

Student experience of digital learning tools: information literacy training in higher education

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Abstract

Introduction. *The paper presents a qualitative study of how students in higher education experience the use of digital learning objects as part of information literacy training.*

Methods. *The study is inspired by the phenomenographical method and take a second-order perspective asking how students experience information literacy training and digital learning tools. The study builds on seven focus-group interviews with a total of 29 students from law, engineering, and nursing.*

Analysis. *The first part of the analysis presents results on students' experience of the digital learning tools across the cases with focus on student motivation. The second part of the analysis focuses on the roles of the different actors in information literacy building. The analysis illustrates how the use of digital learning tools and face-to-face information literacy training is deeply related to the roles of the different actors taking part in the information literacy practice. The academic librarian is almost invisible to the students in two of the three cases, but student interaction with the digital learning tools promote visibility.*

Conclusions. *The findings confirm related research on the importance of integrating information literacy training into curriculum and nuances our understanding of how students experience information literacy training and digital learning tools.*

Keywords: *information literacy, information seeking, higher education, academic libraries*

Introduction

Academic libraries have a long tradition of providing information literacy training and their central role in promoting information literacy is generally acknowledged (Cox and Corral, 2013; Julien and Genuis, 2011; Virkus, 2003). Cox and Corral (2013) point to how academic librarians' role has expanded and developed significantly from focusing on formal instruction of students learning 'library skills' to encompassing broader conceptions of information literacy education. Consequently, many academic libraries are continuously developing teaching activities and (digital) learning tools aiming to support students' information literacy competences.

The emphasis on information literacy in academic libraries reflects in the research literature discussing a variety of initiatives on supporting students in building information literacy competences as part of their academic training (see for example literature reviews by Tewell, 2015; Virkus, 2003). Despite the long tradition, the research literature also shows how information literacy training in higher education is still being widely discussed and challenges persist. Among other, core challenges remain related to how to promote student motivation and active learning (Khailova, 2017; Loo et al., 2016; Shenton and Fitzgibbons, 2010, 2010; Stiwinter, 2013) and how to promote integration of information literacy training into curriculum activities (Junisbai et al., 2016; Mounce, 2010; Virkus, 2003).

Building on a long tradition on addressing the student user experience in information literacy research (Bruce, 2008; Buchanan et al., 2016; Kuhlthau, 1991), the present article presents a qualitative study of how Danish students in higher education experience the use of digital learning objects as part of information literacy training. The study exemplifies an ongoing trend in using digital learning tools (such as online tutorials, videos, e-tivities, quizzes etc.), as building blocks in developing flexible and engaging information literacy training. The aim of the study is to provide insights and knowledge about how different digital learning tools promote student motivation and active learning and what challenges remain. The following research question guided the study: How do students experience the use of digital learning tools developed to support information literacy training?

Related work

This related research section first introduces the concept of information literacy and how the concept is approached in context of the present study. Based on two main motivations behind the study, the following sub-sections present prior research on students' use of digital learning products for information literacy training and related research on the importance of integrating information literacy training in educational context.

The concept of information literacy

The concept of information literacy is central within higher education and academic libraries. At the same time, it is a much-debated concept, which has been defined and approached in numerous ways (Bawden, 2008; Owusu-Ansah, 2003; Sample, 2020; Tewell, 2015) and is closely related to concepts such as digital literacy and technology literacy. Broadly defined information literacy can denote '*the set of skills and knowledge that allows us to find, evaluate, and use the information we need, as well as to filter out the information we don't need*' (Eisenberg, 2008, p. 39), and particularly in higher education, information literacy is considered critical for students to succeed with their education (Mokhtar et al., 2008; Saunders, 2018). In a wider scope, the importance of information literacy for democratic participation, economic development, and lifelong learning is acknowledged (Julien and Genuis, 2011).

Researchers have presented different approaches to information literacy. Early research on information literacy focused mainly on content and technology (Buchanan et al., 2016). The so-called skills-based or behavioural approach to information literacy has often been criticised for its focus on teaching a list of generic skills applied in a linear and discrete set of steps and independently of the relevant knowledge domains (Sample, 2020; Sundin, 2008; Tewell, 2015; Tuominen et al., 2005). Later

research has shifted focus to understanding the human perspective of interacting with information including prominent examples focusing on the student user experience (Kuhlthau, 1991) or the relationship between information use and the learning experience (Bruce, 2008). Much of the recent information literacy literature argues for using a sociocultural approach seeing information literacy as a situated and distributed activity, learned in specific contexts, through practical activity and as part of social practices (see e.g., Buchanan et al., 2016; Diekema et al., 2011; Tuominen et al., 2005). While it is outside the scope of this article to discuss the different approaches in depth, they are highlighted here because they are considered useful lenses for studying information literacy practices including ways of teaching and designing digital tools.

The aim of the present study is to provide insights and knowledge about how students experience the use of digital learning tools and how they support information literacy building. The perspective is therefore on the individual students and how they ascribe different meanings to the information literacy training. The approach is inspired by the phenomenographic method which will be elaborated in the methodology section. Even though focus is on the individual student experience, the study approach information literacy as a situated and social practice which is also reflected in the empirical data and analysis.

Students' use of digital tools in context of information literacy

Information and communication technology is widely used by academic libraries to communicate knowledge about how information can be sought, evaluated, and used in various educational practices, and literature on the topic includes numerous case studies describing design and evaluation of online information literacy tools or programs. Main motivations for developing digital learning tools to promote information literacy competences include the potential of reaching more students online and providing flexibility to students about where and when they prefer to study (Saunders, 2018; Stiwinter, 2013).

The three cases on information literacy training included in the present study apply a combination of online and face-to-face communication in different blended formats (further described in the methodology section). Accordingly it is interesting, that a recent literature review of information literacy programs comparing student preferences towards delivery methods (face-to-face, online or blended) found that in 14 studies (of the 19 studies included in the review) students expressed '*no preference at all in relation to format*' (Weightman et al., 2017, p. 46). In the remaining studies, two studies found that the online course was favoured in terms of perceived benefits and attitudes towards the course. On the other hand, three studies preference face-to-face delivery in terms of greater confidence following training or a higher satisfaction in general (Weightman et al., 2017). The high number of studies pointing to no student preferences towards format and delivery method is surprising, and this study can contribute with qualitative insights on students' experiences and preferences.

Integration of information literacy training in educational context

Strengthening the collaboration between library and faculty staff was a main motivation behind the development of two of the digital learning concepts in the present study. According to Mounce (2010), the library literature is filled with examples of faculty-librarian collaboration on information literacy teaching. Even though there has been some discussions into the questions of whether information literacy should be taught as a stand-alone topic or integrated into the curriculum, the majority favour the curriculum integration model (Junisbai et al., 2016; Kim and Shumaker, 2015; Mounce, 2010; Virkus, 2003). The main argument is that integrated information literacy training helps students situate information seeking and use in a subject disciplinary context. Integration of information literacy training into the curriculum can take many different forms as for example embedded librarian, creation of shared learning outcomes and course-integrated instruction. While it is difficult to compare results

across the scattered case-studies in the area, several studies show positive evaluations of embedding information literacy into the curriculum program. These studies take a primarily quantitative and summative approach to evaluation, e.g., by rubric-based assessment of student research essays or assignments (Douglas and Rabinowitz, 2016; Junisbai et al., 2016), correlation between student assignment grades and self-assessment of information literacy skills (Kim and Shumaker, 2015), or assessment of student success measures (Burgoyne and Chuppa-Cornell, 2015). However, qualitative studies of the student experience of participating in an integrated information literacy training building on collaboration between library and faculty staff are missing. Other studies have focused on investigating the possibilities and challenges experienced by librarians and faculty engaged in collaboration. An often mentioned challenge is that even though faculty agree on the importance of information literacy then collaboration and integration into curriculum structures meet resistance from faculty (Junisbai et al., 2016; e.g., Moran, 2019; Mounce, 2010). These challenges highlight the importance of uncovering the student experience of the different approaches to integrating information literacy in subject disciplinary contexts.

Methodology

Research context and participants

The context of the present study is an information literacy project carried out in nine Danish academic libraries across research fields. The aim of the project was to develop the participating libraries' information literacy teaching and as part of the project, participating staff took part in a competence development course on practicing e-learning (Harbo and Jensen, 2016). Further, as mentioned earlier a main motivation behind the project was to strengthen the collaboration between library and faculty staff. The project outcome was the development and implementation of digital learning tools on information literacy, and the project outcome was evaluated applying a mix of quantitative and qualitative methods. The present article builds on qualitative data from focus-group interviews with students from three of the nine cases. A total of 29 students from three different higher educations participated in seven focus-group interviews. Table 1 provides an overview of the focus-group participants and cases.

The digital tools developed as part of the project were tailored towards the individual library's context and the following three concepts are discussed in the focus-group interviews with students and are accordingly relevant in this context:

- **Case 1: Flipped classroom using videos as preparatory material**
As part of this project, several videos were produced and applying a flipped class-room approach, seven of these videos were preparatory material for a 2-days credit-bearing course on academic information seeking (topics include search, copyright, plagiarism, reference management etc.). In-between and after the face-to-face instruction, students did compulsory written assignments related to their subject.
- **Case 2: Collaboration between library and faculty – lecturers as co-producers of videos**
In this project five videos were developed in collaboration between library staff and staff at the law department. The videos were aimed at first year law students as part of a module on administrative law. Librarians presented about document types and search (three videos) and a professor in dialogue with a student explained how to read and understand legal cases (two videos). The videos were made available on the local learning management system together with text-based tutorials. In addition, first year students attended a two-hour face-to-face library introduction.
- **Case 3: Integration of information literacy training in nursing education**
This project revolves around continuous integration of information literacy activities throughout 3,5 years of an online nursing education – in close collaboration with lecturers. Important information literacy elements are e-tivities, online teaching and feedback from librarians, text and video tutorials. E-tivities are online activities designed to support active learning (Salmon, 2013).

Table 1. Overview of participating students in the seven focus-group interviews and brief description of information literacy concepts. *The 15 engineering students cover different subject areas including civil engineering, architectural engineering, mechanical engineering, human life science engineering, materials and manufacturing engineering etc.

Case	Subject area	Focus group participants	Participants	Brief description of learning concept including digital learning tools and information literacy training
1	Engineering*	Graduate (11) and undergraduate (4)	15	Flipped-classroom approach using 9 videos of 5-10 minutes as preparatory materials for a 2-day credit bearing information literacy course.
2	Law	Undergraduate, 2nd semester	7	Collaboration between library and faculty. Production of online and video tutorials. Lecturers as co-producers of video tutorials.
3	Nursing	Undergraduate, 5th semester	7	Integration of information literacy in curriculum in a distance education e-learning program. Including e-tivities, online teaching, embedded librarian, text, and video tutorials

Data collection and analysis

The digital learning products developed by the three academic libraries illustrate a diversity in the cases' approaches to enhance students' information literacy and integrate activities into curriculum. The aim of the study is to not to formally assess the level of learning outcome. Instead, the study aims to provide insights and knowledge about the student user experience of using digital information literacy tools. It is an empirical inquiry into a phenomenon within its real-life context, where the boundaries between the phenomenon and context, as is the case of information literacy from a student perspective, are not evident. The methodological approach is inspired by the phenomenographic method traditionally applied by educational researchers concerned with the experience of learning in different contexts (Yates et al., 2012). But the methodology has also been used in context of information literacy studying the relationship between information use and the learning experience (Buchanan et al., 2016). The present study is inspired by the phenomenographic method taking a second-order perspective asking how students experience information literacy training and digital learning tools. That is, phenomena are investigated through the experience of the participants rather than of the researcher (Marton and Pong, 2005). The perspective is therefore on the individual students and how they ascribe different meanings to the information literacy training. The interviews were carried out as group interviews (Bryman, 2016) to prompt participating students to articulate and reflect on how they experience interacting with the digital learning tools and the training. A semi structured interview guide was developed to structure the interviews. Apart from demographical questions, the interview guide also included questions related to the students' use of and interaction with the digital learning tools along with how the tools were used in learning tasks such as project work or writing assignments etc. Inspired by a phenomenographical approach, questions were formulated to prompt the participating students to describe and give examples of how they use information in academic tasks, and they experience the digital learning tools. For instance:

- How do you seek and use information as part of project work?
- How did you experience the videos about academic search and information literacy?
- Describe how you assess the quality and relevance of a source/document

The focus group method provided insights into a range of experiences and opinions among the participants and thus illustrated the variation in students' way of experiencing digital learning tools.

Participants were recruited by the staff at each of the three libraries and the focus-group interviews were conducted in Danish by the authors and audio recorded. Students received a symbolic gift for their participation. The data were subsequently analysed using a combination of discussion summaries

written by the authors immediately after the interviews and thematic content analysis of the transcripts using Nvivo.

Limitations of the study

The present article focuses on how students across three different academic disciplines experience specific digital learning tools developed as part of a larger competence development project with nine academic libraries. It is outside the scope of this article to describe and discuss the different teaching practices and pedagogical approaches taken by the participating libraries. However, a deeper understanding of the specific teaching practices and how teaching practices are reflected in the developed learning tools could have provided deeper insights. Further, the interviews conducted as part of the study did not include questions about how students across different disciplines define information literacy and how they would prefer to learn about it. From a student-centred approach this could be relevant to include in future studies.

Students' experience of information literacy training and digital learning tools

The analysis consists of two parts. The first part presents results on students' experience of the digital learning tools across the three cases with focus on student motivation. The second part of the analysis focuses on the roles of the different actors in information literacy building.

Integration of information literacy training into curriculum activities sparks motivation

From a student perspective this section illustrates how student motivation is highly related to the degree of integration of information literacy training into curriculum activities. In both cases 1 and 2 several short videos on information literacy topics are made available for students to be used together with online text tutorials and face-to-face instructions. Most of the engineering students (13 out of 15) in case 3 signed up for the two-day stand-alone course in academic information seeking as preparation for writing either their master thesis or final paper in their bachelor's degree program. The engineering students participated in the course with different degrees of confidence in their own abilities to effectively seek and use academic information. Some reflected a high degree of self-confidence and explained that they found it easy to find relevant literature within their field of research. While a few experienced that they lacked basic competences: *'I never really knew how to use [the library catalogue]. I tried to use it, but it did not really work out for me... Instead, I googled some stuff, talked to my supervisor, or used my textbooks'* (engineering student 6).

In the same way, students' motivation for interacting with the videos as preparation for the course differ. One third of the students had watched the videos as course preparation and found them relevant and useful, and the length of the videos appropriate. Another third of the students had only watched few videos and then stopped because they experienced the videos as too long, boring, too basic or overlapping with course content: *'They [the videos] were not really exciting and then I lost concentration. They were too long'* (engineering student 12) and *'They mainly present common knowledge somehow'* (engineering student 13). The assignments in-between course day 1 and 2 did not stimulate student interest, except one exercise which several students highlighted because they could target it towards a specific topic of interest: *'...because you can choose your own topic for the literature search, and then it suddenly becomes relevant and you do something that you actually find interesting'* (engineering student 3) and *'I think, I will do more work on this assignment, because I know that I need the result'* (engineering student 8).

In contrast to the engineering students in case 1, all the law students participating in the focus-group interviews in case 2 were familiar with all five videos. The videos had been recommended by instructors and a professor which clearly motivated the students to use the videos. Especially the two videos with lecturers as co-producers on how to read legal cases were pointed to as relevant and helpful both during the semester and when preparing for exams. In addition, the communication form in the videos with lecturers as co-producers was also pointed to:

'I watched it again because I feel the videos were sort of pedagogical because they talked you through the subject instead of just handing out a piece of paper. It's more personal, and you feel...well, when you start at the university you fear that no one has your back if you overlook something...' (law student 1).

The videos by librarians introducing relevant sources in legal information seeking were used by the students in combination with text tutorials, as the two delivery methods support different study tasks, and the text tutorials were searchable and used to re-find information. Case 2 with the law students also illustrates the importance of critical timing when introducing digital learning objects as several students discussed how the videos were made available too late in the semester which created some confusion:

'It just seemed a little out of place all of a sudden...Well, we were already reading legal cases so we had figured out how to do it when these videos suddenly came out and they did not relate to the topic we worked on' (law student 3).

Case 3 with the distance education nursing students exemplifies a program where information literacy training is highly integrated in curriculum activities. The focus-group interviews with the nursing students focus on the e-tivities as they are the central digital learning tool in the program, and the participating students had just handed in an e-tivity assignment. The participating nursing students are in the fifth semester, and the interviews reflect how they have developed a broad set of information literacy competences in the continuous work with e-tivities. During the focus-group interviews the nursing students used precise terminology to explain about medical databases, the search process, peer-review etc. The e-tivities are mandatory assignments but nevertheless the nursing students are motivated because the information literacy tasks are integrated into disciplinary contexts: *'We must include a section on the literature search process in the assignment we are working on so we use what she [the embedded librarian] has taught us'* (nursing student 6) and *'yes, because I needed to find more articles to be able to continue with my assignment...'* (nursing student 4). As in case two the nursing students also become frustrated and less motivated if the information literacy activities are not scheduled to support the overall assignments and/or learning objectives. This illustrates the importance of building alignment between information literacy training and curriculum structures to support students' construction of learning through relevant activities.

Across the three cases students' personal preferences towards delivery format and media type (video, text, face-to-face, online etc.) vary greatly:

- *'I do assignments – that is how I learn'*
- *'I prefer to talk to a librarian instead of watching a video'*
- *'I used the videos as preparation for the information literacy class'*
- *'I downloaded the text tutorial to Dropbox and check the document if I'm in doubt'*
- *'In the beginning of my study I always used the database tutorials'*
- Etc.

From the interviews we learned that preferences towards delivery format and media both relate to personal preferences but equally to timing and context. That is, depending on the learning task at hand (course preparation, writing assignments, studying for exam etc.) the students' preferences varied. This emphasizes the importance of a close contact between academic librarians and the coordinating lecturers to ensure the relevance and timing of the information literacy initiatives. It further emphasizes that information literacy should be supported by (digital) learning tools in different formats and with flexible timing to match student diversity in relation to preferences and learning styles.

Actors in information literacy building

Academic libraries have traditionally played an important role in information literacy training in higher education. The analysis of the focus-group interviews shows, however, that both the

engineering and the law students primarily see the university library as a place to study. Only two of the engineering students have previously been in contact with a librarian during their study. In line with earlier research (Douglas and Rabinowitz, 2016) this illustrates uneven access to information literacy instruction: *'I've never heard of this course until my supervisor told me about it. And I've talked to a lot of people in my class who have never heard of this course either...'* (engineering student 6). But meeting the librarians face-to-face during an information literacy course can motivate students to ask librarians for help:

'I might... Or I will reach out to a librarian after this course and ask for help. I knew it was a possibility before, but I don't think I would have reached out. But I think it will save me time' (engineering student 10).

Just meeting a librarian via video tutorials can build a connection:

'I know that you don't have to know people [librarians] personally, but you still get sort of a different relationship to people and feel a little more confident. I have used the library reading room a lot, and I actually started after we got access to the videos, because you kind of felt like you belonged...' (law student 2).

In contrast, the interviews illustrate how the nursing students are highly familiar with the embedded librarian in their study program and asking for help is integrated in their study routines:

'You ask a librarian... It's usually [first name of the librarian]... She also helps you if you are stuck in your search process. When I did the module 7 assignment, I had a search problem. Then you can just send her an email, and you can either go to the library or book an online meeting' (nursing student 1).

Across the three cases, the lecturer/professor clearly has an important role and impact in relation to choosing relevant literature and databases. The first-year law students explain how they often ask their instructors questions about curriculum and call one of their professors, the queen: *'She's our professor and her words are law... We must stick to the curriculum'* (law student 4). Similarly, one of the nursing students explains how they have been introduced to several medical databases by the librarian: *'But I think, we will always use Cinahl because most lecturers prefer this database'* (nursing student 3). These examples reflect how students emphasize and rely on input from lecturers. Especially the engineering students preparing for writing their master thesis explain how they ask lecturers for suggestions and advice. However, other examples from the interviews also illustrate the iterative nature of academic work and how students confidently navigate between the different actors in the process. For example, one of the nursing students explains the process of narrowing in an assignment topic and formulating a research question, and how this process relates to searching for information to inform the learning process with guidance from the embedded librarian. Similarly, an engineering student explains why he will contact a librarian: *'Supervisors don't have time to help with literature search and you feel stupid if you ask. Therefore, it is helpful to already have started before you ask your supervisor'* (engineering student 13).

Finally, several students from all three cases mention how co-students are important actors in relation to information literacy training and how they most often rely on co-students for help and advice. This aspect is not further elaborated in the present article.

Taking a student perspective illustrates how the use of digital learning tools and face-to-face information literacy training is deeply related to the roles of the different actors taking part in the information literacy practice. Further, the role of the academic librarian is almost invisible to the students in two of the three cases, but student interaction with digital learning tools promote visibility and is generally experienced as both relevant and useful by the students.

Discussion and conclusion

This study addresses two core and interrelated challenges regarding student motivation and integration of information literacy training into subject disciplinary contexts. Overall, the findings from this qualitative study confirm related research on the importance of integrating information literacy into curriculum (Diekema et al., 2011; Junisbai et al., 2016) and nuances our understanding of how students' experience information literacy training and digital learning tools. Across the three cases, students are difficult to motivate when predominantly skills-based approaches and generic tasks are presented as part of mandatory information literacy programs. Students easily experience frustration in these situations or do not complete a task because they experience long or boring videos, the assignments as irrelevant or out of context or similar. In contrast, the focus-group interviews also illustrate how students' motivation to engage in information literacy training is related to whether they experience the learning activities as relevant and important to their academic tasks, development, and performance. Here the three cases show how integration of information literacy training into curriculum activities can effectively take different forms as for example shared learning goals, lectures as co-producers of (digital) learning tools, embedded librarians and integrating information literacy skills building into subject assignments.

Looking forward, the results of the study have implications for future design of digital learning tools in context of information literacy training. Firstly, as already mentioned, insights from a student perspective clearly illustrate the advantages of some degree of integration into curriculum activities instead of stand-alone trainings. Secondly, integration should allow for a high degree of flexibility and support optimal planning and alignment of the activities. Thirdly, the qualitative data nuance our understanding and illustrate that students have (strong) personal preferences towards delivery format and media type. This is in contrast with Weightman et al. (2017) findings and point to the importance of flexibility and variety in future designs of digital learning tools.

Overall, the results of the empirical study illustrate the difficulties students' encounter in a skills-based approach to information literacy training. The results of the study support the idea of moving away from a focus on skills to a broader focus on information use in the construction of knowledge (Diekema et al., 2011). Seeing information literacy as a practice that occurs inside other academic practices (Lloyd, 2010) also brings forward how information literacy building is deeply related to the roles of different actors.

As a concluding remark we agree with Shenton and Fitzgibbons (2010) that one size does not fit all in context of information literacy training and accordingly information literacy should be approached from the student experience of complex and situated learning activities.

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