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Predictable Information Literacy Misconceptions of First-Year College Students

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Abstract

The process of learning includes not only success in developing knowledge, skills, and abilities but also mistakes and errors that impede such success. In any domain of learning, instructors will have developed a sense of the typical errors learners make; however, there has been no systematic investigation and documentation of predictable misunderstandings in information literacy learning in higher education. This study begins to fill that gap. Through an analysis of survey responses and focus groups, the researchers identified nine information literacy misconceptions and developed a model framework of information literacy misconceptions. The article concludes by proposing learning outcomes that could counter the misconceptions.

Keywords: misconceptions; first year students

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Predictable Information Literacy Misconceptions of First-Year College Students

Instructional design models and approaches have been prominent in the library instruction literature since the establishment of bibliographic instruction as a component of the academic library service profile. Careful attention to what is taught and how it is taught effects what is learned and how well. Throughout the years, the field of information literacy has sought to ground its work in best practices in instructional design in order to ensure instructional effectiveness. This study seeks to contribute to the evidence base upon which academic librarians develop first-year information literacy instruction by uncovering the misconceptions students have about information literacy so that these misconceptions can be corrected through instructional interventions.

Instructional Design and Information Literacy

Early works by Roberts (1979) and the ACRL Bibliographic Instruction Section Policy and Planning Committee addressed many instructional design considerations including developing objectives, instructional modes and methods, instructional materials, and evaluation. By 1993, the ACRL Bibliographic Instruction Section codified best practices in instructional design and delivery in the text *Learning to Teach: Workshops on Instruction*, which was developed as a curriculum to teach librarians to teach, and then sought to emphasize active learning instructional design in Gradowski, Snaveley, and Dempsey (1998).

The field of information literacy has recently turned to focus more on critical inquiry and instructional design. Swanson (2004) and Elmborg (2006) set the stage by exploring the concept of critical information literacy. The signature handbooks in this genre are Accardi, Drabinski, and Alana Kumbier (2009) and Pagowsky and McElroy (2016). These critical approaches exist alongside more conventional instructional design models. In fact, ACRL's signature document on information literacy, the *Framework for Information Literacy for Higher Education* (2015), which positions itself as a more critically-orientated document, itself draws the field's attention to *Understanding by Design* by Wiggins and McTighe (2005), a curricular design approach widely used throughout elementary, secondary, and post-secondary education.

Investigating Misconceptions

Wiggins and McTighe (2005) present an approach to designing instruction, which they term “backwards design,” that includes extensive reflection on essential questions, enduring understandings, and learning priorities and goals. Teachers know that the process of learning includes not only success in developing knowledge, skills, and abilities, but also the necessity of correcting mistakes and errors that impede such success. Wiggins and McTighe observe that in any domain of learning, instructors will have developed a sense of the typical errors learners make. They term these “predictable misunderstandings” and encourage consideration of them in the instructional design process in order to anticipate and overcome learner misconceptions. Shaughnessy’s (1979) work identifying student errors in writing is an early touchpoint for more systematic investigation into student misunderstandings in a domain of learning.

Previous information literacy research has investigated how to best implement information literacy instruction for first year students and has measured the effectiveness of first year information literacy instruction through various assessment methods. As an example, Gilbert (2009) used assessment techniques such as pretests and posttests to determine that multiple information literacy sessions were more effective than one-shot sessions for first year students. Research has also shown that instructors design learning activities based on beliefs about their students. Birmingham et al. (2008), for example, analyzed how first year writing teachers actively integrate information literacy into their instruction based on their perceptions of what students already know. In addition, various authors have investigated faculty, librarian, and student perceptions of information literacy. Project Information Literacy (<http://www.projectinfolit.org/>) has published numerous reports about how college students search, find, and use information in schooling and everyday life settings. Gross and Latham (2009), Ganley (2013), Yearwood, Foasberg, and Rosenberg (2015), and Perry (2017) are further exemplars of investigations into perceptions of information literacy and related behaviors. This study continues in the mode of investigating instructor perceptions, but focuses on investigation and documentation of predictable misunderstandings in information literacy learning.

Misunderstandings are a particularly vexing kind of conceptual error because they are rooted in previous success with the conception. As Wiggins and McTighe (2005) describe:

Learners are not blank slates. They come to the learning situation with prior knowledge, experience, and, quite possibly, some misconceptions. Such misunderstandings, as opposed to confusion or inattention, typically

flow from prior experience and a plausible inference based on that experience. (p. 142)

Librarians conducting first year information literacy instruction sessions can almost certainly identify misunderstandings they have encountered in the classroom and that is a useful pedagogical strategy. As Wiggins and McTighe (2005) state, “identifying potential misconceptions can help us better understand the understandings we are after and appreciate unavoidable impediments” (p. 142). As such, the researchers of this study set out to use the collective wisdom of the community of first year instruction librarians to identify misconceptions that first year students have around information literacy and to create an inventory of these misconceptions to begin systematic investigation of this topic.

The study was inspired in particular by the findings reported in the *First Year Experience Survey: Information Literacy in Higher Education* (2017), which is a report of a survey conducted by Library Journal and Credo Reference. The survey found that, with regard to searching and evaluating, librarians at both community colleges and four year colleges and universities ranked the ability to evaluate sources for reliability as the top challenge for first-year students. Students at four year schools were also perceived to lack awareness of library resources and to find it challenging to identify appropriate sources for their assignments. At two-year schools, students lack prior information literacy experience in using an academic library or completing research projects. With regard to metacognition, the survey found that students do not always understand that they need to learn these skills, or how they are helpful. Respondents stated that first-year students lack an understanding of what they need to learn or how research can benefit them. In addition, librarians reported that overconfidence may make students less willing to attend or absorb new training. Other librarians cited problems such as student apathy and a lack of attention span as challenges. Librarians noted that some students arrive having attended high schools without a library and lack basic computer skills or experience navigating a library.

In considering all of these reported problems through the Wiggins and McTighe (2005) lens of misconceptions, the research team asked this question: What are the misconceptions that drive errors in information literacy practice? In other words, if errors and struggles are the displayed behaviors, are there misconceptions driving those behaviors, and if so, can they be uncovered through a systematic review of librarian perceptions?

Study Methodology

This study was conducted in two phases. Phase 1 of this study created a misconception inventory using the responses from the *First Year Experience Survey*. Phase 2 of the research reviewed, validated, and amended the inventory through a series of focus groups with academic librarians.

To develop the misconception inventory, the researchers extracted all of the open-ended comments from the *First Year Experience Survey*. A misconception inventory is intended to be a list of erroneous beliefs, but it is not an empirical finding of how many students have each misconception, and not all students will have all of the erroneous beliefs. The open-ended comments were reviewed to identify statements that reported a misconception. A misconception is a belief held by students that is incorrect but held based on prior experience. As such, statements that dealt with affective state of mind (e.g., “students feel..” rather than “students believe..”) and statements that dealt with things first year students have not yet been taught (e.g., “students do not yet know how to..”) are not considered misconceptions. Likewise, statements that dealt with incorrect concepts due to ignorance or lack of knowledge are not considered misconceptions (e.g., “students do not know what a scholarly journal is”). Librarian comments about faculty beliefs or feelings are also not student misconceptions and were removed from consideration.

The process of coding the comments involved reviewing each of the open-ended comments repeatedly for different coding considerations. As the researchers coded the librarian comments, each comment was re-phrased into a potential predictable misunderstanding, coded for reflection of ACRL Framework concepts if there was a connection, and given an indication of whether the comment was indicative of a cognitive misunderstanding or an affective state of mind. These data were recorded in an Excel spreadsheet so that they could be easily sorted and searched.

After rephrasing and coding, the rephrased comments were revised to have consistent syntax and grammar and then the process of data reduction began. As a first step, direct duplicates were eliminated. This reduced the dataset from about 400 comments to just under 70 comments. The researchers then printed each comment on a physical card, sorted them by general concept, and wrote synthesizing statements for each group. The researchers used the card sort and synthesis to engage in two rounds of data reduction with the goal of combining like concepts while ensuring that no concepts were lost. The result was a list of nine misconceptions that fully encapsulated all of the sentiments originally expressed in the survey results. The nine original misconceptions are represented in Table 1 (Column 1). Creating the misconception inventory concluded Phase 1 of the research.

Table 1: Misconception inventories (draft and final)

Draft Misconception Inventory	Final Misconception Inventory
<p>Original List of Misconceptions:</p> <ul style="list-style-type: none"> • First year students believe they are supposed to do their research without assistance. • First year students believe that learners are outside of the community of scholars. • First year students perceive the library as a place to get books • First year students believe research is a linear, uni-directional process. • First year students believe that freely available Internet resources are sufficient for academic work. • First year students think Google is a sufficient search tool. • First year students believe that relevancy rankings in search results reflect quality. • First year students conflate achieving access and information quality. • First year students believe that they are information literate. <p>Additional Misconceptions from First Focus Group</p> <ul style="list-style-type: none"> • First year students believe that all library resources are credible. • First year students think that everyone question has a single answer. 	<ul style="list-style-type: none"> • First year students believe they are supposed to do their research without assistance. • First year students perceive the library as only a place to get books or to study. • First year students believe that research is a linear, uni-directional process. • First year students believe that freely available internet resources are sufficient for academic work. • First year students think Google is a sufficient search tool • First year students believe that accessibility is an indicator of quality. • First year students believe that they are information literate. • First year students believe that all library sources and discovery tools are credible. • First year students think that every question has a single answer.

Phase 2 of the research consisted of focus groups with librarians who work with first year undergraduate students. The focus groups functioned as a community check on the misconceptions inventory created by the researchers as a way of critiquing and validating the misconceptions list. Because the focus is misconceptions of first year undergraduates, it was important that the focus groups be comprised of academic librarians who work with first year students.

Focus group participants were solicited via email messages to the ILI-L and FYE-L Listservs and via Twitter messages by the senior researcher. Fifty-nine librarians expressed willingness to participate in a focus group; an additional 20 asked for more information, though they were not available for the scheduled focus group times. Though not all focus groups reached capacity, all four had sufficient participation (ranging from 5-12 participants) for a robust and multi-faceted discussion. The focus groups were conducted virtually using Blackboard Collaborate and moderated by the senior member of the research team.

Focus group participants were asked a series of questions about the inventory of misconceptions identified in Phase 1. The questions explored if they had ever identified those misconceptions in their experience with students and if they had any insights as to what might underlay those misconceptions. Focus group participants were also asked if they noticed any misconceptions in their students that were not included in the inventory.

Participants in the first focus group expanded the inventory by identifying two additional misconceptions that were not found in Phase 1. These two were suggested in the first focus group and the protocol was updated for the remaining focus groups to ask about these misconceptions as well. The final focus group protocol is included in Appendix A, and the complete list of misconceptions discussed in the focus groups is in Table 1 (Column 1).

After all the focus groups were conducted, the researchers reviewed and analyzed the recordings of each group's discussion. For this analysis, the researchers considered the degree of consensus for each misconception to validate the inventory as well as any expressions of direct disagreement that then led the researchers to review any focus group suggestions for refining the misconception or eliminating it from the list. In general, agreement was either expressed outright or by sharing a strategy that a librarian was currently using to try to address the misconception. Disagreement was either expressed outright or by positing an alternative perspective on the topic. The researchers also reviewed the responses of the librarians to determine if each item in the inventory was seen as a student misconception or if the librarians believed the statement actually reflected a lack of knowledge rather than a misconception per se.

Findings

Following the focus groups, the researchers re-evaluated the original nine misconceptions and the two additional misconceptions added during the focus groups. The responses from participants were analyzed for the level of agreement with each misconception. The researchers found that the misconceptions with the strongest level of agreement were these:

- First year students believe that every question has a singular answer;
- First year students believe that research is a linear, uni-directional process;
- First year students believe that Google is a sufficient search tool;
- First year students believe that freely available internet resources are sufficient for academic work;
- All library resources are credible.

Misconceptions with less consensus were these:

- First year students believe they are supposed to do their research without assistance;
- First year students perceive the library as a place to get books;
- First year students conflate achieving access and information quality;
- First year students believe they are information literate.

The misconceptions with the least consensus and that were often challenged by the participants were these:

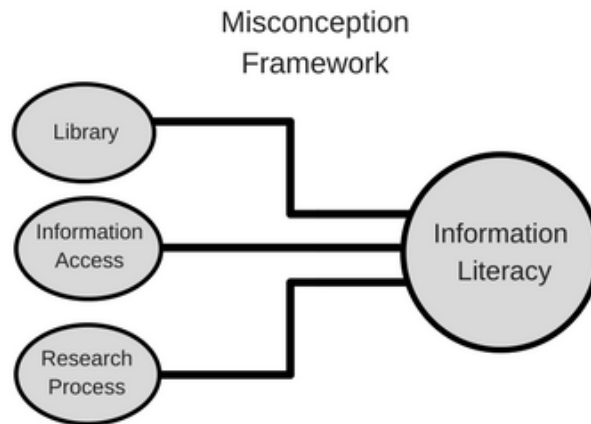
- First year students believe that learners are outside the community of scholars;
- First year students believe that relevancy rankings in search results reflect quality.

Following this analysis, the researchers eliminated the two misconceptions with the least consensus that were most challenged. First year students' belief that learners are outside the community of scholars was eliminated after the focus group analysis convinced the researchers that it is not a misconception but rather a lack of knowledge. First-year students do not know that there is a community of scholars encompassing novices through experts. It is a concept that students are not aware of rather than a concept that they misunderstand. The focus group analysis also convinced the researchers that first year students' beliefs regarding relevancy rankings were encompassed in the misconception related to accessibility and quality. The researchers also revised the misconception statements themselves to reflect the focus group discussions. The final misconception inventory is listed in Table 1 (Column 2).

Finally, the researchers returned to the misconception that "first year students believe that they are information literate" multiple times during the study, interrogating if it was as affective state rather than a conceptual mistake. Each time the conclusion was that this was a misconception, but that it was somehow distinct in type from the others. This led to grouping the misconceptions thematically and the recognition that "...are information literate" is likely a result of the other misconceptions.

The thematic groupings are presented in the misconception framework in Figure 1 and Table 2. The framework categorizes the misconceptions into thematic groups: misconceptions of the library, misconceptions of information access, and misconceptions of the research process. The framework theorizes that any misconception within these groups can lead to the misconception that students believe they are information literate.

Figure 1: Misconception framework



In turn, the researchers also posit that a student belief that they are already information literate manifests in the form of affective challenges. When the open ended responses from the *First Year Experience Survey* were coded, comments related to student affect or attitude were set aside. Returning to them in light of the framework, it seems plausible that they are a result of students believing that they are information literate because of their other misconceptions.

Table 2: Misconceptions and potential learning outcomes grouped by themes

Misconception	Potential Learning Outcome
Library	
First year students believe they are supposed to do their research without assistance.	First year students understand that research is a process in which one should seek assistance from librarians or other information professionals in solving information problems.
First year students perceive the library as only a place to get books or to study.	First year students understand that the library is a learning commons that offers a range of information resources and services.
First year students believe that all library sources and discovery tools are credible.	First year students understand that library resources and tools should be evaluated for relevance and quality.
Information Access	
First year students believe that freely available Internet resources are sufficient for academic work.	First year students understand that academic work may require information resources that are not freely available via the Internet and develop information search strategies that incorporate library resources.
First year students think Google is a sufficient search tool.	First year students understand that library databases provide different search options that are customized to academic search needs.
First year students believe that accessibility is an indicator of quality.	First year students understand that all resources should be evaluated for relevance and quality regardless of ease of access.
Research Process	
First year students believe that research is a linear, uni-directional process.	First year students conceptualize research as an iterative process.
First year students think that every question has a single answer.	First year students understand that a research question may have more than one right answer, or no right answer, and that developing an answer to a question requires assessing the evidence that supports different answers.
Information Literacy	
First year students believe that they are information literate.	First year students understand that information literacy is a process of engaged learning.

Implications

One of the goals of this study was to start an exploration of how students' misconceptions affect the outcomes and design of information literacy instruction for first year students. In *Understanding by Design*, Wiggins and McTighe (2005) point out that "identifying potential misconceptions can help us better understand the understandings we are after" (p. 142), and they go on to advise that misconceptions be considered in instructional design as a mechanism to help identify the understandings that students should instead develop through instruction. Accordingly, academic librarians are advised to design information literacy instruction in a way that addresses the predictable misunderstandings of first year students.

For each misconception identified in this study, the researchers drew on their experience with first year students to suggest learning outcomes for designing instruction that guides students to a corrected conception. These outcomes provide an illustration of how identifying misconceptions can be used for instructional design. The final misconception list and suggested outcomes are presented in Table 2. A review of the proposed learning outcomes reveals some resonance with the threshold concepts identified in the ACRL Framework but minimal overlap. This suggests that correcting misconceptions and establishing a foundation of conceptual understandings may be a precursor to Framework-based information literacy instruction. Using the results of this study with the ACRL Framework could be a strategy for developing sequential or scaffolded information literacy learning outcomes.

In addition to influencing instructional design, this research should be understood as only the beginning of research investigation into the topic of first year students' misconceptions of information literacy. This study was based on librarians' perception of students' misconceptions, developed through the instructional design ideas of Wiggins and McTighe, with the singular purpose of identifying what misconceptions may exist in students. The misconception inventory developed here can serve as a theoretical foundation for empirical research, or for further theoretical development. Such research could analyze student coursework to determine the extent of harbored misconceptions or how they are manifested in student research projects. Further exploration of this topic might also include research into whether misconceptions are displayed in student behaviors in class sessions or if they are perceived by course instructors and students themselves.

On the topic of instructional design, further research could evaluate which instructional strategies are more or less effective in moving students from misconceptions to correct conceptions, with the goal of developing effective strategies for re-teaching and re-forming

students' misconceptions. This type of research could also inform library and information science (LIS) curricular programs and professional development opportunities for practicing instruction librarians. LIS courses and professional development materials on the topic of library instruction might teach how to incorporate the consideration of students' misconceptions into instructional design practices.

The researchers also see implications for librarian-faculty collaboration. The *First Year Experience Survey* responses and comments from focus group participants show a strong perception among academic librarians that the research assignments designed by faculty do not always complement the information literacy instruction designed by librarians and may at times reinforce misconceptions. The misconception framework and inventory can be a tool for librarians to use as they work with faculty to design assignments and instruction that appropriately address first year students' misconceptions about libraries, information access, and the research process. Further research on this topic could even include experiments with collaboratively designed assignments and empirically evaluate if those improve student learning.

Conclusion

The results of this study reveal that librarians perceive first-year college students to have misconceptions related to the library, information access, the research process, and information literacy itself. Attending to these different misconceptions will ensure that first-year college students do not persist in erroneous beliefs that will impede their success with college level research. Though the suggested learning outcomes that address the misconceptions do not comprise a comprehensive information literacy curriculum, they can help to address barriers that first-year students experience in developing robust information literacy knowledge and skills.

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Appendix A: Focus Group Protocol

Introduction: To get started, I'd like to ask each of you how you work with first-year students – is it in reference or instruction settings, or both?

Focus Group Questions: Based on analysis of previous research on barriers students face in using the library and conducting research, I'm going to ask you a series of questions about student misconceptions. I will appreciate your perspectives on these and welcome discussion and debate.

- Do you agree that students believe they are supposed to do their research without assistance? Why or why not?
- In your experience, do students believe that as learners they are outside of the community of scholars?
- Do you find that students perceive the library as only a place to get books and not as a learning commons with great variety of source types and services?
- Have you found that students believe that all library resources are credible?
- In your experience, do first-year students tend to think that everyone question has a singular answer?
- Do you find that your students conceptualize research as a linear, uni-directional, process rather than an iterative process?
- Would you agree that first-year students believe that freely available Internet resources are sufficient for academic work and therefore to not see the value of library resources?
- Do students tend to think that Google is a sufficient search tool and therefore do not see the value of library databases?
- Do you find that your students believe that relevancy rankings in search results reflect quality rather than search statement relevance?
- In your experience, do students conflate achieving access and information quality? That is, that they do not differentiate between finding information and finding good information?
- Do your first-year students believe that they are information literate?

Closure: Thank you for sharing your opinions and insights. Are there any additional observations you would like to share based on today's discussion?