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# Embedded librarianship and digital literacy instruction in academic libraries

## A case-based study of the Copenhagen University Library

### Abstract

*Academic libraries have undertaken an important role in facilitating students' acquisition of digital literacy knowledge and skills, preparing students to navigate an increasingly complex information society. One approach to this is through embedded librarianship, which focuses on placing librarians in user contexts. This article presents the results of a case study on digital literacy instruction at the Copenhagen University Library. It examines library instructors' practice when teaching digital literacy courses, and to what degree this instruction takes the variety of students' different disciplinary backgrounds into account. This case study is comprised of four library courses, using both observational studies of these courses and interviews with the library instructors responsible.*

*In the article we adopt a sociocultural approach to digital literacy, seeing it as highly context-dependent, and we argue that library instructors should situate the acquisition of digital literacy knowledge and skills in students' specific disciplinary context. We find that digital literacy instruction at Copenhagen University library is mostly situated in a general academic library context and seldom focuses on students' actual disciplinary context. We term this approach to embedded librarianship, where students have increased access to library expertise and resources, but their disciplinary perspective is not prioritized, "practical embeddedness". Our findings suggest that academic libraries would benefit from pursuing an alternative approach, here termed "epistemological embeddedness", which prioritizes discipline-specific knowledge and approaches. This greater emphasis on epistemological embeddedness could ensure that students learn digital literacy approaches that can help them navigate the information-rich contexts they meet beyond their academic tenure.*

**Keywords:** academic libraries, embedded librarianship, digital literacy instruction, sociocultural learning, case studies

## Introduction

Academic libraries have pushed to expand students' digital literacy in many different contexts. This illustrates the importance of digital literacy education and shows that academic libraries stand at the forefront of developments in this field. For example, in the United States – where the news media and online political dialogue has recently largely been characterized by misinformation and polarization – academic libraries are uniquely situated to provide students guidance and education on fact checking (Addy, 2020). Likewise, academic libraries strive to keep up with the influx of new technology, e.g. by situating the role of artificial intelligence within academic contexts (Gasparini & Kautonen, 2022). These issues showcase the need to strengthen students' competencies in navigating increasingly complex information landscapes, and that academic libraries play a key role in this by facilitating students' acquisition of digital literacy knowledge and skills.

One way that academic libraries strengthen students' digital literacy is through embedded digital literacy instruction (Abrizah et al., 2016; Kesselman & Watstein, 2009). This term describes instruction provided by librarians as part of students' existing courses. This approach brings librarian expertise outside of the library itself, meeting students where they already are. However, in practice, embedded instruction is challenged by how contextual and disciplinary differences vary noticeably between learners from different contexts. Pieta Eklund (2022) found that disciplinary differences between researchers from different scientific fields manifested in different needs for library services. For instance, science, technology and medical researchers more frequently requested assistance with systematic information searching, which librarians attributed to the nature of these researchers' work, such as clinical trials requiring systematic searches. Although researchers' work is different from that of students, this example shows how disciplinary differences may result in different information needs. This is a challenge for university libraries who cater to students from a wide array of disciplinary backgrounds.

In the present study such contextual and disciplinary aspects of digital literacy are addressed through the lens of sociocultural approaches to learning (Haider & Sundin, 2019; Hicks et al., 2024; Lloyd & Talja, 2010; Säljö, 2003). There is a wide array of research investigating the role of university libraries in information and digital literacy education (Bønløkke et al., 2016; Breen et al., 2023; Goforth et al., 2018; Johnston, 2020; Spante et al., 2018). Notably, Li Wang examined how sociocultural learning techniques can be applied to a library context (Wang, 2007). Still, there is a lack of focus in the manner in which sociocultural learning approaches are currently applied in libraries' digital literacy instruction. Additionally, and as this article will later outline in more detail, existing embedded librarianship approaches to information literacy instruction fail to account for this plurality of contextually situated information literacies (Abrizah et al., 2016; Bonanni & Vogus, 2022; Dewey, 2004). Therefore, the aim of this article is to investigate how library instructors practice embedded librarianship when teaching digital literacy courses, and to examine to what extent this instruction takes the variety of students' different disciplinary backgrounds into account.

As part of the University of Copenhagen's (UCPH) Strategy 2030, a project on digitalization of degree programs was formulated. The purpose of the project is to ensure that all students develop basic digital skills in the form of familiarity with digital methods and tools of relevance to their studies, and that they are "able of reflect on the meaning and consequences of digitalization in relation to

themselves and society”.<sup>1</sup> As part of the project, a “UCPH model for students’ digital literacy and skills” was developed. The model is comprised of five “petals”, each signifying a key topic, which together outline what basic digital skills and digital literacy UCPH students should develop while working towards their bachelor’s degree.<sup>2</sup>

The Copenhagen University Library is given a key role within this model, and in its newest four-year strategy plan, “Strategy 2027”, the library claims to be “a central part of the university’s model for digital literacy” (Copenhagen University Library, n.a.). Notably, the library contributed to the model by developing e-learning content which university educators can apply in their courses. However, the Copenhagen University Library also provides a wide array of courses addressing various facets of digital literacy. These courses clearly align with the university strategy’s ambitions, though the courses offered predate the existence of the UCPH model.

This illustrates how academic libraries can position themselves as having expertise in digital literacy and aim to occupy an important role in student digital literacy education. When universities draw on librarians in strategies like the UCPH model, it is crucial to consider how libraries best educate students in digital literacy. One way to do so is to investigate how libraries, such as Copenhagen University Library, approach digital literacy education.

Much of the existing literature on academic libraries’ digital literacy education applies a case-based approach, showing how digital literacy theories and frameworks are applied in practice. This article furthers this research tradition by exploring the use of embedded librarianship, and the term itself, through the Copenhagen University Library as a case. Furthermore, it employs a qualitative methodology to pursue nuances that may otherwise be ignored in this research field, which is often dominated by quantitative studies (Hicks et al., 2024). The case study shows how university libraries can contribute to universities’ digital literacy strategies, like the UCPH model, to strengthen students’ ability to navigate today’s information-rich society.

The paper has the following structure. First, it outlines how existing literature has examined the term embedded librarianship in the context of digital literacy instruction and applies a sociocultural approach to information literacy to nuance the concept of embedded librarianship. Then an overview of the methodological considerations behind this case study is provided. This includes an outline of the observational study and interviews conducted, as well as details about the four selected courses which constitute empirical units. Thereafter, the analysis presents how the selected courses situate digital literacy instruction in different contexts. The discussion section compares the results of the analysis, showing how the observed courses mostly focus on a general academic context, despite some courses practicing embedded librarianship. The conclusion suggests possible reasons for these results and explores the consequences of not situating learning in students’ disciplinary context.

### **A sociocultural approach to embedded librarianship and digital literacy instruction**

This section builds on a review of key literature on embedded librarianship (Dewey, 2004; Drewes & Hoffman, 2010; Kesselman & Watstein, 2009; Luca, 2019), including existing literature reviews examining the research landscape addressing the term (Abrizah et al., 2016; Bonanni & Vogus, 2022; Schulte, 2012; Vassilakaki & Moniarou-Papaconstantinou, 2015). This literature review reveals that, within higher education contexts, the term “embedded librarianship” (EL) primarily implies a focus on university librarians’ physical presence in non-library contexts. The literature emphasizes how EL

<sup>1</sup> Quote from an internal UCPH strategy document.

<sup>2</sup> The model’s five focus points are: 1) Data management, 2) Digital analysis and methodology, 3) Digital reflection, 4) Technological understanding, and 5) Digital scientific information search.

improves user access to library resources and expertise for researchers, educators and students alike. Additionally, this literature often focuses on strengthening relations between embedded librarians and users and, as Luca (2019) states, embedded librarianship should be seen as user-centered rather than library-centered. The review of literature also suggests that EL activities can be divided into three general categories: 1) EL in teaching contexts and information literacy instruction, 2) EL in research and 3) embeddedness in digital spaces. Though the examined literature sometimes refers to a need for domain specific knowledge for librarians embedded in research contexts (Abrizah et al., 2016; Dewey, 2004), this focus is not applied in the literature discussing embedded librarians in teaching contexts.

The term embedded librarianship was first inspired by embedded journalists in the Iraq war and described an ambition of becoming fully integrated into the daily life of a target user group (Dewey, 2004). This term grew out of the concept of branch libraries, which had a focus on domain-specific library resources, in contrast to the modern academic library's focus on library services and instruction (Dewes & Hoffman, 2010). However, while the branch library is described as situated in a particular disciplinary context, the description of methods and characteristics of embedded librarianship largely ignores the relevance of domain knowledge.

One of the primary ways in which academic librarians are "embedded" is through course-integrated library instruction, where university educators actively include the librarian in a course, or where librarians actively take part in course design (Kesselman & Watstein, 2009). Literature suggests that librarians are uniquely equipped to teach digital literacy and embedding them in student courses is an effective way to meet students where they are (Abrizah et al., 2016). In this way, course-integrated library instruction is a natural extension of embedded librarianship to improve student access to library resources and expertise.

We will describe this focus on increased access as "practical embeddedness". Practical embeddedness has the benefits of enabling closer, more effective lines of communication with professors and university staff and providing greater knowledge of user needs. For example, a practically embedded librarian will understand what digital literacy topics are most relevant at any given point in students' education and will be able to effectively coordinate and schedule course-embedded instruction with professors.

Other terms, like "library liaisons" (Dewey, 2004), "subject librarians" (Abrizah et al., 2016), or "branch-" and "clinical librarians" (Dewes & Hoffman, 2010) show an increased focus on domain knowledge and subject-specific services. However, within the examined literature, these terms were not applied in studies on instruction of students, which favored the description of "practical embeddedness" outlined above.

The benefits of practical embeddedness outlined above do not describe how the embedded librarian should navigate in the "foreign territory" in which they find themselves. This article tries to address this gap in the literature, and will argue that, from a sociocultural perspective, the librarian will have to relate their instruction to the specific disciplinary context that will be relevant to students. This generally means embedding their instruction within the disciplinary contexts relevant to various groups of students. In contrast to the practical embeddedness outlined above, we will conceptualize this form of EL in digital literacy instruction as "epistemological embeddedness".

The idea of epistemological embeddedness is grounded in the sociocultural approach to learning. It emphasizes the existence of a plurality of digital literacies, each of which are situated within a particular context. This understanding suggests that what it means to be digitally literate must be

highly dynamic, depending on the social context in which it is situated (Talja & Lloyd, 2010; Tuominen et al., 2005; Wang et al., 2011). Education researcher Lasse Lipponen uses an example of information literacy within a hospital setting to explain how literacies are contextually situated. He explains that someone who may otherwise describe themselves as informationally literate, for example having a good understanding of basic information competencies or an expanded information-seeking skill set, would not necessarily be able to correctly utilize the hospital's digital technologies to note patient symptoms or communicate with medically trained colleagues (Lipponen, 2010). Just because an embedded librarian is an information specialist does not mean that their information practices are relevant to any given situation. Thus, digital or information literacy instruction is not universal and must be related to a particular practice.

This article uses Lloyd's theory of information literacy landscapes as an analytical lens, as it represents a sociocultural approach to information literacy and information literacy instruction in higher education (Lloyd, 2010, p. 152). Lloyd describes how actors within a context intersubjectively co-construct the way in which information is understood and used in that particular context. Information literacy is understood as the ability to construct and navigate an information landscape. The theory furthermore expands on an understanding of literacy as purely textual, outlining three modalities of information that shape an information landscape: epistemic, social, and corporeal (Lloyd, 2010).

Essentially, Lloyd's three modalities of information are sites in which understandings of information are expressed and operationalized in a context. Epistemic modalities of information are codified textually as rules and regulations for practice, which lead to an understanding of information as universal or objective. Social modalities of information are constructed, both subjectively and intersubjectively, as tacit knowledge within a group and are therefore variable and changing. Lastly, corporeal modalities are developed and formed from experience and enacted bodily. In this way, Lloyd outlines an information architecture composed of how context, in the form of one's information environment, influences discourse and modalities of information. These "in turn influence the affordances that constitute information literacy as socio-cultural information practice" (Lloyd, 2010, p. 155).

Although Lloyd applies the sociocultural approach to information literacy in higher education it can likewise be applied to digital literacy. Digital and information literacies are often mentioned in conjunction with one another (Onyancha, 2020) and can be thought of as somewhat overlapping categories (Bawden & Robinson, 2022). Moreover, a sociocultural approach suggests that the digital context for working with information can itself be conceptualized as contextually situated. This suggests that there is no one understanding of digital literacy, but instead there exist various digital literacies, all situated in different contexts.

Lloyd's information literacy landscapes suggest that each research discipline at a university constitutes a new information landscape with its own traditions, theories, methods and information sources. In the same way, each research discipline will have its own digital literacy landscape, with these same traditions, theories, methods and sources manifesting in favoured use potentials for digital technologies. This article will use the term digital literacy as a more specific subsection of information literacy.

Overall, this theoretical framework suggests that librarians cannot address students' specific needs for digital literacy instruction without situating themselves in students' information landscapes and adequately integrating instruction into the specific students' academic context. Ideally, from a sociocultural perspective, librarians should not only be practically embedded in a target community

but also seek to epistemologically embed their instruction in the information practices and needs of this community.

### Methodology

The design of this case study is best described as a single case study understood through four specifically selected empirical units. The empirical units are not intended to be representative of all Copenhagen University Library digital literacy instruction courses. Rather, they represent empirical snapshots of how digital literacy courses can be differently embedded within educational contexts. Hence, the four courses were chosen to reflect a diversity of faculties, academic levels, and focuses within the wider category of digital literacy. This variety of different empirical units reflects the breadth of ways in which Copenhagen University Library's digital literacy education can be seen as being embedded, both within specific courses and assignments, but also in a particular information landscape. The case study is used to generalize theoretical propositions but is not intended to present a representative sample of frequencies (Yin, 2009). The two data collection techniques were repeated for each of the four empirical units, all of which were chosen from the overall case of digital literacy education at Copenhagen University Library. Two of the units focus on digital tools, while the other two focus on information seeking. The courses were all offered during the spring semester, lasting between 2-3 hours.

The first empirical unit (course 1) was a literature-seeking course offered to students from a particular STEM department who were writing their bachelor's assignment. This constituted the pilot study for data collection. The course was chosen due to its focus both on general skills (information seeking) and specific tools (the database used). Also, the course was chosen due to its embeddedness in a specific study program and since it was further grounded in a specific context, namely the students' bachelor's assignment. As part of this embeddedness, the librarian instructor for this course was also the designated library contact for this group of students, assigned to work within this specific discipline.

The second empirical unit (course 2) offered students an introduction to a specific reference management tool. Notably, this course was offered to university students from all faculties and therefore presented an opportunity to understand how librarians teach an audience with backgrounds from across academic disciplines.

The third course (course 3) also provided instruction on a specific reference management tool – though a different one than in course 2. This course differed from course 2 since it was specifically intended for students from the Health and Science UCPH faculties. This allows for a comparison of how learning is situated within a specific context. Course 3 had two librarian instructors, which made it different from the other courses observed, which only had one librarian responsible for instruction.

Another course in information seeking was also selected for analysis. This empirical unit (course 4) was chosen because it was an embedded course offered to a group of students as part of a specific course within the humanities department, thus constituting a different academic context than that of course 1. However, like course 1, the librarian instructor for course 4 was also the primary librarian assigned to assist students from this discipline.

Together, the four courses represent different branches of the Copenhagen University Library, which helps create a more holistic view of the university library as an institution and prevents the analysis from relying too much on any one part of the university library.



The case design employs two data collection techniques: 1) participatory observational studies of library digital literacy instruction, and 2) supplemental interviews with library staff responsible for each course. The interviews are described as supplemental because they occurred in conjunction with the observational studies and could help to correct misunderstandings that inevitably arise from short observation periods (Justesen & Mik-Meyer, 2012, p. 106), while also providing an understanding of how educators position their instruction and perceive their own practices. Notably, these data collection techniques are qualitative. Much of the research on information literacy is quantitative, which emphasizes learning through attainment and provision; the use of qualitative research methods contributes to a nuanced understanding of information practices (Lloyd, 2021).

All observational studies were carried out by one of the paper's two authors, with the same author carrying out the studies and interviews each time. On a continuum of "total participation" and "total observation", this participatory observation is best described as "participant as observer" (rather than "observer as participant") (Justesen & Mik-Meyer, 2012). This describes how the participant observer carrying out the study is not positioned apart from the students participating in courses and is also open about their role in observing the course for research use.

The decision to inform students of the researcher's role as observer was made for two reasons: firstly, to uphold ethical ideals of transparency and honesty and, secondly, under the assumption that a researcher will always influence the subject of their research, either through the way they act or through how they interpret the actions of others. The constructivist notion underpinning the collection of empirical material suggests that, if this bias will always be present, it is ideally made explicit. Students who have been informed of the role of the observing researcher may for instance appear to be more actively participating and listening to instruction, putting their best foot forward, if they feel as though they are being judged. However, this explicit bias is preferred to more imperceptible ways in which the researcher's presence would potentially affect the observed practice, had we opted for an anonymous observational setup.

These data collection techniques were also chosen to gain an understanding of how information is constituted and operationalized through several of the information modalities identified by Lloyd (2010) within the library's digital literacy instruction. Observational studies were carried out based on an observation guide, which adapted theoretical interests into specific focuses for observation. For instance, awareness of the epistemic modality of information resulted in a focus on textual information and "what rules are expressed?". Likewise, the social modality was operationalized through a "Focus on value-laden statements and actions" and implicit understandings within a community. However, corporeal modalities of information were not included in the observational study. This was because observations alone are not able to adequately examine Lloyd's corporeal modality, which is an experience of how information practice becomes ingrained in bodily habits, instincts, and daily life. This subjective, first-hand experience is therefore exceptionally difficult to observe, especially in an educational setting, where students are mostly following instructors' explanations.

The interviews followed a semi-structured format. Essentially, this format uses an interview guide to ensure that the interview explores topics that are relevant to the problem statement, while also leaving room to explore different lines of conversation which arise during the interview but are deemed interesting or relevant to the study's focus (Justesen & Mik-Meyer, 2012; Lloyd, 2021; Tanggaard & Brinkmann, 2020). The interview guide focused on ideas and thoughts that influence instructors, as well as background for the instruction observed, but less on the instruction itself.

All interviews were conducted in Danish and parts of the field notes were also originally written in Danish. For this purpose, all Danish-language material has been translated by the authors into English for consistency and ease of reading.

The transcribed interviews and field notes from the observational studies were coded qualitatively based on two theoretical strands. These coding categories were deductively derived from literature on embedded librarianship and Lloyd's theory of information literacy landscapes.

In alignment with the study's sociocultural approach to digital literacy, librarian instructors are understood as embedded in various disciplinary contexts or "information landscapes". When this perspective was applied to the collected material, librarians were found to either situate digital literacy education in students' actual disciplinary contexts, or in a more generalized, academic library context. The information landscapes in which library educators situate instruction were analyzed through two primary strands:

1. The way the librarian is embedded, practically or epistemologically, in various disciplinary contexts. This analytical strand goes beyond practical embeddedness since, from a sociocultural perspective, embedded librarians can also modify their practices to align with the understandings which are prevalent in the context in which they work. Thus, this strand of the analysis distinguishes between practical and epistemological embeddedness, including an analysis of both the degree of embeddedness and what kind of embedded librarianship is in place in the observed courses.
2. The different information landscapes are represented through various modalities of information. The different empirical units were observed to be grounded in several different information landscapes. This included both the students' discipline-specific information landscapes and the librarians' general, academic information landscapes. These landscapes became apparent through differences in the epistemic and social modalities of information which were identified in the observation field notes and in the interview transcriptions. This theoretical strand is important as a way to nuance the first theme of embedded librarianship by examining how instructors relate to students' information landscapes.

Taken together, strand 1 of this analysis pinpoints the type and degree of embeddedness seen in the library's instruction and strand 2 further nuances this understanding by examining which modalities of information characterize how instructors teach information literacy.

### **Analysis**

The resulting analysis is split into 3 parts: 1) examples where instruction is situated in a generalized, academic library context; 2) examples where instruction is somewhere between student and librarian contexts; and 3) examples where instruction is situated in students' actual disciplinary context.

Courses 2 and 3 are infrequently mentioned in this analysis, as they are mostly relevant to comparing course-embedded instruction and open courses. Instead, the analysis favors courses 1 and 4 since they focus on a more specific subset of students, allowing for more considerations about whether they can achieve a level of epistemological embeddedness.

#### *Instruction situated in a generalized academic context*

In some empirical units, the librarians' instruction is situated in a generalized academic context. Despite being offered to a specific STEM department, course 1 takes a general academic information landscape into account in its presentation of literature seeking when writing a specific academic



assignment. The field notes describe how the instructor: “Helps to operationalize methods and techniques in regard to students’ own thesis statements” (field notes, course 1, 18/03/2024). This way of helping students work through the process of writing an academic paper is further reflected in the interview: “[...] for them, at least on this level, it is really about a quite concrete goal: ‘I need this for my assignment. I need to know what I’m supposed to do’.” (interview, course 1, 18/03/2024)

This reflects how librarians perceive the students to be interested in a generalized, academic context. The information searching course is characterized by an epistemic modality of information: information is found in specific sites (databases) and is governed by rules that are codified into requirements for various assignments. This fits Lloyd’s explanation of an information landscape that focuses on the epistemic modality of information, which emphasizes “written rules and regulations for practice” that can be “evaluated against a set of sanctioned criteria” (Lloyd, 2010, p. 161). Essentially, the quote from the interview reflects an academic environment where information skills can be tested, and learning is reflected by success in assessments.

This can also be seen in course 3. This course is partially embedded. While it aims to introduce a reference management program to the health and science faculties in particular, the interview clarifies that the class welcomes any students:

anyone is welcome, even if it may not be entirely relevant [to them]  
[other instructor]: because, for reference management programs, you can get a lot out of it even if you want to use another search term [referring to how database search results are imported to the program]. (...) It’s also the same with literature searches. (Interview, course 3, 16/04/2024)

Beyond this, the instructors clarify that they would not modify the course’s focus based on individual students’ majors. It could be argued that the course is practically embedded to a limited degree, since it caters to students primarily from two faculties. However, the empirical material from the interview clarifies that for some courses and digital literacy subjects offered by the library there is an understanding that one overall digital literacy skill set can apply to all students. An epistemic modality of information is prevalent through codified, academic standards, which define what constitutes information literacy. These codified standards suggest that there is an overall academic information landscape, characterized by academic standards and rigor, that applies to all students.

#### *Instruction between students’ and librarians’ contexts*

Some parts of the collected material indicate that instructors could be mindful of students’ disciplinary context while still largely situating learning in a general academic context. This could be seen both for courses open to all students and for instruction embedded in disciplinary courses.

One example of this can be found in course 2, an introductory course on a specific reference management program, which is open to students of all faculties. For instance, in response to a question about the inclusion of some slightly advanced course content the instructor for course 2 explains:

Maybe it’s a historical thing. Because when I started at [department], when I taught it, the [department] students were taught how to use the Vancouver standard manually. They noted their references manually! During this, they saw these things with bracket parentheses and all sorts of things. So, they had an expectation that “I would like my own references to look like this.” (Interview, course 2, 09/04/2024)

Notably, this shows that instructors of open courses are also aware of their audience and will, in some instances, modify courses to account for what students from specific courses have an interest in.

This can also be seen in course 4, which is an example of course-embedded instruction on literature seeking offered to students taking a specific humanities course. The instruction took place in a classroom and the librarian introduced herself as an information specialist responsible for delivering library services particularly to the students' department. Although it was practically embedded within a course the students were taking at UCPH, the epistemological embeddedness of this library course can be questioned. The field notes for course 4 describe the instructor showing examples of database searches drawn from the wider disciplinary context of the students' class, which are presented to students:

The class, in which this course is embedded, is highlighted through the use of related examples. The department which the students are a part of is also referred to — especially when it concerns the topic of an information search. Beyond this, the library, librarians, and the instructor's colleagues are referred to in the form of what they do, offer, and recommend. Sometimes academic practice and assignments are referred to. (Field notes, course 4, 15/04/2024)

Beyond this, during instruction, the librarian refers to the department library's website, which includes databases relevant to their subject (field notes, course 4, 15/04/2024). The librarian for course 4 describes how embedded librarianship helps them ensure that the students of that specific department gain an understanding of the aspects of digital literacy that the librarian deems important:

We [Copenhagen University Library] teach database use because we think it's good and because it's nice, and because understanding that databases exist and can help you is a part of being digitally literate for those working with academic information-seeking. (Interview, course 4, 15/04/2024)

The librarian in this course straddles an interesting line, having one foot in the world of the students, their assignments, and the subjects which are of interest to their studies, and having the other foot in the world of the university library and the interests which they promote. Their embeddedness requires them to work with examples that are of greater relevance to students but also grants them greater control in ensuring that students learn the academic digital literacy competencies which are emphasized by the Copenhagen University Library. They are certainly practically embedded, but the librarian's expertise is prioritized above domain knowledge. Essentially, the library instructor allows their own information landscape, emphasizing generalized academic digital literacy skills, to influence the choices they make about what is important for students to learn, and the more niche, discipline-specific knowledge which characterizes the actual student information landscape, is used to exemplify these skills in context.

Seemingly, instructors will allow their own professional expertise to determine what digital literacy content is in focus, but they will also contextualize this content within students' actual disciplinary information landscape when possible. Viewed through a sociocultural lens, this entails a risk that the instruction becomes too general to be of value in the students' disciplinary information landscape.

The second analytical strand, focusing on Lloyd's information modalities, also suggests that some instruction falls between student and library contexts. This can be seen in course 4, which was embedded in a class offered by a specific department but included students from a variety of different majors within this department. Focusing on the social modality of information brings the understandings of information that are implicit throughout the course's discussions and examples to the surface. The students' information landscapes are partially acknowledged, as can be observed in the following segment of field notes, which describes instruction as:

mindful of the students' subject interest within the class and department (...) but doesn't refer further to different students' specific educational focus within the department. (Field notes, course 4, 15/04/2024)

The course discussions and examples do not exclude discipline-specific issues. However, within the collective information environment of this information-seeking course, understandings of information literacy are limited to concepts that become shared by the students and the librarian instructor. The classroom education format includes a variety of majors, which does not allow instructors to ground their instruction entirely within each student's information landscape. However, it is relevant to consider that perhaps this degree of situated learning is not possible within this type of classroom instruction and should not strictly be an aspiration.

In this way librarians, whether their instruction can be classified as fully, partially, or not at all class-embedded, still intend to relay the course material to students in a way that allows them to relate to it. Seemingly, librarians will allow their own professional expertise to determine what digital literacy content is in focus but will also contextualize this content within students' actual disciplinary information landscape when possible. Moreover, the degree of practical embeddedness of a given course is not always indicative of a similar epistemological embeddedness.

#### *Instruction situated in students' disciplinary context*

Despite the ways in which the classroom format limits the degree to which instructors can ground learning in each individual student's information landscape, course 4 is still a good example of how mindfulness of students' backgrounds comes into play. In this course, the instructor notes how they prioritize finding examples which are useful and relevant to the students taking the course:

I spend a lot of time designing examples which fit the class. And I spend a lot of time searching for the things I'm working with so I get an impression of what I can find, what I can show them, and what makes sense regarding this class, because I have noticed that, as you bring out more general examples, students become less interested. They want to hear a story about themselves. When they sit down to work with [class focus], well, then we also need to talk about [class focus] through this kind of example. So, in that way, I spend a lot of time aligning the course but, essentially, I do the same thing every time. (Interview, course 4, 15/04/2024)

This is also corroborated by the field notes from course 4:

Instructors show what their example search looks like in the library system. One of the students stops the instructor mid-search because they want to take a picture of the literature that shows up [I think: presumably because one of the citations is relevant for their own project]. (Field notes, course 4, 15/04/2024)

The instructor clearly puts a lot of effort into finding examples that are relevant to the students and the description of the student taking a picture shows that this is appreciated. The instructor's interest in using examples of relevance to students also further suggests that they adjust their thinking of information to the students' disciplinary landscape. This context can be thought of as an information landscape which is more specifically centered within the disciplinary field which students are studying, and it is therefore different from the general, academic information landscape described earlier.

The instructor's focus on examples from students' disciplinary context illustrates a focus on epistemological embeddedness which goes beyond the purely practical considerations typically associated with embedded librarianship.

## Discussion

The analysis conveys the type and degree of embedded librarianship which occurs in the four empirical units. Although not all the instructors in all four examples are embedded in a way that previous research describes as being physically present in non-library contexts, we found that instructors for both the class-embedded instruction and open courses are consistently aware of the broader student context in which they are situated. However, the knowledge instructors convey is inconsistently related to the students' specific field of study. Though some courses, such as courses 1 and 4, are practically embedded, the analysis shows that the knowledge they refer to straddles the line between being "what the library thinks is good", grounded in the academic world of assignments, and genuinely grounding instruction in students' academic background. Similarly, courses such as course 2, which are not practically embedded, are also found to be primarily focused on an overall academic context. Thus, the analysis shows that despite varying degrees of practical embeddedness the observed courses mostly have a focus on a general academic context.

For instance, the analysis notes that course 1, which is a practically embedded course, focuses on a general academic context to prepare students for their bachelor's thesis, despite the course being embedded in a particular STEM department. While the analysis recognizes a few instances where the librarians partially situate their instruction, they still rely on their own library information landscape to determine what digital literacy content should be in focus, and only rarely do they contextualize this content within students' actual disciplinary information landscapes. Within this top-down approach, librarians determine what students need to learn and make occasional adjustments based on the students' context. An epistemologically embedded approach is more bottom-up – or user-centered (Luca, 2019) – since students' needs determine what library instructors focus on.

The second strand of the analysis presented how understandings of information in the observed information landscapes were expressed through different modalities of information. For instance, the epistemic modality of information was particularly prevalent in open courses which focused upon standardized rules for information literacy. These standardized rules ensure that course content is relevant to all students and situate the courses within a generalized academic information landscape.

Understandings of information are also co-constructed through discussion and sharing of tacit knowledge within a group – the social modality. For instance, in course 4 a shared understanding of information literacy was constructed through discussions and examples in the classroom, which took the students' disciplinary background into account. These examples show that librarians' instruction includes both elements that are situated in students' information landscapes and elements that are more general, situated in an overall academic information landscape.

This supports Lloyd's idea that we all experience several information literacy landscapes, with some of these literacies partially overlapping (Lloyd, 2021). In this case, the librarians largely focus on the overlap between their professional knowledge and students' disciplinary information landscapes, without entirely grounding courses in students' specific disciplinary contexts. Students' disciplinary information landscapes have some overlaps with the more generalized academic information landscape presented by the librarians. Some aspects of digital literacy for each overall landscape also overlap. As an example, the strategies and techniques librarians present as part of the academic information seeking process are also highly relevant for students and applicable in their disciplinary information environments. However, the two contexts are different, and successfully navigating the disciplinary information that is specific to students' information landscapes would require situated domain knowledge and experience beyond that which library instructors are usually equipped with.

One problem caused by a focus on the general academic information landscape is that students primarily learn to master information practices for academic study, not the practices of their future workplace. This suggests that the understanding of embedded librarians being physically present in student spaces (Abrizah et al., 2016; Kesselman & Watstein, 2009) is not enough. Rather, an approach to instruction that emphasizes epistemological embeddedness could meet long-term learning goals by more specifically targeting students' future information needs. Luca similarly states that embeddedness requires librarians to adopt a disciplinary lens, and that "librarians must work closely with academic staff to design learning experiences, not teaching IL as a general concept, but instead, IL embedded within discipline-specific information practices" (Luca, 2019, p. 83). At the same time, he recognizes that establishing this can be difficult for both the librarian and the academic community due to various reasons, such as for instance level of engagement.

As noted in the analysis, it is also difficult to target learning activities towards each individual's needs within a classroom format. Still, it is not unreasonable to look beyond the disciplinary context in order to see each individual as their own subject with changing learning trajectories (Moring, 2012). This could further suggest that an "epistemological embeddedness", which is more mindful of contextual differences, is important to teaching digital literacy. Despite it being difficult for educators to intuitively adapt their instruction perfectly to each individual, using the perspective of epistemological embeddedness can encourage librarian instructors to at least be more mindful of each specific student's learning trajectory.

### Concluding remarks

The analysis finds that practically embedded courses do not necessarily situate learning in students' disciplinary context. This substantiates the conceptual idea that embedded librarianship can be divided into practical embeddedness and epistemological embeddedness, although the two approaches sometimes overlap in practice. From a sociocultural perspective, practical embeddedness is largely inconsequential to the question of teaching digital literacy. Practical embeddedness takes different forms, for instance a librarian can be physically present in a department library and their courses can take place in a classroom rather than a library space, and it can have different benefits, such as practically embedded librarians having a closer, more effective line of communication with professors and university staff and some knowledge about the average student's understanding of digital literacy at different points in their education. Though beneficial for productivity, all these points are, from a sociocultural perspective, ultimately irrelevant unless the librarian also has a degree of epistemological embeddedness. The instances when instructors situate courses in students' disciplinary context necessarily involve a degree of domain knowledge that helps the instructor ground digital literacy education in examples and practices that have genuine relevance to the specific audience. Practical embeddedness could constitute a starting point for epistemological embeddedness, since librarians who are working alongside staff and students from a particular context will be exposed to domain knowledge and will have more opportunities to contextualize their instruction in the specific domain they are working with.

A greater emphasis on epistemological embeddedness could ensure that students learn digital literacy approaches that will be relevant beyond their academic tenure. Epistemological embeddedness in digital literacy instruction could prepare students for navigating the information-rich contexts they will meet both within and outside of higher education contexts. Since this is a goal for university strategies for improved digital literacy, such as the UCPH model for digital literacy, academic libraries should develop their understanding of embedded librarianship to include a dimension of epistemological embeddedness. Library and university strategies could explicitly be designed so that they encourage an improved disciplinary focus. This could, for instance, take the form of allocating resources for providing librarians with more specialized training in subject areas

and by strengthening communication and collaboration between librarians and the students' primary university educators.

It is naïve not to recognize the resource-intensive aspects of this suggestion. Perhaps a focus on practical embeddedness is the result of librarians being given limited resources and limited access to students. When the same librarians are responsible for teaching students from multiple faculties and are not given resources to research what discipline-specific information needs and concerns these different students may have, they are forced to produce general content that can more easily fit whatever group of students they happen to be presenting to. More empirical studies are therefore needed to determine how this approach to epistemologically embedded instruction could be enacted in practice.

This article shows that the degree to which instruction is socioculturally situated depends on the topic and format of the course in question. The study shows that the fact that a course targets a specific subset of students does not always correspond to a greater degree of epistemological embeddedness. However, course 4 demonstrates how class-embedded instruction can allow for a greater degree of context-situated instruction in academic information seeking. Beyond this, we found that the tool-focused courses observed less often had the same degree of epistemological embeddedness as courses on more complex processes, such as information seeking. We can speculate on whether this reflects the fact that the basic use potentials for reference management programs do not vary considerably between different disciplines, which could result in fewer opportunities to ground instruction in discipline-specific practices. Future research could further examine this, looking into what aspects of digital literacy instruction the epistemologically embedded approach to embedded librarianship would be most important for.



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