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Virginia M. Tucker
San José State University, virginia.tucker@sjsu.edu

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Title

Becoming an information architect: The evolving librarian's skillset, mindset, and professional identity

Author

Virginia M. Tucker, PhD, MLS

Associate Professor, School of Information, San José State University

One Washington Square, San José, California 95192-0029 USA

virginia.tucker@sjsu.edu

Abstract

Learning the essential concepts and skills of information architecture (IA) has the potential to not only significantly extend the abilities of practicing library and information science (LIS) professionals, but also to evolve their professional identities and envisioned career opportunities. An online course on IA was designed around: the principles of threshold concepts, practical knowledge for the workplace, and professional 'soft' skills, such as collaboration and basic project management. The primary objective for the course was creating experiences for students in which they could discover and engage with critical concepts in IA and to collaborate with their peers to design content-rich and user-centred websites. The learning experiences of two sections of the course (n=32) were studied, through questionnaires and reflective writings, and analysed thematically. The outcome was that, in learning information architecture concepts, and acquiring and applying the concepts and tools to do information architecture work, the students did more than acquire new professional skillsets; they also evolved in their professional identities.

Keywords

identity shift, information architects, librarians, professional identity, threshold concepts

Title

Becoming an information architect: The evolving librarian's skillset, mindset, and professional identity

1. Introduction

This paper reports on a course on information architecture (IA), offered online, both to MLIS students and to practicing information professionals returning for continuing education in a post-Master's certificate programme in web design, and on how the course impacted the students' ways of thinking about their professional identities and career possibilities. The guiding objectives behind the course's development were rooted in the theoretical framework of threshold concepts (Meyer & Land, 2003), which has as its primary practical objective to guide curriculum design so that students are able to approach, recognise, and internalise the essential knowledge of a domain (Land et al., 2006). The study's aim was to integrate core principles of IA design (Rosenfeld, Morville, & Arango, 2015) with hands-on and immersive learning activities, creating a course that significantly extended the abilities of practicing library and information science (LIS) professionals. The outcome was that, in learning information architecture concepts, and acquiring and applying the skills to do information architecture work, the students did more than acquire new professional skills. They also evolved in their professional identities.

Many librarians, particularly in public library and school library environments, are called upon to develop and maintain the websites of their organisations, regardless of the extent of their pre-existing knowledge. Their organisations' websites are the digital front door for the organisation's users and visitors. For libraries, their websites are the primary way to connect people to authoritative, accessible, and up-to-date resources on topics ranging from health and the law, to employment benefits. To support librarians' continued professional learning, MLIS programmes have been adding coursework in web design and IA over the past decade or so (ALIA, n.d.; ALISE, 2020; Marchionini & Moran, 2012). Through acquiring knowledge of IA principles and then applying them to design websites—or to re-design sites

needing improvement—librarians learning IA are enhancing access to vital resources for their communities. Deepening their knowledge in IA also opens up career paths and niches within librarianship not previously envisioned. The case illustration in this research study explored this phenomenon of expanding career horizons and perceptions of professional identities.

1.1 Research question and aims

This study is one of the early phases in a larger research project exploring the impacts on students of learning experiences in MLIS courses that have been intentionally designed based on threshold concepts theory. (The courses have a domain focus in information science, such as this one on information architecture, and are not connected to the information literacy framework (ACRL, 2016).) With this as the larger context, the study focused on the transformative and integrative characteristics of threshold learning as manifested in the perceptions of the learners themselves. The two guiding principles behind the course's design are noteworthy. First, the conceptual knowledge covered is based on threshold concepts (Meyer & Land, 2003) for the domain of information architecture (Tucker, 2019; 2020); the course also has skills-based content and tools knowledge. Second, the assignments are hands-on, immersive, and collaborative, providing realistic practice in the kinds of activities an information architect would experience in the workplace. As such, the course is intended both to generate transformative—i.e., threshold—learning experiences and to provide practice in IA work that supports students for careers in the field, enabling them to onboard rapidly and authentically.

To frame the study's design and the larger trajectory of the research, the research question posed for this phase was:

- What are the characteristics of the learning experiences of LIS students who complete a course in information architecture that has been designed based on threshold concepts?

The research question was intentionally open-ended so that nuanced answers would be fostered. Integral to the question were the study's two inter-connected aims:

- to explore the effects of the course on the learners, in their sense of self and their envisioned future careers; and
- to evaluate the course materials for their effectiveness in preparing students for careers that demand IA skills and conceptual knowledge.

The learning experiences of 32 students in an information architecture course were studied through analysing two datasets, questionnaires completed near the end of the course and reflective writings. In addition, the study sought to support the larger work in progress for next steps and to provide insights into refining its research design.

2. Research context

Relevant research literature for this study included works from the domains of transformative learning (Mezirow, 2003), the nature of identity itself—with particular attention to aspects of identity transformation and authenticity (Appiah, 2019; Todd, 2008; Turkle, 1984; 2011)—purposeful mindsets (Dweck, 2019), and multiple aspects of student learning experiences in online environments. While this review of literature discusses a range of theoretical works, the primary theoretical framework for the study was threshold concepts (Meyer & Land, 2003), covered in 3. *Theoretical framework*.

2.1 Transformative learning and reflection

Studies of transformative learning draw upon the foundational work of Mezirow (2003), or branch off and add to the wealth of knowledge about the characteristics of learning experiences that transform the learner in some way. Transformative learning is possible when a learner reflects on their experiences and shifting viewpoints in ways that open up their mindset to be “more inclusive, discriminating, open, reflective” (Mezirow, 2003, p. 58). In addition, significant research studies focus on the factors in curriculum design that support transformative learning experiences, so that students “gain a broader, more inclusive view of themselves and their world” (Baumgartner, 2019, p. 69).

Reflective writings have been used as datasets in studies of transformative learning experiences in a range of academic disciplines (Hodge, 2019), including LIS (Eva et al.,

2021). Examining the learner's own writings has been demonstrated as effective for gathering nuanced understandings of their experiences, perspectives, and expectations (Estrem, 2015). Atherton and Meulemans's recent research (2020) explored transformative learning experiences through students' reflective writings, in a study designed around threshold concepts theory. Blending the literature of transformative learning and threshold concepts (discussed below) is gaining interest among researchers (Hodge, 2019).

2.2 Identity, authenticity, and mindset

In her decades of research on identity, with the focus on its evolution as technology's presence grows, Turkle (1984; 2011) has noted the seemingly incongruous loneliness that has arisen simultaneously with our increased ways to connect with people around the world. She writes in her book *Alone Together* (2011) about the ways "we are changed as technology offers us substitutes for connecting with each other face to face," continuing with the observation that "technology redraws the boundaries between intimacy and solitude" (p. 11). In the online learning environment, this phenomenon is starkly present, as students are free to don a mask in one class, a different one in another class, and yet another in their home and work lives. We are able to create personas for ourselves, try them on, discard and rework them. Online learners may be bold in discussion forums with their peers; the same students who would hesitate to speak up in a face-to-face classroom may be the most voluble of all in online discussions. And all of these personas may be authentic (Todd, 2008), as we are fluid and can learn to thrive in different contexts, online or otherwise.

Decisions about career directions impact students' contemplations that affect their identities, too. While career opportunities in our technology-ridden information professions seem to abound (Marchionini & Moran, 2012), they also astound us, and can lead to a kind of overload among students preparing to enter the workforce or make a career change. As they seek out professional pathways, they are also shaping and reshaping their professional identities; and these identities are integrated with their personal and social selves, with how they are present in their multiple contexts and communities (Hicks, 2020). In his studies of

the nature of identity itself, Appiah (2019) spoke of such contexts and their consequences, in sobering and eloquent words:

There is a liberal fantasy in which identities are merely chosen, so we are all free to be what we choose to be. But identities without demands would be useless to us. Identities work only because, once they get their grip on us, they command us, speaking to us as an inner voice; and because others, seeing who they think we are, call on us, too. If you do not care for the shapes your identities have taken, you cannot simply refuse them; they are not yours alone. (pp. 217-218)

The issues of identities, contexts, impacts of technologies, mindsets for learning, and online environments—all complicate the learning experiences to be studied in any research project. The choice of perspective, method, and theoretical framework can help align the questioning.

2.3 Holistic perspectives

Holistic perspectives in the LIS research domain, such as informed learning (Bruce, 2008) and information experience (Bruce et al., 2014; Conrad et al., 2020), are pertinent to this study as they inform and explore a user's learning experience from the broad context of their information world. As described by Todd (2014), "the information worlds of people are subjective and individual, imprecise, uncertain, and fluid, and at times richly disruptive" (p. xxi), leaving information researchers with the challenge to deepen our understanding "in more holistic ways" (p. xxi). In a similar way, emerging perspectives on professional competencies that reflect holistic understandings (Gracy, 2018), encompassing soft skills, concepts, professional praxes, all combined with technical abilities, are highly compatible with other areas in the LIS domain that are inclusive of insights across the disciplinary spectrum (Bawden & Robinson, 2009; Marchionini & Moran, 2012). Parallel research in education on teaching students how to learn to learn (Fink, 2013) emphasises another form of inclusivity through strategies for the challenges student face, both with overloaded course content and with being able to continue learning as more new content areas emerge. Fink

(2013) identified effective ways to support students in learning how to be better learners, such as teaching students how to ask astute questions and how to use self-reflection, discerning for themselves approaches that work for them, and ones do not.

3. Theoretical framework

A threshold concept is a core concept that, once understood, transforms perception of a given subject (Meyer & Land, 2003). Not all core concepts are threshold concepts—several characteristics are necessary for a concept to be considered threshold knowledge. Briefly, the concept must be transformative, irreversible, integrative, and troublesome—meaning that a learner will likely need to wrestle with the concept to fully grasp it. In addition, a threshold concept, once grasped, will reshape the learner’s identity. This is evidenced in changes in the learner’s discourse about the new knowledge, and it may also show up in how they are able to reconstitute the knowledge. Understanding a threshold concept involves “a reconfiguring of the learner’s prior conceptual schema and a letting-go or discarding of any earlier conceptual stance. This reconfiguration occasions an ontological and an epistemic shift” (Land, Meyer, & Baillie 2010, p. xi). Timmermans and Meyer (2017) described this stage as “epistemic and ontological unmooring” (p. 3) that is an opportunity for learners “to shift their identities and understandings of the world” (p. 3).

While the threshold concepts theoretical framework is not without its detractors (Rowbottom, 2007; Brown et al., 2021), the framework has been rigorously and effectively applied to multiple academic disciplines (Barradell, 2013; Quinlan et al., 2013; Tight, 2014) and for its original and primary purpose of designing courses that lead to transformative learning (Cousin, 2006; Timmermans & Meyer, 2017). Over the last almost two decades since the framework was put forth (Meyer & Land, 2003), the original five characteristics of a threshold concept have expanded to reflect deepened understanding of their nature and the vastly expanded research literature (Flanagan, 2020). One reflection of this more complex and realistic set of characteristics—supportive of and integral to the framework’s original purpose—are the learner’s shifts in discourse about the new knowledge (Flanagan & Smith,

2008) and the learner's shifts in identity (Stokes et al., 2020). There is also now a greater understanding of the place of affect in the framework itself (Rattray, 2016; Timmermans & Meyer, 2020).

Within the LIS discipline, perspectives about the transformative experience of fully understanding information structures extend far back in the research literature. Bates (1999) stated, "People who come into this field...go through a transformation; they shift their primary focus of attention from the information content to the information form, organization, and structure" (p. 1045). This still holds true for LIS professionals today, and information structures was one of the early LIS subjects to be established as threshold knowledge (Tucker, Weedman, Bruce, & Edwards, 2014). For deepening understanding of ways for librarians to learn about information structures, and about IA specifically, threshold concepts theory provides a robust framework, as well as guidance for curriculum design, discussed next.

4. Case illustration and course design

This is a case illustration, with the objective to explore and illuminate a contemporary phenomenon (Gray, 2013; Yin, 2017). Specifically, it was structured to explore the characteristics of the learning experiences of students in the course, and to evaluate the course's effectiveness specific to the aims of developing sense of self and preparing students for careers requiring IA skills. The course content was developed around the primary goal of creating experiences for students in which they could discover and engage with critical concepts in IA and collaborate with their peers to design content-rich and user-centred websites. This was reflected in the stated course learning objectives:

- Apply best practices for website content inventorying, structuring, labelling, and navigation;
- Learn about and apply methods for eliciting user requirements and information needs;
- Evaluate websites according to principles of effective IA, usability heuristics for content-rich sites, and concepts of information-seeking behaviours;

- Evaluate and use appropriate tools for conducting user research and creating IA design documents and prototypes.

Course materials had been designed around findings from previous research on the threshold concept of information structures in the domain of information science (Tucker, 2019; 2020), and the course content explored aspects of this threshold concept from a kind of kaleidoscopic approach based on these previous works; for example, database structures, site navigation and sitemap hierarchies, labelling as it affects perception of content, and user task analysis from an information structures viewpoint. The course assignments covered practical knowledge, too, including learning to use tools for prototyping webpages and sitemaps, conducting content audits, and practicing 'soft' or enabling skills, such as collaboration and basic project management. The learning activities were sequenced in three main phases: (i) acquiring knowledge of concepts; (ii) applying those concepts to hands-on projects; and (iii) communicating to peers and to their clients about their project outcomes and deliverables. The main course assignments were:

- website critique: applying industry heuristics to evaluating a website, involving group discussion of strengths and weaknesses, a summary report, and reflections;
- course project, with multiple deliverables that involved: learning to use software tools for rendering IA design products, such as content inventories, user scenarios, and prototype pages (wireframes), as well as practice conducting user research (e.g., card sorts and prototype testing); design pieces with stages of iterative feedback and refinement, such as instructor feedback and peer review in small seminars.

The critique, as the first assignment involving considerable group interactions, also served as an activity to help students get to know their peers and decide who they would like to partner with for the much larger course project that involved four deliverables over several weeks.

[insert Table 1 near here]

As described, the course activities had been designed around IA concepts, with intentional and close attention to the threshold concepts curriculum considerations outlined by Land, Cousin, Meyer, and Davies (2006). Table 1 describes these curriculum design considerations, and the first four elements were the theoretical basis and structure used to analyse the results. The purpose of these curriculum considerations in threshold concepts theory is to support the student's "transition to new knowledge that becomes integral to one's identity and praxes" (Tucker, 2019, p. 60). It is noteworthy that these considerations are highly compatible with other innovative approaches—some of them long-standing ones—that emphasise elements such as active learner engagement, Socratic methods, and constructivist, learner-centred instruction (Aparac-Jelušić & Kurbanoglu, 2019). Elements 1 through 4 in Table 1 were the basis for the data analysis. Elements 5 and 6 (instructor's listening and beware oversimplification) were directed towards the instructor, so not a good fit for understanding the learner's experience.

The primary dataset were responses to a questionnaire distributed near the end of the course term. Two sections of the course were studied, a total of 32 students, during the two years of data collection, 2019-2020. This dataset was supplemented by data gathered from students' reflective writings. Reflection has been studied widely as an activity essential to self-awareness, identity transitions, and in threshold concepts studies (Meulemans, Carr, & Quiñonez, 2020; Moore & Felten, 2020). Specific to threshold learning, reflective activities have been found to be a critical component in supporting learning that is both integrative and irreversible, two core characteristics of threshold knowledge (Cousin, 2006). The writings came from two sources: discussion posts in student interactions with their peers; and individual writings done on completion of one of the assignments. The individual writings tended to be where students captured what they perceived to be the important take-aways for them from the assignment. In the discussion posts, they were required to do an initial post in response to guided questions, then to respond to a peer's initial post in ways that would move the conversation forward. Little further encouragement was needed from the instructor to make for lively discussions in which almost all students actively engaged

beyond the minimum requirements. Thematic analysis of the data from the two datasets relied on qualitative coding analysis (Cousin, 2009; Saldaña, 2021) aimed at eliciting evidence relevant to the four threshold concepts curriculum elements.

5. Results

In alignment with the threshold concepts curriculum considerations, described above and in Table 1, several types of learning activities were found to be effective. For example: exercises conducted in small-group discussions, supporting extensive peer engagement; practice in evaluating website architectures, engaging with industry heuristics and practices; and phased development of a major IA project with iterative stages of feedback. The project's phases included: writing a client-centred proposal, drafting sections of the final report for early feedback, and presenting parts of the user research results and designs to peers for further feedback, all prior to finalising the submitted report. We built a collaborative and supportive online learning environment through these activities. The peer review at formative junctures while developing their projects was highly effective.

The questionnaire included several questions about specific aspects of assignments and course readings; this was useful to the instructor, but not highly relevant to the study. The main section of the questionnaire was open for students to comment on their experiences in the course. Selected comments reported below are combined with reflections from their writings that were pertinent to the study's research question and aims; they are organised thematically by the threshold concepts curriculum elements delineated in Table 1. In short, the four elements are: 1-Engagement; 2-Tolerance for uncertainty; 3-Recursiveness; and 4-Learning is a journey. All comments are identified by participant numbers; any personal identifying information has been removed.

Element 1 – Engagement: active student engagement, including representing new knowledge, applying it, and connecting it to their lives.

“I felt a little overwhelmed in the beginning. However, when we started applying the information into the assignments and project I was able to connect the two.” (P0102)

“The discussions and project helped me understand the material. I also like how you gave us a lot of readings at the beginning and less at the end so we could apply what we learned and go back to the readings if/when needed.” (P0101)

“This assignment [website critique] was one of the highlights of the course in terms of engaging with classmates on discussions about IA.” (P0112)

Element 2 – Tolerance: for uncertainty and troublesomeness, requiring self-awareness and metacognition

“Working with partners was not only helpful in learning IA and developing the project but for me it was also another opportunity to further develop my online communicating/collaborating skills with strangers which I guess happens a lot in the "real" world.” (P0105)

“The small seminar was great for feedback! It is an extension of user research in that everyone, aside from the professor, views IA differently.” (P0206)

Element 3 – Recursiveness: learning as a recursive activity (different ‘takes’ on the material)

“I never heard of the heuristics and I liked applying them in a "real" way. Helped me to learn and remember! Most of the time I think 'I have to live with this', but I really don't. And now I can articulate the feelings and structure I prefer in a website.” (P0105)

“Having the different stages for the project was great. We were able to treat this like a real job, where we needed to discuss the project with others that were not in the group. Having the ability to grow and expand the information received from others to make the website better.” (P0102)

“I loved that I created something as close to a real assignment for exposure and experience. I also liked that we presented to one another. That was great. Again, I learn from fellow classmates.” (P0103)

Element 4 – Learning is like a journey, not a destination or end-point

“The course activities improved my understanding of information architecture and how it impacts web design. Professionally, I will be using the concepts I learned in this course to work on improving my library's website so that it supports user needs and so users can have an easier time finding the information they need.” (P0208)

“Did an excellent job of mirroring a real-life scenario with the project and with the class as a whole. I'm glad I took this class because now I can understand website design more and it will be helpful down the road in my career.” (P0204)

“Based on what I've learned in this class about information architecture careers, I don't think that I want to become an information architect. However, IA and UX concepts are important to know in my field of work and I feel that this course has made me better at my job as well as jobs that I will hold in the future.” (P0207)

The peer engagement activities and the recursive learning, intentionally built into the course, supported varied ways of reconstituting new knowledge, such as the graphical components in the course project, written reports aimed at a real client, spreadsheets for content inventories, and the seminar presentations. Even the students who opted to work alone on the course project—due to issues of scheduling around family responsibilities, caregiver, and/or work hours—reported positive learning experiences, despite having less interaction with peers in group meetings.

Learning about the essential principles of knowledge management (Koenig, 2015) is supportive of learning about IA, and this was evident in students who came into the course with coursework and/or prior work experience in knowledge management (KM), as they were able to draw connections between their prior experiences and the IA-focused course content. They saw overlapping concepts and best practices that strengthened their understanding and ability to apply them to the assignments. In addition, the sophistication they demonstrated when reflecting on what they had learned was animated: “I feel that I have learned a lot in this course and I'm already using what I've learned about IA and UX in my current workplace.” (P0207)

The second offering of the course was in 2020 and, as such, the students (and instructor) were deeply impacted by the coronavirus pandemic and lockdown (Boté-Vericad, 2021). Many students lost their jobs or had reduced incomes, most had young children who were suddenly at home full-time and needed parental help with online learning, and all were immeasurably stressed. Several of us had family members who suffered from COVID19 for many weeks or lost their lives to it. There is no overstating the effects on our lives during these times, and there were many comments from students in the reflective writings that reflected, in some way, this dramatically altered and distressed way of living and learning.

6. Discussion

The research began by exploring threshold knowledge about information structures as a core threshold concept for information professionals (Tucker et al., 2014), and this led onward to the current research study examining the ways students are impacted by courses designed on principles of threshold concepts theory. The design of this particular course on information architecture aimed to bridge the challenges of integrating coursework learning into real-world settings, using the theoretical framework of threshold concepts in combination with learning activities that applied the new knowledge during the course, in iterative and collaborative design assignments. In studying threshold concepts in entrepreneurship, Hatt (2018) faced similar challenges when exploring ways that learners connect critical knowledge, typically taught in a graduate business degree programme, to practical application in varied work environments of entrepreneurs. She argued for an understanding of entrepreneurial learning that is a combination of practice-based and holistic. Her work is especially relevant to the teaching of information architecture, with its own mix of conceptual and practice-based knowledge necessary to success in the profession.

Peer interactions were a critical aspect of the study, with the group dynamics in developing assignment deliverables and in the online discussion forums. Flanagan and Smith (2008) reported, "We have repeatedly seen students who have grasped a local threshold concept themselves enthusiastically and volubly attempt to lift their partners over

the same threshold” (p. 101), and this was evident in this study as well. The level of student engagement with the course concepts and the level of creativity reached were exceedingly high in the group activities. As one participant observed, “I learned so much from my partners! I think working as a group is a necessary component, since you must work as a group in the real world” (P0103). Group processes and peer engagement as they impact the learning experiences are worthy of further study, with the online learning environment of particular timely interest (Raymundo, 2020). Factors in launching an online group project, such as assigning roles to group members, have been shown to make significant differences in the outcome (De Meyst, 2021).

In this study of LIS graduate students looking to acquire the essential knowledge and practical skills of an information architect, another finding was that further study is needed for a holistic understanding and to evaluate the learner’s experience more completely. This may extend to retention of the new knowledge, for example, shining light on the irreversibility characteristic of threshold knowledge. Similarly, more attention to the threshold characteristic of troublesomeness would be a helpful next step in the research, looking to elicit more about the students’ experiences when they struggled to learn concepts. For example, there were reports from students who struggled with learning the software tools, but little data on troublesome experiences with the conceptual knowledge about information structures. Interestingly, learning about industry heuristics and best practices for IA generated many ah-ha moments for students; this knowledge was, superficially, not threshold concepts, yet as a composite it represented threshold knowledge about information structures, user information seeking behaviour, and information experience (Bruce et al. 2014; Conrad et al., 2020). Data on these elements may be better elicited through other means, such as semi-structured interviews or focus groups, allowing for more free-flowing and forthcoming discussion with participants. In addition, awareness of the potential for researcher-observer bias, an inherent weakness in this type of case study, will continue to be considered the larger project’s next stages of data collection and analysis (Tucker, Bruce, & Edwards, 2016). Ultimately, future work in this research will lead to a

clearer understanding of threshold knowledge in information architecture; being rigorous through methods such as transactional curriculum inquiry (Cousin, 2009; Barradell & Peseta, 2016).

Further to the students' tendencies to contemplate and rethink their career directions, they also demonstrated a strengthening of their commitment to lifelong learning habits. This strong and self-driven desire for ongoing learning in one's lifetime is common among LIS students and practitioners and, indeed, this tenet of the profession is codified in professional association competency schemas (American Library Association, n.d., 'Knowledge and competency statements developed by relevant professional organisations'). Exploring this further, as well as other 'soft' or enabling skills—such as flexibility, relationship building, and influencing skills (Special Libraries Association, 2016, 'Enabling competencies')—is similarly worthy of follow-on study.

7. Conclusion

The completed course projects demonstrated a wide range of ways that students were able to contribute to their communities by re-designing existing sites or by transitioning non-Web content into well-structured websites. Projects included sites built from the ground up, where students developed the information architecture, prototype pages, and large parts of the site content; other projects were major overhaul re-designs of existing websites, for which students developed new information architecture, prototypes, and sophisticated renderings of user personas journey maps that represented a nuanced understanding of the target audiences for the site. The content was from a wide range: re-entry resources for recently released convicts, educational materials for First Nation teachers and para-educators, and an overhaul of a popular music streaming service so that it would better meet the needs of independent musicians promoting their works, strengthening support for a neglected user group.

This blend of learning conceptual knowledge, best practices in information architecture, and integrating the knowledge by applying it to a real project meant that the

students took away both a foundation in best practices and hands-on experience with the knowledge covered during the course. The primary findings were that students reported a shift in their thinking about their professional roles, in their identities relative to both the LIS and IA domains, and in what they anticipate for their future career options. Many reported in their reflective writings that the new knowledge opened up career niches within librarianship they had not previously envisioned. The students reported experiencing a shift in identity as they integrated the learning of IA concepts and skills with their application to actual projects in their current jobs as they took on new roles in their workplaces. For some of the students, the experience led them to rethink their career trajectory and to explore work environments and positions where their knowledge of IA would define their primary responsibilities, seeking to extend their IA work beyond that of an add-on role to their current position. For them, learning about IA concepts and skills, then applying them to a realistic scenario in collaborative learning activities led to a transformative shift in their mindsets, perceptions, and how they experienced their professional identity. Ultimately, they perceived their futures differently as well, with elements of lifelong learning, ways of thinking about LIS in more environments, and further possibilities for career shifts later in life. These findings will inform next steps in the larger research project.

Currently underway is a content analysis of student discussion posts to assess, through a nuanced approach, the discourse among peers for what it reveals about the learning experiences and, through this, the evolution of the students' shared knowledge and the willingness to share that knowledge and learn collaboratively. Another method will be to elicit information about the learner experiences through focus groups, likely as a follow-on to the project seminars that were successful in opening up conversations among the students about their projects, group dynamics, and processes of creating the design deliverables. In fact, a key area of interest in the future will be the group processes in the design projects, for there was early evidence here of the seed of extraordinary synergy and learning—or, at times, the source of considerable frustration for learners to be overcome working as a group. In the setting of online learning—and knowing that many courses taken online during the

pandemic may well remain there—there is much to be studied about learners who are new to this environment and about how it is affecting their sense of self, their authenticity, and their identities.

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Table 1

Table 1. Course design considerations according to threshold concepts framework.

	Element for consideration	Explication / Illustration
1	<i>Engagement:</i> active student engagement	Students need to engage with new knowledge and be asked to explain it, to “represent it in new ways, to apply it in new situations, and to connect it to their lives” (p.199).
2	<i>Tolerance:</i> for uncertainty and troublesomeness	Students need skills of self-awareness and metacognition to help them not give up when encountering uncertainty, discomfort, and troublesomeness.
3	<i>Recursiveness:</i> learning as recursive activity	Students need to “adopt a recursive approach to what has to be learned, attempting different ‘takes’ on the conceptual material until the necessary integration and connection ... begins to take place” (p.202).
4	Learning as a <i>journey</i>	Learning is like “a journey or excursion”—not a destination or end-point—in which “deviation and unexpected outcome within the excursion” (p. 202) are to be expected.
5	<i>Instructor’s listening:</i> active listening by instructor	Educators must listen for understanding and not “second guess where students are coming from or what their uncertainties are” (p.199).
6	<i>Beware of oversimplification</i> a caution to instructors	A simplified interpretation of a concept may operate as “false proxy, leading students to settle for the naïve version and entering into a form of ritualized learning or mimicry” (p.204).

Based on Land et al., 2006.