**Flipping for the Framework:** **Adapting a Library Instruction Session to the Framework for Information Literacy using Flipped and Discovery Based Learning Tactics**

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 **Introduction**

This paper will provide a brief overview of the new Framework for Information Literacy for Higher Education and how one librarian adapted the Framework into a College Writing Library class. The library instruction class employed two different teaching techniques. First, using the flipped classroom approach, students completed online research modules prior to class. Students accessed American University Library’s Research Tutorial which was an embedded Blackboard course page (See <http://american.beta.libguides.com/libraryresearch> to review the content of the tutorial). The tutorial contained text, calls outs, narrated clips, videos, and screencaptures. The online instruction helped students work through lectures on topic selection, searching, selecting sources, evaluating, and citing. The five online modules were assigned before in-person instruction. Since the lecture was 'flipped', the majority of class time was devoted to the second teaching technique, guided discovery-based searching addressing the threshold concept "Searching is Strategic". This part of class included individual interaction and feedback. The students completed Comparison Log worksheets during class time addressing the threshold concept "Research as Inquiry". Students were given time to reflect on how they modified their search strategies during the forty-five minute search activity. The pre-class tutorial aligns with the lower order skills of understanding and recalling in Bloom’s taxonomy. The in-class searching incorporates the higher order skills in Bloom’s taxonomy, those of applying, analyzing, and evaluating. This paper also addresses the one setback of discovery-based learning, cognitive overload. I suggest strategies to help minimize the cognitive overload arising from an adapted discovery-based classroom.

**Framework & Comparison Log Assignment/Assessment**

I first read the second draft of the Framework for Information Literacy for Higher Education in June 2014. The third draft passed an ACRL vote of approval in January 2015. The Information Literacy Competency Standards for Higher Education, adopted by ACRL back in 2000, were a granular, behavioral based set of learning outcomes. The Framework is a “richer, more complex set of core ideas” and as such includes a new definition of information literacy (ACRL, 2014 Draft 3 p.1). In a marked departure from the Standards, the Framework may not even be written to create learning outcomes statements (Oakleaf, 2014 p. 512).  It is now “based on a cluster of interconnected core concepts, with flexible options for implementation, rather than a set of standards or learning outcomes, or any prescriptive enumeration of skills” It defines information literacy as “a spectrum of abilities, practices, and habits of mind that extends and deepens learning through engagement with the information ecosystem”. It includes “engaging in creative inquiry and critical reflectionto develop questions and to find, evaluate, and manage information through an iterative process, creating new knowledgethrough ethical participation in communities of learning, scholarship, and civic purpose and**,** adopting a strategic view of the interests, biases, and assumptions present in the information ecosystem”(ACRL, 2014 Draft 3 p.1-2). The Framework really is a new lens through which instruction librarians can view information literacy. The new Framework repositions information literacy as less skills-based and more conceptual.

After reading the new Framework document, I set about applying the threshold concepts and suggested assignments to a redesigned college writing library class. Using the second draft of the Framework, I created an in-person assignment, a “Comparison Log” addressing the threshold concept “Research as Inquiry”. I incorporated Oakleaf’s recommendation of research logs, reflective writing, ‘think alouds,’ and open-ended question responses when using the Framework as a roadmap for instruction (Oakleaf, 2014 p. 513). Additionally, students were asked to reflect on changes in research questions as searching progressed in each resource. Part of the Comparison Log assignment asked students to “Take a few moments to summarize how your research strategy changed as you went from database to database. Did you change your keywords significantly as you moved through the research process? What new research questions opened up while searching (Appendix 1). This was an adaptation from an assignment in the draft Framework. From the “Research as Inquiry” assignment list, I adapted the suggestion to “assign students to keep research logs in which they note changes in particular research directions as they identify resources, read, and incorporate new learning” (ACRL, 2014 Draft 2 p.15). Instead of doing full-blown research logs, I asked precise open-ended questions about the research process.  I also asked students to fill out a worksheet comparing and contrasting the type of sources and the relevancy of results in different databases. Students were asked to name the three databases they searched in, document the keywords used in each source, and name the type of resources encountered in the database. This was adapted from the “Searching is Strategic” assignment suggestion asking students to “choose a topic, develop key search terms, and use two different search engines. Have them compare the results” (ACRL, 2014 Draft 2 p.16)

**Adapting the Class**

In general, the library class changed from a lecture based session heavy on search skills to an active learning discovery-based class empahsizing two frames, “Research as Inquiry” and “Searching is Strategic”. “Research as Inquiry” refers to an understanding that research is iterative and depends upon asking increasingly complex questions whose answers develop new questions or lines of inquiry.  In order for students to physically experience this continuous research loop, I dedicated class time to hands-on database searching. “The average student will be unable to recall most of the factual content of a typical lecture within fifteen minutes after the end of class. In contrast, interests, values, and cognitive skills are all likely to last longer, as are concepts and knowledge that students have acquired not by passively reading or listening to lectures but through their own mental efforts” (Bok, 2006, pp. 48–49). For this class session, student's mental efforts included a forty-five minute compare and contrast activity evaluating results in three selected databases with the Comparison Log worksheet. They were given time to work on a pending annotated bibliography assignment looking at the social impact of popular culture topics such as taking selfies, twerking, emojis, bitcon, food trucks, etc. The instruction session was 'flipped' so most of the lecture topics were covered in a library tutorial students were required to take before class. The class time allowed for a transfer of learning and a deepening of what was learned online. Most students came to class already aware of such concepts as Boolean logic, keyword searching, and evaluating sources.

During the searching activity, students evaluated a source for its quality and suitability for use. Both the writing faculty and the librarian assisted students adjusting their research strategy in class and answered research questions. One-on-one consultations with students kept both teachers engaged for all forty-five minutes of the guided search activity. The in-class time divided between fifty percent searching and fifty percent one-on-one feedback. I selected a guided discovery-based learning strategy because it allowed for high levels of student/faculty interaction. I wanted to be sure to incorporate time to ask questions, clarify research processes, and review tutorial material. Some research indicates “having students come to class prepared to employ what they’ve learned from an electronic lecture is useful for simulating real world activities. Library instruction is generally focused on making sure students are prepared to replicate the search and evaluation processes they take from the lesson. Therefore a simulation environment, which also provides an opportunity for feedback and adjustment, is determined to be an efficient way to use the very limited classroom” (Arnold-Garza, 2014 p. 13).

I found flipping the class led to more cognitively engaged students as compared with my usual lecture. Students took more responsibility for their own learning because they were required to actively engage in the research process.  I was also confident the research skills were being retained more readily due to increased cognitive processing. The students were not just observing me conduct searches in lecture but instead were physically engaging in the search process using the databases.

**Discovery Learning, Guided vs. Unguided Searching, and “Searching is Strategic”**

Based on Mayer's 2004 research, I decided against a pure discovery based session and instead opted for a guided discovery based session. Mayer documents better student outcomes when students are guided through discovery learning instead of left to flounder through cognitive overload (Mayer, 2004).  Students were still given ample class time to make sense of the databases and make connections between the tutorial and the in-class searching. However, most of the time was structured around a Comparison Log asking students to reflect on the difference in results in each resource searched. Additionally, the class changed to include one-on-one individual interaction. The capped class size of fifteen students ensured every student had the opportunity to be individually coached. Discovery-based learning is an inquiry-based learning method. Inquiry implies a need or want to know premise. It allows students to draw upon his or her own past library research experiences and existing knowledge to continue to discover for themselves. In a pure discovery classroom, teachers provide students with just the tools for learning a concept, and the students make sense of the tools. In a guided discovery classroom the students are assisted in helping to make sense of the tools, namely by being able to ask questions and get explanatory feedback.  In addition to the in-class assignment, the guided discovery session also supported the Framework’s threshold concept “Searching is Strategic”. Locating information requires a combination of “inquiry, discovery, and serendipity, searching identifies both possible relevant sources as well as the means to access those sources. Experts realized that information searching is a contextualized, complex experience” (ACRL, 2014 Draft 3 p.13). The class addressed the complexity of that experience by assigning a search activity and a worksheet.

**Addressing Cognitive Overload**

I found the adapted library class fairly successful. I encountered one stumbling block in adopting discovery-based learning. There was a fair amount of cognitive overload that needed redressing via one on one consultation. Letting students learn at their own pace before class did not mitigate questions in class. As students searched for information on the social impact of their popular culture topic, some became overwhelmed. "Cognitive load theory suggests that the free exploration of a highly complex environment may generate a heavy working memory load that is detrimental to learning" (Kirschner, Sweller, Clark, 2006 p.80) & (Paas, van Gog, Sweller, 2010). I observed students who struggled to make sense of their search process.  Those were the moments where I moved the class into individual one on one interaction where both faculty worked to reduce the cognitive load of the activity (Moreno, 2004). I made sure to structure the class so as to provide opportunities for explanatory feedback when students ran into trouble. I found these moments to be highly fruitful opportunities for real learning.  Meyer and Land, the originators of threshold concept theory upon which the Framework is based, make a recommendation about structuring classes. They recommend “a rich feedback environment offered at the point of conceptual difficulty (‘stuckness’, the liminal state)” is advisable for good learning and assessment of learning (Oakleaf, 2014 p. 511). Having both a writing faculty and a librarian available to help students through the liminal state made for a better class environment. Every student was afforded one on one assistance during the class session.

Based on Moreno’s research, I recommend three strategies to help students cope with cognitive overload in a discovery-based class. 1) Allow students in class to repeat, review, and ask questions about the out of class videos and lecture. 2) Have both the teaching faculty of the course and the teaching librarian available for one on one questions during the class session. Take the time to explain aspects of information searching or the research process to each student and refer them to the writing faculty if it is appropriate. Make sure to provide explanatory feedback, and not corrective feedback. 3) Create a think-pair-share activity where students are paired up with one other person in the class to work through research questions together. Have students report back to the group on how they solved research problems together. All three examples take advantage of the in-person research help available. They also leverage existing resources to help students work through the research process. This activity helps students work through the real life messiness of research and provide opportunities for optimal learning.

**Conclusion**

This paper provided a brief overview of the new Framework for Information Literacy and documented a librarian’s attempt to adapt the Framework into a library instruction class. The class addressed two different teaching techniques, flipped classroom modeling and guided discovery-based searching. The in-class experience included individual interaction and feedback with students. The students completed Comparison Log worksheets during class time. Students were also given time to reflect on how their research process changed and progressed during the forty five minute search activity. This paper also addressed the one setback of discovery-based learning, cognitive overload. Strategies were suggested to help minimize the cognitive overload of an adapted discovery-based learning classroom.

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Appendix I

Comparison Log

Name of database                                             Name of Database                                          Name of Database

Keywords used                                                Keywords Used                                               Keywords Used

Type of sources                                               Type of Sources                                              Type of Sources

How is it useful?                                            How is it useful?                                             How is it useful?

Please take a few moments to summarize how your research strategy changed as you went from database to database. Did you change your keywords significantly as you moved through the research process? What new research questions opened up while searching?