How Master of Library Studies Students Learn to Search for Information: A Pilot Study

Lindsay McNiff, *Killam Library and School of Information Management, Dalhousie University.*
lindsay.mcniff@dal.ca

Lauren Hays, *College of Education, University of Central Missouri.*
lauhays@ucmo.edu

Master of Library and Information Studies (MLIS) students represent a population for whom literature searching is a core practice and a learning outcome for an entry-level course on information searching. How LIS students learn to find information, though, is not completely clear. Many studies have explored undergraduate searching behavior, but few recent studies have investigated the search behaviors of MLIS students. The purpose of this Scholarship of Teaching and Learning study was to explore the following research questions: (1) How do MLIS students describe learning to search?; (2) What works in helping MLIS students see themselves as better searchers of information?; and (3) What works in helping MLIS students become better searchers of information? Participants articulated that course sequence was important in their development of searching skills, that demonstrable skills and engagement with research improved their view of themselves as searchers, and that course structure, content, and active learning were important factors in their improvement.

The purpose of this Scholarship of Teaching and Learning (SoTL) study is to better understand how Master of Library and Information Studies (MLIS) students learn to be effective searchers of information. MLIS students represent a population for whom literature searching is a core practice and a learning outcome for an entry-level course on information searching. Among the course outcomes is to become more adept at approaching "research-based reference questions" and "practice better searching skills." In general, the students do not enter the course with better searching skills than their colleagues in other departments. However, as per the course outcomes, many become more fluent in searching by the end of the course. By examining their evolving search strategies, and their sense of how they have improved as searchers, we hoped to better understand how this improvement happens and how Library and Information Studies (LIS) instructors

KEY POINTS:

- LIS students are invested in learning to search for information and have described a scaffolded approach to this skill as beneficial to their learning.

- The reference interview process should be introduced early and students should be encouraged to reflect on its relevance and to see research as a process of asking questions.

- A well-constructed LIS curriculum should allow students ample opportunities to work toward improvement in order to diminish professional anxiety and boost confidence.

can use this understanding to better teach students in the LIS discipline to search for information.

This research expands on a previous study conducted by Ondrusek, Ren, and Yang (2017), who investigated the online searching tactics and strategies of advanced MLIS students in an online searching course: an elective course that allows students to build upon the skills they developed in their introductory reference course. The goal of their study was to identify for LIS educators particular "signposts" (p. 142) to watch for in student searches. Using qualitative content analysis, the researchers discovered that LIS students used search strategies such as term selection, brainstorming, grouping, Boolean operators, and the evaluation of individual items.

The authors of this study wanted to expand Ondrusek's et al. (2017) work with first-year MLIS students and ask the following research questions:

1. How do MLIS students describe learning to search?
2. What works in helping MLIS students see themselves as better searchers of information?
3. What works in helping MLIS students become better searchers of information?

The course under discussion is an entry-level core course in the graduate MLIS program at a Canadian research university. The course is characteristic of others in ALA-accredited programs that address aspects of "reference work" or the provision of public services in an information organization. While topics such as information behavior theories and service models and trends are also addressed in the course, students are given multiple opportunities to develop their searching skills through assignments and in-class activities. Completion of the course is required for all students in the program.

As a first-year course on information services, the course includes much content beyond searching skills; however, as this study explores how MLIS students learn and describe learning how to search, this is the area of interest to this discussion. Students begin the course with instruction on basic library catalog and database searching delivered via a video, and they learn reference

interview skills through readings, lecture, a role-playing activity, and a reflective assignment based on Catherine Sheldrick Ross's (2003) classic reference interview observation assignment. They complete three in-class 30-minute reference questions of roughly equal difficulty throughout the semester, and the first one immediately follows an in-class workshop on database infrastructure. They complete a searching-related assignment in which they are asked to select three of ten possible reference questions, discuss the question and their search strategy in detail, and provide an email answer to the hypothetical patron. This assignment is followed by another in which they construct a full search plan in preparation for a bibliography on a selected topic. Later in the course, they learn about advanced search techniques and controlled vocabulary via readings, lecture, and in-class activities. Most students in the program take this course during the first semester of their incoming year.

Literature review

Library and information studies (LIS) students have indicated that they would like more explicit instruction on information literacy skills, including how to find information and how to help others locate information (Inskip, 2017). Additionally, research has shown that high self-efficacy perceptions affect LIS students' information searching (Bronstein, 2014). How LIS students learn to find information, though, is not completely clear. Many studies have explored undergraduate searching behavior, but with the exception of Ondrusek et al. (2017), recent studies have paid minimal attention to the search behaviors of MLIS students.

In order to understand the teaching and learning of search strategies, it is useful to consider studies of students in programs outside of LIS. One study of psychology undergraduate students found that the AND-operator is primarily used by students conducting research. As this is only one of the many ways to use databases, the researchers recommended that students learn how to use search engines more effectively (Vakkari, Pennanen, & Serola, 2003). Furthermore, Vakkari et al. (2003) found over the course of their longitudinal study that undergraduate psychology student participants' search vocabulary grew, but their use of search tactics and operators remained the same, and that participation or not in a research seminar affected only whether participants used the NOT operator in their searches. Similarly, researchers found that the absence of Boolean searching among humanities scholars was a commonality in beginner search patterns and that training can help searchers improve in their use of proximity searching and truncation (Siegfried, Bates, & Wilde, 1993). Bodemer (2012) posited that despite arguments to the contrary, searching is not a lower-order skill. Instead, students are already somewhat familiar with search (based on their interaction with Google), and their internet practices will influence their conceptions of information organization. Bodemer therefore recommended starting instruction on searching, and specifically instruction on the use of databases with what students already

know. Indeed, LIS students enter their programs already immersed in the information world (Smith & Roseberry, 2013). Owing to these findings, there is room in the literature for more research on literature searching, and particularly research strategies of LIS students.

Searching for information is emphasized in LIS programs because it is a core skill of librarians. Previous research has looked at which topics were being taught in library schools to enhance search education. Nicholson (2005) found that most LIS programs included a searching component in core courses followed by additional searching components in electives, and recommended that more time be devoted to searching to better prepare future librarians for their work. Specifically, Bawden (2007) urged LIS educators to consider information retrieval in conjunction with information seeking and behavior when teaching, because through syllabus analysis he found that retrieval is often taught in isolation. Campello & Abreu (2005) pointed to instructor clarity as key to increasing LIS students' motivation and success in search tasks and found that students in their study were underskilled and ill-prepared for future librarian work.

Emotions affect the search behaviors of LIS students (Furi & Balog, 2016; Saunders et al., 2015). Saunders et al. (2015) found that while LIS students are reportedly confident with computers generally, they feel more capable of conducting searches for personal rather than academic purposes. These findings matched results from a Project Information Literacy study (cited in Saunders et al., 2015) with undergraduate students. This suggests that LIS students feel no more confident than other students in this area, which underscores the need to further develop instruction. Other researchers used a survey and think-aloud method to analyze the information literacy skills of students in LIS and non-LIS disciplines (Furi & Balog, 2016). They found that LIS students tended to overestimate their information literacy skills and expressed the same feelings of uncertainty and anxiety when confronted with database search tasks as non-LIS students. Indeed, LIS students scored lower in most areas and took longer to perform search tasks. From these findings, the researchers surmised that non-LIS students were not as emotionally engaged and thus not prone to embarrassment when an approach failed (Furi & Balog, 2016). Lopatovska and Arapakis (2011) noted a variety of studies and found that positive emotions were associated with successful results and search completion, while negative emotions were associated with the system itself, and that negative feelings hindered searching. The influence of emotions on search skills underpins the need for LIS instructors to understand what students are experiencing as they learn strategies for locating information.

Methods

The study was carried out in a Canadian research university. Graduate students enrolled in a Master of Library and Information Studies (MLIS) course were the study population. Forty students were enrolled in the

course, and six students participated in this pilot study. This course was chosen because it is a required course for students in the MLIS program and because one of the course outcomes for students is to become more adept at approaching "research-based reference questions" and "practice better searching skills." In general, students do not enter the course with better searching skills than students in other disciplines. There are, of course, exceptions, such as students who have already earned advanced degrees or who have worked in a library, although most students working in libraries prior to their degree seem to hold positions in circulation or the stacks rather than reference and research services. The course under discussion is taken by most students in the program during the first semester of their first year, before many have started internship or practicum positions. Given the interdisciplinary nature of LIS, students come to these programs from undergraduate degrees with differing research demands. However, as per the course outcomes, many become more fluent in searching by the end of the course. By examining their evolving search strategies, and their sense of how they have improved as searchers, the researchers hope to better understand how this improvement happens, and how we can use this understanding to better teach students in the LIS discipline to search for information.

Multiple course assignments provided data pertinent to this study. Two of the four major course assignments were search-related assignments that also asked students to reflect on their process. The researchers collected and analyzed these assignments. The first of these assignments required students to develop answers to research-based reference questions, which included documenting their search process, reflecting on the challenges and successes of each question, and composing an email response to a hypothetical patron. The second of these assignments required students to develop a detailed search plan on a topic of their choice, compile resources, justify their choice of research tools, and reflect on their process and its relevance to their future careers.

Students in this course also engaged in three in-class activities that occurred at various points throughout the semester. Based on the approach used by Keren Dali (personal communication, July 8, 2015) in similar courses, the researchers assigned periodic "in-class reference questions." Students were given 30 minutes to read, interpret, and begin to answer a reference question. The format for these exercises was flexible (see Appendix A for sample approach), and while students were required to participate, they neither were graded on the exercises nor received individual feedback. Rather, the instructor selected a few interesting examples, removed the students' names, and posted them in the learning management system for the class to review. The instructor also facilitated a brief discussion about the question at the beginning of each class following one of the exercises. While comments from previous years' Student Ratings of Instruction suggested that students found these exercises stressful but

useful, the exercises themselves did not require students to reflect on their process. Hence, the instructor added a follow-up component during the year of the study in the hopes of capturing students' thoughts on the process and strengthening student learning from these exercises. Beginning in the study year (2018), students are now required to write a short (400–500-word) reflection within four days of the in-class exercise, loosely structured around the following questions:

- Describe the process you used to find the information.
  - What went well?
  - What could have gone better?
- Why did you approach the question this way?
- What other thoughts/feelings do you have about this search?
- How equipped did you feel to answer this question? Did any class activities, readings, etc. help you feel more equipped to answer this question?
- At this point in the program, how do you view your skills at finding information?

After the course was complete, students were also contacted to participate in an interview. The interviews were semi-structured (see Appendix B) and were about 20 minutes in length. When the interviews were finished, the interview data and assignment data were analyzed for themes. The researchers reviewed the transcripts, assignments, and reflections separately. Each used open coding to develop an initial list of codes. They then met and compared the codes they identified as being present in the data. During this meeting, they collapsed codes, discussed wording, and finalized a list. Finally, they used member checking to ask the participants to review the analysis of the collected data. The researchers shared their initial research conclusions via email. Study participants were given the opportunity to confirm that their thoughts and feelings were represented in the results.

Ethical considerations and recruitment of participants

This study received ethics approval. The research project was described in the syllabus and introduced in the first week of class. Written consent was obtained from the students via email from the co-investigator throughout the course and students had the opportunity to withdraw from the study by communicating with the co-investigator at any point. To minimize risk to the students, the course instructor did not know which students consented to and remained in the study until after final grades were submitted. Additionally, the course instructor created a code list that the co-investigator used to remove student names from the collected data. Finally, data were not accessed or analyzed until after final grades were submitted.

Results

Research Question 1: How do MLIS students describe learning to search?

To better understand how MLIS students learn to search for information, the students were asked to reflect upon and describe their learning process in the interviews. Additionally, information from the reflection assignments was used to identify trends in students' thoughts about their learning during the course. Table 1 shows the themes from the course and specific course examples.

For this research question, the course sequence was the only theme that emerged. Within that, specific content in the areas of searching techniques and searching processes were emphasized by study participants. Study Participant A stated that they found it helpful when the instructor "would open up a database and we would be talking about different tools or techniques or operators and she would actually sort of show us on screen how she was doing that and things that worked and things that didn't work. And I think for me that that style worked really well. That's sort of where we're actually being shown in real time and given examples . . . it was interactive." Study Participant C expanded on this by stating that they learned how to search for information through a combination of techniques used by the instructor. For example, the instructor used techniques "like reading and then lecturing and then practicing all together and it really felt like for the whole course we kind of built on things and the things that we did in class related to not just the in-class exercises but like the larger assignments and it just felt like it all reinforced pretty well."

Participants cited that a heightened awareness of search techniques and search processes was an important factor in their learning. While all participants articulated that their search skills had improved over the course of the semester, some participants saw this heightened awareness as empowering (Participant C described this as a "levelling up" of their skills), while others experienced it as at times overwhelming, or evidence of the inadequacy of their prior skills. Participants often described the process of learning to search as a process of becoming familiar with a) *more* databases, and b) database infrastructure and subject headings. Many practicing librarians would agree that understanding the latter is fundamentally more important than a wider exposure to different products and interfaces. Cook and Klipfel (2015) have reflected on the benefit of teaching students the "deep structural characteristics of a database" (p. 38) rather than teaching them how to use specific databases to help students engage with the information they encounter. Participant D in particular demonstrated a shift in their thinking in this area, moving from an early focus on the value of learning individual databases to a later focus on database infrastructure in general. Their early reflective writing showed an interest in becoming familiar with *more* databases (evidenced by comments such as "I felt equipped as far as technical search strategies but less

Table 1: Ways in which MLIS students describe learning to search

Theme	Course examples

Course sequence	• Intertwined content
	• Scaffolding
	• Practice
	
	• Searching techniques
	    ○ Berrypicking
	    ○ Citation chaining
	    ○ Database functions
	    ○ Search functions
	
	• Searching processes
	    ○ Adjusting search strategy
	    ○ Drawing on personal experience
	    ○ Consulting LibGuides
	    ○ Engaging with search results
	    ○ Initial broad search
	    ○ Keyword adjustment
	    ○ Keyword selection
	    ○ Learning the database
	    ○ Resource selection
	    ○ Reviewing help material
	    ○ Tracking searches

so in terms of database familiarity" and "I want to work on diversifying my familiarity with databases"), but by the end of the course their emphasis had shifted to how databases work. This participant articulated during the interview that they had learned that similar techniques can be used across different resources and stated that they felt that they were "gaining . . . conceptual knowledge of the techniques so that they weren't specific to those questions."

On the other hand, because this course both imposes hypothetical reference questions on students and "forces" (a word used frequently in participants' reflections) them to explore many different resources to complete assignments, participants did make some interesting observations about the benefit of exploring a wide variety of databases. In particular, Participant A found that searching beyond their usual complement of resources gave them a more complete understanding of the topic, and Participant B noted that this process helped them understand the interdisciplinary nature of their topic. While time spent demonstrating different resources could be better spent on the deep structure of databases, instilling in students the drive to consult a wider variety of search tools (or indeed specifying a set number on an assignment) can give students the

tools to gain a richer sense of their topic. Participant C cited the importance of searching multiple resources as one of their takeaways from the course. Table 1 further showcases course examples mentioned by participants as being beneficial for learning.

Research Question 2: What works in helping MLIS students see themselves as better searchers of information?

To understand what works in helping MLIS students see themselves as better searchers of information, the researchers asked interview questions about their view of themselves. Participants indicated that gaining demonstrable skills and engaging with research were the greatest influencers on their view of themselves as searchers of information. Specifically, to show demonstrable skills, the participants needed to be able to perform successful searches, understand database infrastructure, and apply course content. To engage with the research, participants needed to understand how to approach the question, which often included a desire to ask the hypothetical patron follow-up questions. Participants also indicated that to see themselves as better searchers of information they must engage with the research by understanding their own limits and planning a search strategy to ensure the patron receives the best service. Table 2 shows the themes from the course and specific course examples.

Study Participant D said that "an expanded knowledge and expanded skillset has made me feel far more confident in my skills." Additionally, Participant F shared that they see themselves as a better searcher of information because they no longer "haphazardly look for things." Instead, they are able to "develop . . . an efficient plan." In other words, their confidence level had increased because they recognized the searching skills they now possess. Specifically, they said they "[see] the improvement in efficiency in my searching and also getting better results from those searches that made me feel a lot more positively about my searching abilities."

Between the first and second reflection assignment, participants saw at least some evidence of improvement in their performance answering reference questions. This improvement was tied to what they viewed as a better understanding of the functions involved in searching (e.g., "I think that I'm getting a better grasp on how to utilize keywords and subject headings"—Participant A). Participant A also noted that their new confidence with databases has led to a deeper understanding of how and why some searches are unsuccessful ("I am more confident and better understand how different databases work, so I am able to understand why I may be finding [or not finding] the results I expect"). Increased enjoyment of searching later on in the course emerged in two participants' second reflections; for Participant B, this enjoyment was connected to feeling "less panicked than [they] did during the first assignment," and Participant A noted "a sense of competency and confidence during this search, which I didn't really feel during the last in-class question." Participant C found

Table 2: Ways to help MLIS students see themselves as better searchers of information

Theme	Course examples
Demonstrable skills	• Previous experience • Efficiency • Confidence • Use of skills at work • Use of skills in other classes • Self-reflection
Engagement with research	• Critical thinking • Deliberateness • Increased awareness of search methods • Okay to ask for help • Outside of disciplinary comfort zone • Planning a search • Engagement with patron • Perseverance

that success answering a reference question later in the term helped to decrease the anxiety that they had over an earlier less successful search, and they stated that "Finding good results this time has reinforced for me that having difficulty with one search does not mean my skills have disappeared."

Participants began to demonstrate a service orientation very early in the course. Because much of the research they were asked to conduct for their exercises and assignments was with the goals or interests of a hypothetical patron in mind or to assist a specific, defined imaginary researcher, students began to develop an appreciation of the importance of robust dialogue in the reference interview. Since these patrons were hypothetical and the students had no way to communicate with them to obtain more information, many found the lack of opportunity for dialogue frustrating and limiting. Understanding what questions they might ask of a researcher in order to deepen their understanding of their search was part of how participants articulated their view of themselves as searchers. Participant A remarked that they had become a better searcher because they "don't just take things at face value" (referring to reference questions) and has learned to ask "more questions to get to ideally what a person really wants to find." Participant E reflected that they "should have acquired the patron's confirmation first before I decided not to use" certain terms in their strategy, which suggested that their approach to the search, including the terms selected, was tied to the patron's needs and perspective.

Research Question 3: What works in helping MLIS students become better searchers of information?

The researchers gathered data from the interviews, in-class reference questions, and reflections in order to determine what works in helping MLIS students become better searchers of information. The three themes that emerged were a graduated approach to content, active learning, and the course content. Table 3 shows the themes from the course and specific course examples.

Study Participant B mentioned that they appreciated the "graduated approach" in which the instructor would teach simpler searching techniques and then move onto more complex in-class assignments. The in-class "assignments really gave us a chance to become familiar with not only databases, but particular you know quirks or search operators that each database will accept or not accept." This study participant went on to state the first in-class reference question was stressful due to time constraints. However, those constraints forced the participant to learn how to organize their thoughts quickly and start searching for the needed information. More specifically they stated, "And so I think with each exercise, I guess I've learned I guess A) how to prepare better and then B) how to really identify what resources and what search terms would be most useful, what search strings." Additionally, another study participant used the term "linear" when describing the construction of the class. They indicated the course moved in a linear way where concepts built over time. Because the participant "felt like the assignments were really well connected to what we were doing in class," they "never questioned why [they] were doing particular assignments or activities" (Participant C). Participant C voiced appreciation for the combination of readings, videos, and practical examples provided by the instructor and found that the repetition of concepts through these three modes solidified their learning. Participant F found the course unique in its structure in that "what we were learning in class were actual strategies that we could easily apply to assignments."

The activities most frequently mentioned by interviewees as helpful to their learning were the in-class reference questions and the associated time constraint. These were also the subject of the reflection assignments, so they received a lot of attention. Based on an approach developed by Keren Dali (personal communication, July 8, 2015), these exercises occurred three times throughout the semester. Students were presented with a research-based reference question and had 30 minutes to write notes on their approach to the question, construct a search strategy, and find some resources. The practical, active nature of these exercises was highlighted (e.g., "But then actually going in and trying search strings . . . to reach a certain kind of a specified research question on our own . . . it made more sense once you were able to like immediately apply it"—Participant D). Although students enrolled in this course over the past few years have expressed some discomfort with the timed nature of the activity, results

Table 3: Ways to help MLIS students become better searchers of information

Theme	Course examples
Graduated approach to content	• Course structure • Repetition • Feedback
Active learning	• In-class reference questions • Time constraints
Course content	• Database infrastructure • Assignment examples • Readings • Reflections • Lectures • Assignments

of this study suggested that the challenge created by the time constraint is integral to the experience. Participant A found that the difficulty and disappointment they had experienced with the second of the two exercises caused them to approach the third and final question more deliberately. This participant also felt that the time limit encouraged them to engage differently than they normally would. On their second reflection assignment, Participant B stated that they took a different approach by going directly to a database in order to "save a bit of time"; the time constraint in this case caused them to seek out a more efficient solution, and the participant noted in the interview that "it was a timed exercise and so you had to sort of kind of organize how you're going to search and where we're going to search."

Discussion
Course sequence
The sequence of the course (described in the introduction to this article) is vital to helping MLIS students become better searchers of information. Educators have long known the importance of scaffolding content, but the participants in this study made it clear that they recognized the order in which information was taught and how necessary early information was to their ability to build searching skills. Participants in this study were explicit in stating that they felt prepared to complete their assignments, and that the skills they were learning in class had a direct impact on their performance on assignments.

Although most participants in this study expressed some degree of anxiety related to their searching abilities, all felt that this graduated approach furthered their learning. It is useful to remember that searching, which is an important skill across diverse information professions, may be

integral to students' burgeoning professional identity. For example, a study conducted in Croatia to compare the information literacy skills of LIS to non-LIS students found that LIS students, when compared to their non-LIS peers, exhibited more uncertainty, anxiety, and embarrassment when working on database searching tasks (Furi & Balog, 2016). Although this finding warrants further study, the possibility remains that searching may be a skill that students in LIS programs are highly invested in acquiring and with which they are anxious about struggling or asking for assistance. LIS instructors can help ease this anxiety and facilitate learning by taking a scaffolded approach that gives students ample practice along the way.

Participants saw a real connection between searching and the reference interview, which supports Bawden's (2007) suggestion that LIS educators should approach information retrieval in conjunction with information behavior. Spending time questioning a researcher, or even theorizing on the type of questions they *would* ask a researcher if given the opportunity, helped students develop a more nuanced understanding of both the topic itself and what was missing from hypothetical research questions. The reference interview process is linked to how well we understand research questions and where we decide to look, and participants found that both of these attributes were weakened when they were unable to gather more information about the research need. A better awareness of more resources, which came later in the course, helped students understand the "where," but without the process of questioning, which allows the information professional the chance to consider the topic from multiple angles, knowing which of these resources to draw on becomes more difficult. This finding has implications for course structure in core LIS courses, in that the reference interview process should be introduced early and students should be encouraged to reflect on its relevance to their research throughout the course to help them see research, whether for themselves or for a patron, as a process of asking questions. Understanding the function of the reference interview will help students anticipate information behaviors that could obfuscate the true nature of a research topic.

This finding may also have implications for library instruction. When participants in this study were asked to look at a research need more deeply, they found themselves considering what was missing from the research question, and what they needed to know to fully understand it before developing a search strategy. Teaching non-LIS students some version of the reference interview (likely under an assumed name!) may be an option. Students could work in pairs to interrogate each other's research topics. Starting with some key questions provided by the librarian instructor, such as those typical of a reference interview ("what do you already know about this topic?" or "what would you like to learn about this topic?") may lead to a deeper discussion and contemplation of the students' topics. This is just one example of a possible activity.

Demonstrable skills

For MLIS students to possess the identity of someone who is able to find information, they need opportunities to demonstrate their skills and to become increasingly successful. This can be done through in-class activities or workplace experience. These opportunities to demonstrate their searching skills lead MLIS students to greater levels of comfort with research. Participant F said that the more opportunities they had to practice research, the less "scary" and "unknown" it became. In short, it is important for students to get better at searching and to have opportunities to see that change happening. The participants in this study felt decreased anxiety and greater confidence when they were able to see improvement, which supports Lopatovska and Arapakis's (2011) findings that positive emotions were associated with successful results and search completion. LIS educators should also keep in mind Lopatovska and Arapakis's related finding that negative feelings hindered searching. A well-constructed LIS curriculum should allow students ample opportunities to work toward improvement in order to diminish professional anxiety and boost confidence.

Value of practice and active learning

For MLIS students to become better searchers of information, they need an introduction to core concepts (e.g. database infrastructures and the reference interview) and then time to immediately practice what they have learned. Practice should then be repeated and built upon throughout the course. It was clear from the interviews that the ability to find information is not a skill that is complete at the end of a course. Instead, students need continual practice throughout their degree program and likely into their professional career. Participant A emphasized this idea when they stated that now that the course was finished, they were "probably a little bit rusty on very specific things." They further indicated that their schedule that semester did not offer many opportunities to practice research. Due to this, the participant said, "part of me is a little bit worried that if I don't use it [search skills] I'll lose it. But I do think that in general . . . I've been using a lot of the skills that I've learned and sort of honed over the semester and I feel more confident in my ability to find things and sort of, you know, say like, Oh yeah, let me go do some quick research for you. And I'm . . . a little bit more apt to do that now that I have that sort of semester."

Critiques and opportunities

Although participants in this study provided largely positive comments about their experience in this course, a few observations from the interviews may provide instructors of core reference and information retrieval courses opportunities to improve instruction or curricula. Participant A expressed some worry that without regular use of the searching skills they had gained in this course, their skills would degrade. Participant E also commented that they would prefer to receive some resources that

would allow them to maintain their skills outside of class. Instructors could prepare for this by providing the students with external resources or practice exercises to use in the future, or by highlighting elements of the readings or lectures that would be particularly helpful to them as they move through the degree.

Participant A detected "a little bit of a divide" between the searching component of the course and its theoretical aspects, although they recognized that "it's a university course" and that a theoretical component is necessary. In this study, the practical nature of this course was highlighted often by participants as one of its benefits, and Participant B even wished for other courses that were "that practical in nature." Instructors may want to look more closely at how they are presenting theoretical and practical information to ensure that the connections between the two are clear, and that students understand the value of both. The need for cohesion in any program is present at both the individual course and the curriculum development levels.

Participant C found the textbook to be at times "a bit basic" and the tone "a bit patronizing," although they also stated that they found the content helpful. The textbook used in this course is one of a few core textbooks often included on syllabi for introductory reference courses: Smith and Wong's (2016) *Reference and Information Services: An Introduction.* The chapters in this textbook cover broad areas like "Models of reference," "Instruction," "The reference interview," and "Assessment," and many of the chapters are essentially lists of resources and products that are likely to become quickly outdated. If instructors elect to use a textbook like this in their course, they should make an effort to choose supplemental readings such as scholarly literature or think pieces that will provide alternative perspectives and encourage students to ask questions.

The findings from this research have implications for library studies programs. Students need opportunities throughout their coursework to practice searching for information. These skills need to be reinforced and revisited throughout the program: A stand-alone reference course is not sufficient. Additionally, instructors need to focus on course design, but beyond that they need to carefully consider program design so that research skills scaffold throughout the program and not only in one course.

Conclusion

This pilot study highlights specific ways to teach MLIS students about how to search for information. The findings have implications for LIS programs' curriculum and pedagogy. However, to gain more insight into how MLIS students learn to search for information, the authors recommend further studies on how MLIS students learn to search for information with a larger sample. Additional data points, such as student grades, may also tell a more complete story about what works in helping MLIS students become better searchers.

Lindsay McNiff is a Learning and Instruction Librarian at Dalhousie University, and is an instructor in the Dalhousie School of Information Management. Her research interests are information literacy, LIS education, the Scholarship of Teaching and Learning, and reading in academic libraries.

Lauren Hays is an Assistant Professor of Educational Technology at the University of Central Missouri. Her current research interests are the Scholarship of Teaching and Learning, digital literacy, information literacy, educational technology, and academic development.

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Appendix A:

In-class reference question: Sample approach (adapted from K. Dali, personal communication, July 8, 2015)

Students were presented with a research-based reference question. For example: I'm trying to find scholarly resources about the use of digital textbooks in university classrooms. Can you help?

These instructions are designed to orient you. Please feel free to modify them and/or add extra text or other information. Feel free to use point form.

1. Write 2-3 sentences with your question interpretation.
2. What types of sources did you consider for tackling this question? For example, general reference sources (ie. Encyclopedias, dictionaries, etc); monographs (books, reports, etc); subscription or open databases; websites; freely accessible information.
3. Write down the search strings that actually worked. I am not interested in trial searches that did not bring fruitful results.
4. Provide specific sources that you've located and found suitable for addressing the question (eg. Specific book titles, citations for specific articles, URLs of specific websites, etc.)

Submit your answer to the submission folder by [the end of class]. The folder will close at [the end of class].

Appendix B:

Research Questions:

1. How do library students describe learning to search?
2. What works in helping library students see themselves as better searchers of information?
3. What works in helping students become better searchers of information?

Interview protocol and Research Question alignment:

1. During this course, describe your experience in learning to search for information. **(RQ1)**
2. Specifically, describe how you learned to search for information? **(RQ1)**
3. What specific activities, readings, etc. that you engaged in during the course helped you learn to search for information? **(RQ1/RQ3)**

4. How did your engagement with _____ [the stated activities, readings, etc. to question 3] impact your learning? **(RQ2)**
5. How would you describe your ability to find information? (**RQ2)**
6. What has impacted your view of yourself as a searcher of information? (**RQ2)** Why did those things impact your view of yourself as a searcher of information?
7. Do you feel like your searching abilities have improved over the semester? What specifically has improved? What do you think facilitated that improvement? (**RQ3)**
8. Now that the course is complete, how do you view your skills at finding information? (**RQ2)** Why do you view yourself that way?
9. Now that the course is complete, how equipped do you feel to answer reference questions? (**RQ2)** Why do you feel that equipped?