

Developing Problem-Based Library Instruction with Millennials in Mind

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Problem-based learning (PBL), a student centered pedagogy, has been used in educational settings since the 1960s. Developed at McMaster University by Howard Barrows and his faculty colleagues, this method is useful in encouraging students to use critical thinking skills to solve real world problems while also becoming self-directed learners (Barrows, 1996). It was clear at the time that students in medical education programs were overwhelmed by the amount of information they had to absorb. Many also failed to see the relevancy of the concepts to their future work as medical practitioners and thus had forgotten much of what they had learned by the time they started their clinical work. Barrows used PBL as a way for students to use their knowledge in real world scenarios regularly so that they could develop and apply clinical reasoning ability. Since then, countless medical schools have adopted problem-based curricula and in recent years PBL has become common in many fields of study in higher education.

In information literacy instruction, the incorporation of problem-based learning exercises gives students the opportunity to apply and develop search skills in the course of a library instruction session. This article outlines two approaches to implementing PBL exercises in library instruction at a small academic library. We describe a partnership that began while we both worked at Mount Aloysius College (MAC) and continued, from a planning and 'exchange of notes' standpoint to ensure we were best meeting the needs of our respective student populations, when one of us left to join Ferrum College.

Components of Problem-Based Learning

Problem-based learning has several characteristics that work together to foster learning. The first is that the learning must be student centered so that students become responsible for and drive their own learning. Second, students work together in groups to solve a real world scenario. The scenario should provide interest and make learning relevant. For example, in a business course in human resource management, students might research the following: "Imagine you are a HR Manager for a local non-profit company. The governing board of your agency has asked you to research how implementing the Affordable Care Act will impact the company. What major issues should be considered? What information will you share with the Board? Why?" When students are able to see themselves in the situation, they become more vested in the solution.

Moreover, in PBL the teacher acts as a facilitator for students' learning. The instructor may assist by answering questions or guiding students to better understand the complexity of the problem at hand. However, students acquire

new learning through self-directed study, which happens within the group while working through the problem (Barell, 2010).

Development of an Information Literacy Instructional Approach

Millennial student searching often relies on Google, using natural language queries and selection of first link results. Moreover, students often lack a well-defined search strategy or knowledge as to why a strategy can help improve search effectiveness (Porter, 2011; Taylor, 2012; Daniel, 2013). PBL library instruction asks students to think critically and employ problem solving techniques, skills critical to the practice of information literacy.

Millennials have a unique set of learning preferences that can be leveraged using a PBL instruction method to better engage student-centered learning. These include preferences for exercises that are: active, visual, collaborative, structured, and meaningful (Oblinger & Oblinger, 2005; Becker, 2012). Moreover, many millennial students learn best through informal learning environments and opportunities for self-learning (McHaney, 2011).

Translating these approaches into practice led to the development of an engaged model for teaching and learning that was employed, separately by each of us, at two small private colleges. The model we developed focused on learning activities that were *active* using iPads, apps, and mirroring technology, *visual* using prezis and tutorials, *collaborative* through small research groups, *structured* with the use of a LibGuide and handouts, and *meaningful* through a real world problem scenario.

Implementation

Starting in Fall 2011 the Mount Aloysius College Library offered PBL information literacy sessions for several 100 level courses using the model mentioned previously. The goal was to present students with a real world "problem" in an area relative to the course and have them "solve" the problem using library resources. Technology employed included: iPads and a charging and syncing cart, a 90-inch HDTV, an Apple TV, and a Mac Mini to run the cart. Our outcomes were: to double the number of active learning instruction sessions offered; to have 95% of the students participating in these sessions locate a database in their field and 95% demonstrate at least one search strategy in a database; and to have 85% of the students participating demonstrate the ability to evaluate two different types of sources critically.

The 50-minute session began with a brief introduction by the librarian to library resources, focusing primarily on the Library's discovery tool. After the introduction, students were asked to form small groups and a short instruction handout was given to them describing the learning activity. Each student in the group of 3-4 students needed to select a role; the options were Researcher 1, Researcher 2, Recorder and Presenter. Once roles were chosen, students were given the problem scenario and told to begin their research. For the groups, researchers were primarily responsible for finding the information, while the recorder filled out the feedback/response form given to them by the librarian and the presenter reviewed materials selected by the researchers. Groups used the Evernote app to store and share the articles that they chose to best answer the problem question. After 30 minutes of research time, the group's presenter shared the two sources they felt best answered the question by mirroring their iPad screen onto the main display and talking briefly about each. At that point, the librarian would lead a discussion on the evaluation of the sources and the teams would wrap up and submit their forms.

These sessions were offered to 44 classes during the first two semesters, which included 646 students. After evaluating the students' feedback and chosen sources we found that 94% of the students were able to find scholarly resources that supported their response to the problem question, and that 85% of them were able to properly evaluate those sources based on criteria given to them, such as authority, currency, and source type. Two questions assessed interest level and had 72% and 80% of students who said they liked the session and that the iPads enhanced the session, respectively.

At Ferrum College, the approach to PBL sessions varied slightly. Mount Aloysius College received grant funding for their technology, which required specific data collection and reporting measures, while Ferrum College did not. This meant Ferrum was not limited by grant specifications, and therefore, had a greater level of flexibility in content delivery and assessment methods. Additionally, Ferrum's implementation came later and this additional time allowed for more PBL research to be conducted and contributed to the development of qualitative assessment measures in Ferrum College's approach.

Thus, in the spring of 2012, Ferrum College's Stanley Library started a pilot project for 50-minute PBL instructional sessions for theme-based English 102 classes. While faculty were not familiar with this approach, several were willing to participate in the pilot. After the first two sessions it was clear that some modifications to the lesson plan were needed. For example, initially the format relied on having students read material prior to the PBL session; however, students did not complete this step even when it was assigned by faculty. This step was removed as it was not deemed to be an essential requirement of the lesson (which the students likely recognized, leading to why they did not do this reading). Second, the sessions lacked any real introduction other

than a description of the exercise. After one particular class discussion with students about why they relied mostly on Google for research, the librarian decided to leverage her knowledge of millennial research strategies and created an introductory Prezi describing differences in content found from search engines versus library databases. This brief presentation became the in-class introduction to the PBL exercise, and its concepts were often cited by students in their after-session assessments as "the most important thing they learned from the session."

The exercise itself was accessed as tabs within a LibGuide and the problem scenarios were developed by the librarian based on information shared by the faculty member. The following example was used in an English 101 course requiring research on school violence, a topic students are quite familiar with from the news, if not personally. "You represent a local citizen's group who *supports* or *opposes* armed guards in your public schools. Your School Board is hosting a town meeting next week to hear arguments on this proposal. Your citizen's group has asked you to speak on their behalf. You want to support your argument to the Board with reputable research. What position will you argue? What research will you present and why?"

The problem scenario for the class was stated on each page of the LibGuide for reference. Using iPads and working in small groups, students were to first discuss what information they needed to gather in order to solve the problem, as well as record how they would phrase their searches. Once complete the librarian displayed the answers from a Google Form for all students to see before moving to the phase of actual searching. Options for the Library's discovery system and Google Scholar were made easily accessible during the search phase. As all students searched for resources they were asked to discuss findings as a group and choose the best result they found to share with the class. The source information was captured for post-assessment. Each group was then asked to have one member display their result using mirroring with AppleTV. Students presented how they searched and why they chose their source. Points of credibility or lack of credibility were pointed out by the librarian as sources were demonstrated. This approach allowed for just in time teaching of research practices by the librarian.

Feedback gathered from students at the end of the sessions via a Google Form was both positive of the format and pointed to a learning of core concepts such as differences between search engines and library databases and the importance of creating a good search query. Faculty feedback was also favorable. One faculty commented on a post session survey, "I'm in awe of anyone who can conduct a whole interactive unit of study and have it completed and assessed in under an hour". Perhaps more indicative of faculty response to these sessions is that we received a second round of requests for PBL sessions from faculty who participated the previous year.

Conclusion

While the PBL sessions continue to be offered as an option for information literacy sessions at Mount Aloysius College, newly developed instructional sessions maximizing the use of iPads and subject-based educational apps are also being offered. At Ferrum College, PBL sessions are a notable component the library information literacy program and now extend to some upper division classes.

The biggest challenge we faced in creating our PBL sessions was buy in from fellow librarians and faculty who were unfamiliar with the approach. While our PBL sessions had positive learning outcomes, more focus needs to be placed on where to introduce PBL and how to scaffold information literacy skills through upper division courses without simply repeating the same type of session.

Moreover, time is an important factor in planning any PBL exercise. Even restricting the material to only the basic essentials of an introduction, time for searching, and a discussion period it is difficult to complete a PBL session in 50 minutes without strong preparation and practice beforehand. Finally, while our design relied heavily on the use of iPads, our research shows a PBL session could be developed similarly at other libraries with different technologies or exercises. Overall, our implementations demonstrate that a PBL approach to information literacy instruction can be applied in a variety of learning situations and provides an engaging learning experience for millennial students.

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can be helpful as well, such as <http://spyrestudios.com/the-anatomy-of-an-infographic-5-steps-to-create-a-powerful-visual/> and <http://www.wired.com/2013/10/13-sterling-pieces-of-data-viz-from-the-best-american-infographic-2013/>. Be sure to at least spend some time reviewing sources like these before you start designing infographics for wide-consumption; otherwise these easy-to-use tools can end up leading to a bunch of output that is not as good as you (or your students or audience) would hope.

Conclusion

Although differing to some extent with respect to features and functionality, Piktochart, Venngage, and infogr.am are all tools that can decrease the learning curve when it comes to producing quality infographics. Students can use these tools to create information graphics to use in research

papers and presentations. Instruction librarians can use them to create infographics to enhance their teaching materials and engage students. You may even want to consider an assignment requiring students to develop an infographic to present information they gather, evaluate, and synthesize as part of the regular research process.

Because these tools make it easier to create quality data visualizations by reducing the effort needed to learn complex graphics and design software programs, they allow you and your student to put the focus on finding and communicating quality information which is, after all, an end goal for information literacy instruction.