Mixed Methods, Mixed Results: A Study of Engagement Among Students Using iPads in Library Instruction

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Introduction and Background

The purpose of this study is to explore the value of integrating tablet computers (iPads) into library instruction for first-year composition students. Many librarians and other faculty have reported their initial use of tablets in libraries and other instructional settings; however there is little established evidence that this technology has an effect on student engagement and learning.

At University of Wyoming, first-year students typically have library instruction in three classes. Making those experiences distinct, useful, and engaging is important to our instruction librarians, and we have worked to develop lesson plans that address different learning outcomes and use different types of activities; students, however, sometimes believe that all library instruction is the same. A concept mapping activity has been part of the lesson plan for library instruction in the first-year composition classes at UW since 2010. The purpose of the activity is to engage students in making meaning out of their broad research topics and revealing what they already know and what they want to know as they begin library research. The activity is focused on mapping out ideas and moving toward a focused research question.

Based on both the literature and our experience, we know that technology can be an effective tool for increasing student engagement and excitement; therefore we are testing the affordances of a set of ten iPads in the library classroom. Before expanding this program, it is important to assess its effectiveness. In this first study, our primary interest was in measuring student engagement. Secondarily, we evaluated student performance on a concept mapping activity aligned with specific learning outcomes.

This paper will primarily address our use of iPads for concept mapping in a first-year composition class. We have also used iPads in some first-year experience courses that introduce students to study within their disciplines or require students to explore a career or major. For those classes we have adapted North Carolina State University library's scavenger hunt activity and sent students out into the library in teams with iPads. A variety of upper-division and graduate library instruction has also incorporated iPads in various ways. In addition to the classroom set of iPads, University of Wyoming has a set of circulating iPads that students may check out for three days, though these programs are independent and the sets never mix.

Literature Review

The use of iPads or other tablet computers in the library classroom is not yet established enough to be significantly documented in the professional literature. We identified four primary uses of iPads and

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other mobile devices among academic librarians: clinical settings, higher education classrooms, reference service, and library circulation programs. As our study was designed to investigate student engagement, we consulted literature on tablet computers and student engagement both in library and information science and the broader higher education literature. We also consulted literature about concept mapping in the classroom.

Researchers at IUPUI studied student perceptions of iPad use in a variety of classroom contexts, including connecting ideas through the use of concept maps. While they identified several opportunities of mobile learning, including research, collaboration, and intuitive design, they also found some limitations, including lack of training, keyboard design, sharing the tablets, and undeveloped information literacy. A notable finding is that students who used the tablets several times during a semester had fewer problems than did those students who only had the opportunity to use them once.[1] This last point was echoed in the recommendations Mang & Wardley make for adopting tablets into higher education.[2] In their pilot study of iPads in the classroom, some affordances of the tablet emerged, most notably the ability to both type and use handwriting to annotate course materials. Similarly, graduate students surveyed at the University of Northern Colorado value the ways the iPad allows them to interact with texts and other course materials in a variety of ways.[3]

Concept maps, first developed in the 1970s as an epistemological tool to organize meaning hierarchically, have been taken up by constructivist teachers as a means for students to represent and organize their own learning and as an assessment tool.[4] Nursing education, in particular, has adopted concept mapping into its curricula to promote critical thinking and assess nurses' learning and gaps in knowledge.[5] The teaching of concept mapping has been associated with gains in students' critical thinking abilities. In an experimental study comparing a concept map teaching approach to traditional methods, Chen, Liang, and Liao found significantly higher overall critical thinking and inference scores for students taught using concept maps.[6]

Additionally, researchers in information science and education have found concept maps to be a useful way to measure students' gains in information skills, including critical thinking skills such as text comprehension, analysis, and synthesis as well as searching skills.[7] In an analysis of concept maps students created before and after searching for information in preparation for writing a research paper, Egusa et al found significant changes in students' mental representations of their knowledge, indicating that concept maps may have a place in information literacy instructional settings.[8]

Methods

Our assessment design included observation of students in the classroom using a standardized form (see Appendix A) to record time on task; students returning to and revising the concept map; and students' participation in the class as evidenced by questioning, sharing, and discussing. We conducted this assessment in ten sections of the same course (freshman composition) with five different librarians and two different observers. All librarians used a common lesson plan and activity. Five classes used iPads, and five used paper for the concept mapping activity. Students using iPads used the app Notability to create their maps and Dropbox to submit; students using paper turned maps in to the librarian.

Following instruction sessions, students' concept maps were evaluated using a rubric to compare relevance, quality, and completeness of paper versus tablet-based concept maps (Appendix B). With four scorers, we established inter-rater reliability by having two scorers for each concept map and a third in all cases where the first two disagreed by more than one point on any criterion. Scores were averaged for the final evaluation.

Scorers also analyzed student evaluations of all ten sections for evidence of student satisfaction and engagement. The standard library instruction evaluation includes both open-ended and likert items. Students choose on a five-point scale whether they agree or disagree with the following statements:

- I learned how to use library resources more effectively
- I learned something new today
- The objectives of the session were clearly explained
- I was encouraged to think and problem-solve for myself
- This session will help me with the work I am doing for my class
- I feel confident in my ability to relate what I learned in this class to other classes and situations

In addition to these six likert items, students are asked to respond to two open-ended questions:

- What will you do differently as a result of this session?
- What, if anything, in this session was confusing?

Results & Discussion
Engagement

As we observed first-year composition classes in the library, we recorded how many students chose to use iPads and how many opted out. Students were presented with a choice before class started—they could use an iPad or a laptop. In the five classes we observed where iPads were offered, all ten iPads were used in only two of those classes. We were surprised to see many students turn down the opportunity to use an iPad in class and we overheard comments like, "I know how to use a laptop—I don't know how to use an iPad." We theorize that students may have chosen to use a familiar technology in order to be as productive as possible or perhaps in order to avoid losing face with peers. It is also possible that students view iPads as more of a personal entertainment device than a learning tool.

The observable surrogates we chose to use to assess the slippery idea of student "engagement" included time on task, questions during concept mapping and searching, and sharing findings in class discussion (Appendix A). We did not observe significant differences in the time spent on concept mapping or in student likeliness to share results or participate in discussion. Students using iPads were more likely to ask questions of the librarian, but they were almost all technology related, such as, "How do I highlight?" or "How do I submit?" Overall, librarian observations revealed no differences in attentiveness or participation between students with iPads and students without iPads.

We compared student evaluations of library instruction sessions for additional evidence of engagement, and found no notable differences between classes with iPads and classes without iPads regarding student satisfaction. Students evaluated the library instruction session in similar ways, with some slight differences. Student responses to the question "I learned how to use library resources more effectively" were slightly lower for iPad classes—3.98 versus 4.089 (on a 5-point likert scale)—and student responses to the question "The objectives of the session were clearly explained" were slightly higher for iPad classes—4.306 versus 4.143. In response to open-ended questions, a few students who used iPads expressed some excitement about using a tablet and some others said that, in retrospect, they should not have chosen to use an iPad.

Concept Mapping Performance

Although our primary interest in this study was observing student engagement, we were also able to compare student outcomes on a specific learning task. In this area, the results were more interesting. We found a clear difference in performance on the concept mapping assignment, with students who used iPads performing at a considerably lower level than students who used paper. We evaluated the student concept maps using a rubric with the dimensions of completeness, relevance, and quality (Appendix B) and gave each map a score out of nine possible points.

| TABLE 1 Average Concept Map Scores	
Average score for non-iPad classes	5.71
Average score for iPad classes	4.515
Average score for non-iPad individuals	5.43
Average score for iPad individuals	4.04

The average scores for iPad-using classes and for iPad-using individuals were lower than the overall average of 5.175. When comparing representative maps created on paper versus those created on iPads, the paper maps are neater, more complete, and more readable than the iPad maps, as illustrated by comparing

FIGURE 1
Example Paper Concept Map
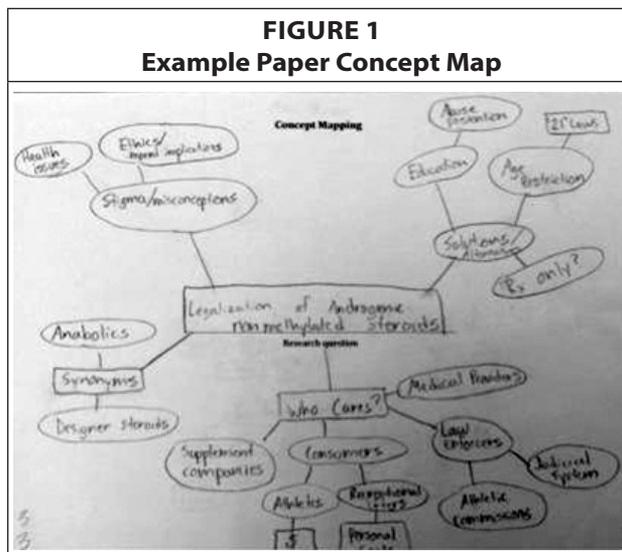
figures 1 and 2, typical examples of the completeness of paper and iPad concept maps, respectively. This difference suggests to us that the unfamiliar technology was a barrier to the brainstorming process and that it probably slowed students down. As shown in figure 2, some students used both the typing and handwriting options on the iPad, though most used handwriting alone.

FIGURE 1
Example iPad Concept Map
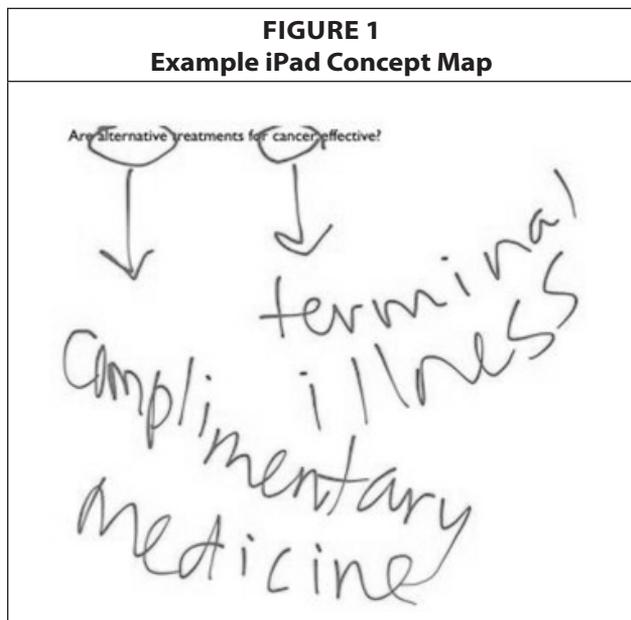
Implications

It was somewhat surprising that the most significant finding was lower performance on the concept map activity among iPad users. We maintain that concept mapping is a useful strategy in the instruction sessions for first-year composition students, but it may not be appropriate at this time to integrate iPads into this activity. It may be that handwriting and drawing on a tablet are activities that require more instruction and exposure before students feel prepared to engage fully in an activity that requires those skills. It is unlikely we will continue using tablets for the first-year composition concept mapping activity in the immediate future.

We also hypothesize that students did not understand the purpose of using the tablets in class and need the librarians to explain their reasoning. Additionally, we hypothesize that students perceive library instruction as somewhat disconnected from their regular classroom work and that the isolated use of iPads in the library furthered that sense of disconnection. We will look for opportunities to make better connections between the technologies we use in library instruction and what happens in the regular classroom.

Because iPads are used in a variety of library instruction contexts at UW, it will be useful to apply what we learned in this study to those initiatives. Potential directions for future investigation include gathering feedback from faculty and students about their use of tablets and what strategies are useful to them in relationship to their teaching, learning, and research needs.

Most importantly, this study reinforced that new devices or technologies alone are insufficient to engage students in their learning and in fact may detract from an otherwise useful activity. It is important to carefully plan and think through the implementation of new technology into information literacy instruction, while at the same time remaining open to experimentation.

Appendix A. Observation Sheet

Librarian Instructor: _____

English Instructor: _____

Librarian Observer: _____

Students in session: _____   # iPad opt-ins: _____   # iPad turnaways _____

Students using paper concept map	Students using iPad concept map
Time on task	
Revision/returning to concept map	

Engagement

Students using paper concept map	Students using iPad concept map
Questions during mapping activity	
Sharing in discussions	
Questions during search activity	
Sharing out findings	

Appendix B. Rubric for Concept Mapping/Keyword Selection

Learning Outcome: Students will be able to identify keywords that represent a research topic.

Evaluation Criteria	Insufficient or Not available – 0	Beginning – 1	Developing – 2	Exemplary –3
Relevance	Lists no keywords or can't tell if keywords are relevant.	Lists keywords that are **not relevant** for the research question.	Lists keywords that are **mostly relevant** OR lists **not enough keywords** to express all aspects of the research question.	Lists **several** keywords that express **all aspects** of the research question.
Quality	Lists no keywords or illegible concept map.	Lists keywords that are **meaningless** and/or keywords that will retrieve **biased** results OR uses all **natural language**	Most keywords are **meaningful** and will retrieve results on **most sides of the issue**. Does not use natural language.	Keywords listed are of high quality and/or will lead student to subject/thesaurus terms.
Revision or completeness of concept map	Blank or illegible	Wrote down question or topic and little else.	Includes question or topic and keywords OR stakeholders OR additional questions.	Extensive concept map with many keywords, stakeholders, questions, etc.

Notes

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