiable characteristics for disciplinary alignments, such as anthropology geography, history, sociology, as well as art historical, literary, or philosophical fields, and sub-disciplinary formations as visual anthropology or visual sociology. This approach reveals innovative research and disciplinary synergies and emerging fields crossing many disciplines, methodologies, and techniques, exploding the art historical perspective, and embracing other traditions and disciplinary influences, highlighting the need for awareness of disciplinary differences for visual literacy.

## References


1. Benjamin, W.: The Work of Art in the Age of Mechanical Reproduction. Prism Key Press, Garden City (2010)
2. Gasser, M.: Histories of photography 1839–1939. Hist. Photogr. **16**, 50–60 (1992)
3. Henisch, H., Henisch, B. (eds.): The early years of history of photography, an interview with Heinz and Bridget Henisch. Hist. Photogr. **30**, 196–202 (2006)
4. Trachtenberg, A.: Reading American Photographs: Images as History. Mathew Brady to Walker Evans. Hill and Wang, New York (1989)
5. Hannavy, J. (ed.): Encyclopedia of Nineteenth-century Photography. Taylor & Francis Group, New York (2008)
6. Warren, L. (ed.): Encyclopedia of Twentieth-century Photography. Routledge, New York (2006)
7. Nickel, D.R.: History of photography: the state of research. Art Bull. **83**, 548–558 (2001)
8. Hershberger, A.E.: The past, present and future of the history of photography: interviews with Peter C. Bunnell, Gretchen Garner and Britt Salvesen. Hist. Photogr. **30**, 203–211 (2006)
9. Newhall, B.: The History of Photography from 1839 to the Present Day, 3rd edn. Museum of Modern Art, New York (1949)
10. Kelsey, R., Stimson, B. (eds.): The Meaning of Photography. Sterling and Francine Clark Art Institute, Williamstow (2008)
11. Brennen, B., Hardt, H. (eds.): Picturing the Past: Media, History, and Photography. University of Illinois Press, Urbana (1999)
12. Clarke, G.: The Photograph. Oxford University Press, Oxford (1997)
13. Peters, M., Mergen, B.: Doing the rest: the uses of photographs in American studies. Am. Q. **29**, 280–303 (1977)
14. Buchanan, A.L., Hérubel, J.-P.V.M.: Clio's other photographic literature: searching the historical journal literature using *America: history and life* to explore the history of photography. Art Documentation **3**, 199–209 (2012)
15. Buchanan, A.L., Hérubel, J.-P.V.M.: Through Clio's lens: exploring disciplinary, intellectual, and historical orientations in the history of photography. J. Sch. Publishing **44**, 237–255 (2013)
16. Hérubel, J.-P.V.M.: Disciplinary morphologies, interdisciplinarities: conceptualizations and implications for academic libraries. In: Mack, D.C., Gibson, C. (eds.) Interdisciplinarity and Academic Libraries: ACRL Publications in Librarianship, vol. 66, pp. 17–53. ACRL, Chicago (2012)

17. Elkins, J.: Responses to Mieke Bal's `Visual essentialism and the object of visual culture' (2003): Nine modes of interdisciplinarity for visual studies. J. Vis. Cult. **2**, 232–237 (2003)
18. Tagg, J.: The Burden of Representation: Essays on Photographies and Histories. University of Massachusetts Press, Amherst (1988)
19. Tagg, J.: The Disciplinary Frame: Photographic Truths and the Capture of Meaning. University of Minnesota Press, Minneapolis (2009)
20. Visual Rhetoric/Visual Literacy: Writing about Photography. http://twp.duke.edu/uploads/assets/photography.pdf
21. Mitchell, W.J.T.: Interdisciplinarity and visual culture. Art Bull. **77**, 540–544 (1995)
22. Dikovitskaya, M.: Visual Culture: The Study of the Visual after the Cultural Turn. MIT Press, Cambridge (2005)
23. History of Photography. http://www.tandf.co.uk/journals/titles/03087298.asp

# Exploring the Information Literacy Experiences of ESOL (English for Speakers of Other Languages) Learners: A Discussion of Methods

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**Abstract.** The paper shares the early stages of doctoral research; discussing the research questions, methods and pilot study findings. The full research will be a longitudinal case study of three community ESOL classes in England. ESOL learners are adult migrants who are learning English and are typically very different from the higher education student who is the focus of much information literacy research. The paper discusses the challenges of the pilot study and looks forward to the full data collection which will use a range of participatory methods.

**Keywords:** Information literacy · ESOL · Adult education · Participatory methods · Language learning

## 1 Introduction and Background

There has been little previous research on information literacy in the context of the ESOL classroom in the United Kingdom or more generally on information literacy and lower level language learning. The study is informed by existing research that suggests that there is a relationship between language learning and information literacy [1, 2] as well as research that looks at the information literacy practices of immigrants and more widely at their information behaviour which suggest that social exclusion can be seen as an information problem [3], transferring information practices is a significant issue [4], and that there is an association between immigrants and information poverty [5].

ESOL learners are adults living in the UK who are learning English as part of adult basic skills provision. They are heterogenous but it is possible to see them as potentially disadvantaged by several measures: they are immigrants and they are more likely to be women, BME (black, minority or ethnic), underqualified, and unde-employed or unemployed [6]. There is ESOL research in digital literacy [7], on the ESOL classroom as a significant information site [8], and on ESOL learners as potentially experiencing information poverty [9]. However the concept of information literacy has gained little currency within ESOL or community learning more widely.

The research is framed by an understanding of information literacy as a social practice and is interpretive and emergent. The findings of this research are likely to be particular rather than generalisable and the researcher will take a reflexive approach to give her research rigour [10]. The initial research questions ask: what is the relationship


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between the development of English language capabilities and information literacy; how are participants interacting with information at the start and end of their studies; and what impact do the changes in participants' information literacy have on their everyday lives. The aim of the pilot study was to explore how far rich data could be collected about the information experiences of learners with limited English, sensitise the researcher, and collect initial ideas from participants to shape the research.

## 2 Research Methods

The full research is a case study of three community ESOL classes over the academic year 2015/16. The researcher plans to use constructivist grounded theory [11] as a method of analysis rather than a methodology. The research will use a range of methods, negotiated with participants, which are intended to be participatory [12], capture holistic experience and support participants with limited English to express themselves.

ESOL learners can be seen as a challenging group to research. Firstly there are important questions around the relative privilege of the researcher and her difference from the participants [13, 14]. Secondly the participants have limited proficiency in English. In this project the researcher will conduct her research in English rather than use interpreters. This means the research will exclude those who are at the very early stages of learning English. However participants may welcome the opportunity to practice their English and within the context of the ESOL classroom they are familiar with working to express themselves in English [15].

Visual methods are an integral part of ESOL teaching and offer a useful way to communicate with ESOL learners. There is also a growing body of information literacy and information behaviour research that uses visual methods [16–18]. At the simplest level, this research will involve photo elicitation as part of focus groups but this may be extended to using techniques such as photo voice, drawing or mapping. The researcher notes that visual methods have the potential to be participatory as part of an overall research design such as photo voice [19] but that this is not an inherent quality.

An early stage of the research includes one-to-one semi-structured interviews with ESOL teachers and managers. It is also planned to carry out one-to-one longitudinal interviews with the ESOL learners over the course of the academic year. The frequency and design of these interviews will be negotiated with the individual learners and may include, for example, the participants keeping journals and the researcher accompanying participants on visits. In this research, interviews are seen as a practice and this is guided by Holstein and Gubrium's [20] writing on the active interview. In this way the researcher and the participants construct meaning with the interview as a negotiated text.

Within this research, focus groups and group interviews are seen as a way to explore interaction and knowledge formation rather than as a way to canvass opinion. A focus group is planned as an initial and final activity for the ESOL classes in combination with group interviews as negotiated with the learners. Focus groups can be seen as more likely to be participatory as they shift power away from the researcher and as conducive to working with participants who lack voice as they allow for mutual support. However, there are also difficulties in using focus groups; in particular they will not capture the

full range of participants' subjective experiences and so in this research they are used together with individual interviews [21].

Classroom observation is a central technique for research in ESOL and education more generally [22] and has also been used in information literacy research. Angrosino [23] argues for a position of cultivated naivety and this ethnographic approach is the starting point of conducting observation in this research. Observation is then seen as a way to understand practice in context and build description as well as potentially overcome language barriers [24]. However it does not meet all the research objectives as it does not seem to capture participants' conceptions of and reflections on their information literacy practices, particularly in relation to their lives outside the classroom.

## 3 Pilot Study

The pilot consisted of an observation of an ESOL and Art workshop, discussed below, and two focus groups. The focus groups were held in existing volunteer-led English conversation classes. In these groups the learners were shown a selection of picture prompts and realia, for example, a smartphone, an ESOL class flyer and a photograph of a library, and asked questions about their information experiences. As a final activity the researcher introduced the concept of information literacy and discussed this in relation to her research plans.

In both focus groups the participants ranged from beginner to upper intermediate in their level of English and had been resident in the UK for between a few months to over twenty years. However the groups were very different in composition. In group one there were four participants, all women, most of whom had come to the UK for spousal reasons, two of whom had no literacy in their first language. There were five participants in the second group, one man and four women. Three participants were partners of PhD students and all had a relatively high level of education.

The most significant findings of the pilot were methodological and are discussed below but several areas of interest, albeit local and limited, emerged. The diversity of the participants' information experiences was the most significant finding. In group one, they told stories of finding it difficult to get information about how to find a job, join the library or visit the doctor, while the second group challenged the researcher's expectations by telling more positive stories. The difference between the two groups was also reflected in the fact that while information literacy was a new concept to all participants, the second group was able to engage in a discussion about the proposed research. Other findings related to diverse use of digital technologies from those who identified themselves as proficient users to those with very limited confidence. Language and literacy were significant barriers to the use of digital technologies, with video and VOIP the most used applications. All the participants discussed the importance of people to find and share information. For group one, family assumed a central importance, while for the second group, friends were more significant. For both groups interactions with people from the same community who spoke the same language were significant. Finally the participants discussed keeping in touch with "home" countries; participants found and shared information in variety of ways but within the context of these groups this seemed unproblematic.

The observation took place in an ESOL class where a print-making activity was taking place. A narrative account was written after the observation and this was used as the basis for analysis. The researcher occupied an ambiguous role: she was welcomed as an invited guest but also performed as a quasi-teacher. The findings from the observation were very limited but showed the complexity of the ESOL classroom; it was not just a site of cognitive learning but a place of intimate relationships where the visual, tactile and affective were important.

## 4 Discussion and Conclusion

In practical terms, the pilot showed that learners with pre-intermediate English or above could, with appropriate support, meaningfully discuss their information experiences, and that observation and focus groups were potentially useful methods. However it also demonstrated that more sustained research relationships would be needed. In the focus groups there was little discussion of the participants' information literacy as opposed to their information experiences. Information literacy was a new concept for all the participants and a single encounter did not enable the participants to engage with the concept in a meaningful manner. The participants were well disposed to the researcher as an individual but did not show a significant level of engagement with the research. Substantial efforts will need to be made during the main period of data collection if the participants are to become co-researchers in any meaningful sense [12]. The complexity of the role of the researcher was clearly shown in the pilot. There were important differences between her and the participants in terms of ethnicity, religion, citizenship and linguistic capital. This can be seen in terms of the challenges of outsider research, however, as Bridges [20] suggests, this is not always a helpful distinction as both researcher and participants have a multitude of selves. Finally the pilot problematised the proposed method of analysis and particularly exposed the power relationships inherent in research; during the data collection the researcher was a guest, but when alone with the collected data there was a significant shift in power [10]. It is anticipated that the richer, fuller data collected during the case study will in part redress this balance [11]. Nevertheless the researcher is keen to consider the process of knowledge creation more closely and explore how and whether this can be participatory.

The lessons from the pilot have then informed the next stage of the research in terms of suggesting further reading but more significantly in encouraging further consideration of how to manage the researcher's relationship with participants in the field but also in design, analysis and writing of the research.

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## References


1. Patterson, D.J.: Becoming Researchers: Community College ESL Students, Information Literacy, and the Library. Ph.D. thesis, University of California, Berkeley, California (2011)
2. Johnston, N., Partridge, H., Hughes, H., Mitchell, E.: Understanding the information literacy experiences of EFL students. Ref. Serv. Rev. **42**(4), 552–568 (2014)
3. Lloyd, A., Kennan, M.A., Thompson, K.M., Qayum, A.: Connecting with new information landscapes: information literacy practices of refugees. J. Documentation **69**(1), 121–144 (2013)
4. Aarnitaival, S.: Becoming a Citizen—becoming information-literate? Immigrants' experiences of information literacy learning situations in Finland. In: Lloyd, A., Talja, S. (eds.) Practising Information Literacy. Bringing Theories of Learning, Practice and Information Literacy Together, pp. 301–329. CIS, Wagga Wagga (2010)
5. Caidi, N., Allard, D., Quirke, L.: Information practices of immigrants. Annu. Rev. Inf. Sci. Technol. **44**(1), 491–531 (2010)
6. Ward, J.: ESOL: The Context and Issues. NIACE, Leicester (2008)
7. Dudeney, G., Hockly, N., Pegrum, M.: Digital Literacies: Research and Resources in Language Teaching. Pearson, Harlow (2013)
8. Rosenberg, S.K.: A Critical History of ESOL in the UK, 1870–2006. NIACE, Leicester (2007)
9. Cooke, M., Simpson, J.: ESOL: A Critical Guide. Oxford University Press, Oxford (2008)
10. Mauthner, N.S., Doucet, A.: Reflexive accounts and accounts of reflexivity in qualitative data analysis. Sociology **37**(3), 413–431 (2003)
11. Charmaz, K.: Constructing Grounded Theory: A Practical Guide Through Qualitative Analysis. Sage, London (2006)
12. Heron, J., Reason, P.: A participatory inquiry paradigm. Qual. Inq. **3**(3), 274–294 (1997)
13. McIntosh, P.: White privilege: unpacking the invisible knapsack. Peace Freedom Mag., 10–12 (1989)
14. McNamee, M., Bridges, D. (eds.): The Ethics of Educational Research. Wiley-Blackwell, Oxford (2002)
15. Baynham, M., Roberts, C., Cooke, M., Simpson, J., Ananiadou, K., Callaghan, J., Wallace, C.: Effective Teaching and Learning: ESOL. National Research and Development Centre for Adult Literacy and Numeracy, London (2007)
16. Eckerdal, J.R.: Empowering interviews: narrative interviews in the study of information literacy in everyday life settings. Inf. Res. **8**(3) (2013). http://www.informationr.net/ir/18-3/colis/paperC10.html#.VQWg6Mtq1pQ
17. Julien, H., Given, L.M., Opryshko, A.: Photovoice: a promising method for studies of individuals' information practices. Libr. Inf. Sci. Res. **35**(4), 257–263 (2013)
18. Smith, M.: Young People: A Phenomenographic Investigation into the Ways They Experience Information. University of Loughborough, Loughborough (2010)
19. Wang, C., Burris, M.A.: Photovoice: concept, methodology, and use for participatory needs assessment. Health Educ. Behav. **24**(3), 369–387 (1997)
20. Holstein, J., Gubrium, J.: The Active Interview. Sage, London (1995)
21. Barbour, R.: Doing Focus Groups. Sage, London (2007)
22. Bassey, M.: Case Study Research in Educational Settings. Open University Press, Maidenhead (1999)
23. Angrosino, M.: Doing Ethnographic and Observational Research. Sage, London (2007)
24. Crang, M.: Doing Ethnographies. Sage, London (2007)

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