

Assessing Information Literacy Comprehension in First-Year Students

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Abstract

Instruction librarians focus on teaching information literacy skills to students in a variety of settings. However, many college professors only allow the librarian one information literacy session per class to convey these skills each semester. During a library session, active learning technology can be utilized to encourage student participation and hands-on learning. Often, librarians seek other avenues to distribute knowledge to students beyond the library session (e.g., Blackboard, wikis, tutorials, and subject guides). The authors used Interwrite Personal Response Systems (clickers) over two semesters to encourage student engagement during an information literacy session in a course originally designed for at-risk freshmen, then redesigned for any first-year student. For the second semester, the librarians added pretests and posttests that were administered using Blackboard, the university's course management system. This study explains how a two-semester project integrated information literacy skills into a first-year curriculum, while serving as an instrumental assessment measure for student learning.

Keywords: information literacy, library instruction, clickers, first-year students

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Introduction

The University of Mississippi is a doctoral degree-granting university with 15 academic divisions, 18,000 students, and 729 full-time faculty members. Over the years, the university has provided various for-credit courses to freshmen to help them meet academic expectations and adjust to collegiate life. With a student-to-faculty ratio of 17:1, Ole Miss utilizes instructors and staff to teach some first-year seminar courses that acclimate students to the university through a diverse group of mentors. Along with the Coordinator for Instruction at the University Libraries, the authors developed a relationship with instructors of one such class entitled "Academic Skills for College" (EDLD 101), offered in the fall of 2008. EDLD 101 was designed as a traditional lecture course restricted to first-year freshmen on academic probation. The class focused on the development of academic skills which included time management, taking notes, reading textbooks, preparing for and taking exams, and orientation to university life. This course required a library component that consisted of a scavenger hunt led by one of four librarians assigned to each section of the course.

A change in course design occurred the next semester. EDLD instructors were redesigning the course for students on academic probation. Having established a good relationship with the director of the developmental studies classes, the librarians recommended a newly structured library component for the redesigned spring 2009 EDLD classes called the clicker project that would incorporate information literacy (IL) learning outcomes.

A new wave of change occurred when the EDLD 101 course was redesigned again in the fall of 2009 to become "The First Year Seminar" (EDHE 105), a course combining academic and social experiences for incoming freshmen. In addition to the academic skills taught in EDLD 101, EDHE 105 was designed to aid freshmen in adjusting to the university, developing a better understanding of the learning process, acquiring essential survival skills, and beginning the major/career exploration process. EDHE 105 introduced students to the mission and values of the university; it also exposed them to different social experiences such as the arts, sporting events, health issues, and money management.

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Literature Review

Clickers and clicker software are called many names, depending upon whether they are discussed in the context of education, business/marketing, or information technology: Classroom Response Systems, Audience Response Systems, Personal Response Systems, etc. For this study, they will be referred to as clickers as they all serve the same function: they are personal digital devices used to poll an audience for the purpose of collecting, displaying, and analyzing results using a receiver and accompanying software.

The chief limitations of early generation clickers were the restricted range of their infrared (IR) receivers and the cost imposed on students who had to purchase different models for each class (Bujega, 2008). Later, clickers switched from IR to radio-frequency receivers that permitted more units per receiver and a much greater range. Furthermore, universities discovered the savings to be gained by signing exclusivity contracts with the product vendors (Jefferson & Spiegel, 2009). As a result of this improved functionality and affordability, the use of clickers has become more commonplace in higher education. There are numerous articles and news reports that explain to the novice reader what clickers are, how they work, and the benefits and drawbacks of such systems (Bobkoff, 2009; Bruff, 2008).

Instructors have integrated classroom response systems into their courses for a variety of reasons, such as assessing prior knowledge, testing recently acquired knowledge, anonymous polling for difficult course content, gathering feedback, and classroom management (Zhu, 2007). Clickers have been found to improve attendance in large lecture courses; students appreciate their anonymity and immediate feedback and feel it gives the instructor a better understanding of their needs (Caldwell, 2007). Some advocates claim that the anonymity provided by clicker use increases class participation in situations where students are attending under duress, such as first-year seminars, prerequisite coursework, and mandatory seminars for students suspected of plagiarism (Bombaro, 2007; Dill, 2008).

Performance may be enhanced as well. Take, for example, a study of biology majors and non-majors each using clickers for a genetics course. The non-majors who used clickers in the classroom showed significant improvement over those who received only traditional instruction; however, the biology majors performed equally well in clicker and traditional classrooms (Crossgrove & Curran, 2008). It seems that students who already have an affinity for a course's subject matter may not benefit from clicker use, but for other, more reticent students, the increased interest and engagement can make a difference.

The authors were particularly intrigued by these findings, since so much library instruction

seems to be mandatory, punitive, or preliminary to further progress in the classroom. Most studies on using clickers in library sessions have reported that the majority of students show increased focus and attentiveness, and generally enjoy using clickers (Corcos & Monty, 2008). As part of library instruction, one may use clicker questions for library practice exercises and to gather evaluative comments, rather than handing out paper worksheets and surveys (Burnett & Collins, 2007).

The studies that have examined the efficacy of clickers have produced mixed results, ranging from vast improvement to no change at all in meeting information literacy objectives. In most cases, the students perceived that using the clickers improved their grades and classroom performance, even when no significant difference was measured (Kenwright, 2009). The studies that demonstrated clickers had no significant effect were careful to use active learning methods for teaching both the control and variable groups (Martyn, 2007). Martyn argued that student success was created by moving away from the lecturing model and employing active learning techniques in order to keep students engaged (p. 71). Other investigators have also found that interactivity has been shown to keep students focused (Bombaro, 2007), awake (Kenwright, 2009), and visually engaged (Armstrong & Georgas, 2006) and has improved attendance (Nelson & Hauck, 2008). However, the investigators warn against simply adding technology to preexisting course content hoping it will work; an important part of introducing a new technology into the classroom is to understand that "simply layering technology onto instruction will likely not yield any significant improvement in student learning" (Dill, 2008). Petersohn (2008) looked closely at question types and ways in which clicker use could be integrated with currently-used successful pedagogy, noting that "the successful use of media in instruction may depend in large part on how closely the media can be aligned with the instructional design." For this reason the authors created an original class plan and script for use with the clickers, rather than try to wedge their use into an existing teaching model. The goal was twofold: to find a tool that would help more reluctant students stay engaged during library instruction, and for it to be something that could quiz them on their existing knowledge, exposing areas requiring further attention.

EDLD 101

Freshman enrollment for 2008-2009 was 3,350. In spring 2009, eight sections of EDLD 101 were taught, with seven sections participating in a library session. In these seven classes, 105 students attended (less than 5% of the total freshman population). The authors were pleased to

have the small sample size for testing new instruction methods. Seizing the opportunity to embed information literacy into a new course, the authors decided to experiment with using Interwrite PRS clickers to foster more interactivity in the classroom. The goals for the spring project were twofold: to determine if clicker technology was an effective active learning instrument to gauge student learning in a library session and to collaborate with faculty to instill academic competence into at-risk students by integrating information literacy skills into their curriculum.

At the time of the project, Interwrite PRS clickers were available in the campus bookstore and several faculty members had begun incorporating the technology into their courses. The library had received twenty clickers as a part of a grant to test their usability in teaching library skills, yet had not implemented them into library sessions as teaching or assessment tools. As an assessment device, the clicker software provides statistical information on each data set collected in class. For the clicker project, the librarians would need to use the clickers in eight sections of the same course. After attending the university's training session for faculty using the clicker software, it was apparent that the target audience for clicker use remained with teaching faculty, requiring the authors to adapt the functionality of the clickers to use them successfully as one-shot testing instruments.

Once the library sessions began, the authors quickly realized that clickers were popular active learning tools for the students. The clickers were used in the library sessions to keep students engaged in the session by having students answer questions on information literacy fundamentals and basic library skills, such as using the library catalog, using the database CQ Researcher, identifying parts of citations and database records, and evaluating websites. This project was instrumental in finding a new avenue to assess student learning and was pursuant to the university's initiative to imbed information literacy instruction throughout the first-year experience, as the authors now had an expanding group of classes that would require a library session, offer follow-up sessions, and create an assignment to test library skills. The librarians had not, however, developed a way to measure student learning at this point.

EDHE 105

The librarians involved in EDLD 101 hoped to redesign the library component to better fit the needs of the students and instructors, assess student learning, and continue using clickers for participation. However, with the course restructure from EDLD 101 to EDHE 105, more changes would need to be addressed. The new course brought more instructors and many more sections

to this expansion of the first-year curriculum. The authors assembled a team of 13 librarians and staff members to collaborate with instructors of 29 sections of the EDHE 105 course aimed at 529 members (14%) of the 3,607 fall 2009 freshman enrollment. This 11% increase from the previous semester required the librarians to focus efforts in a more precise way. They continued the one-shot library session using clickers for classroom engagement and added pretests and posttests outlining information literacy objectives through Blackboard to assess student learning.

The authors attended meetings with the course instructors as changes to the course were being considered in order to develop more library-related opportunities in the curriculum. The instructors agreed that the librarians should continue a similar library session with clickers, but they also agreed that pretesting and posttesting in Blackboard and creating a page in the course textbook about the library were also important to the course. The authors created a separate class in Blackboard to test students in order to gain meaningful feedback about how the library session impacted learning basic library skills. Information literacy objectives were also integrated into the course textbook where a customized portion of the text allowed for institutional contributions. The library received two of the 20 customizable pages in the text. EDHE 105 allowed the librarians to continue their clicker project with revisions, while embedding information into the textbook and requiring students to also enroll into the library's Blackboard "class" for testing.

The librarians, in evaluating feedback from EDLD library sessions, realized there were many areas in which better assessment could be obtained. As stated, implementing an assessment measure for student learning had not been a planned objective for EDLD 101. As the project came to an end, librarians realized that restructuring the session to incorporate pretests and posttests could allow the activity to better support the overall library assessment report which needed an instrument for measuring how much information the students actually learned from the library sessions. Did the clickers help students learn? Were they fun to use? What library skills did the students learn during the session? These were questions the librarians addressed in EDHE 105. They embedded information literacy objectives from the university's Information Literacy Committee into the library session, course textbook, and tests.

Methodology

This two-semester study in clicker use and student learning continued into the fall of 2009 with the derivative class EDHE 105. Because of positive feedback from students and instructors from EDLD 101, using clickers as active learning tools remained a goal the authors wanted to

continue in the fall library sessions. EDHE 105 was designed to reach students before probation was an alternative. The course expanded upon the original goals of developing academic skills including time management, taking notes, reading textbooks, preparing for and taking exams, and adjusting to university life.

Because the clickers were unfamiliar for most librarians, each class was designed with a librarian and a co-librarian to assist with the session. The librarian followed a script to teach the session, while the co-librarian helped students with clickers and other individual technical difficulties throughout the session. This co-teaching arrangement allowed the lead librarian to focus on instruction consistency and time management. The authors put the script in an internal library wiki so that all librarians teaching a session could access the script. Librarians were encouraged to book the classroom and practice the session using the script with the co-librarian in advance.

The script designed a mix of questions that allowed students to sometimes recite demonstrated material and other times use critical thinking skills to analyze possible answers before the skill was actually taught. For the latter questions, librarians would explain why each choice would or would not be a best answer. Some questions had multiple answers; some questions had no wrong answer. The librarians stimulated participation by assuring students that the clicker responses were anonymous and not graded. Students were shown how to navigate the library website, use keywords in the catalog to locate subject specific books, interpret the catalog record, use EBSCO's Academic Search Premier database to identify scholarly articles and email records, and how to contact a librarian for help.

The EDLD 101 sessions had too much information for the students within the 50 minute time frame. Because there was no way to increase the session time, the independent activity assignment was dropped in EDHE 105. For database and catalog searching, topics on higher education were preselected and handed out to students in EDLD 101. Conversely, students were asked to reflect on career choices and to use the catalog and databases to find supportive materials in selecting a career during EDHE 105. This shift of power from the mandate by instructors to free thinking by the students was crucial in supporting an active learning environment. The librarians looked for ways such as these to keep the students engaged in the session instead of allowing them to learn passively as in a traditional lecture.

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Discussion

Deciding the best tool to deliver the pretests and posttests was the university's course management system (Blackboard), the authors created a "class" and enrolled all 529 EDHE students. Having the library's class separate from each instructor's EDHE class in Blackboard allowed the librarians to control all content and grading. Data collected from these tests would remain anonymous, without disclosure to the instructors or the students. Because all students and instructors were enrolled in the library EDHE "class," the authors were able to email reminders or create announcements about the tests that all could see. The authors also used the space to house online handouts that contained information taught in the library session, therefore utilizing the university's push to support green initiatives. Links were also made available that directed students to helpful resources for their writing assignments and career research. Instructors also reminded students to take the pretest before attending the library session. As students arrived for the library session, they were given extra time at the beginning of class to complete the pretest. Because of this, 89% of students (470) completed the pretest.

The pretest and posttest included eight questions based on the seven information literacy standards determined for first-year students at the university (see Figure 1). As it was explained to the instructors, tests and library session goals were designed to help students advance their skills as information literate students; the tests and library session would not in themselves create information literate students. For a full list of the questions, see Appendix 1.

Questions one, two, three, and eight were also clicker questions (thus asked and answered by the student three different times: pretest, library session, and posttest). Question two contained multiple correct answers, thus allowing partial credit. Questions were numbered to reflect the IL Competency addressed (see Figure 1). Questions five and six on the test both aligned with the IL Objective Five. The university's Information Literacy Committee, a unit comprised of librarians and outside teaching faculty, created the information literacy competencies. The list of eight competencies for first-year students was derived from the Association of College and Research Libraries' (ACRL) Information Literacy Standards. There was no attempt to have a fully information literate student upon the completion of this test and single library session, but rather to have the student closer to competency after the session than before the session.

Students received no feedback from the librarian as to whether their pretest answers were correct. In other words, they received a score but no explanation. Students were reassured that the score they received would not be entered into their course grade directly. However, taking the test

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Figure 1: IL Competencies and Test Questions

Information Literacy Competencies for First-Year Students (from EDHE Handbook)	Pretest and Posttest Question Designed to Address IL Competency *also a clicker question asked in session
Students will be aware of services offered by the library, (e.g., chat reference and study areas).	1. What option does the Ask a Librarian button offer you?*
Students will know the location and function of essential areas in the library.	2. What information can you find in a catalog record?*
Students will be able to perform basic searches on the Web and in online library resources.	3. If you go to Articles & Databases and type words into Full text Article Quick Search, what will your results look like?*
Students will be able to focus and articulate key concepts/words of their topic.	4. If you are doing a keyword search in the Catalog for the word emotions, you get 1,015 results. What happens if you repeat the search using emotions puberty?
Students will be able to interpret citations from the search results and locate materials.	the search using emotions puberty? 5. The above citation references a: 6. If you wanted to see if the Library owned a copy of this item, the best place to search first would be:
Students will be able to evaluate information, discerning the strengths, limitations, and usefulness in relation to a topic, including assessing Web sources.	7. If your professor wants you to read and cite a peer-reviewed article for a paper, you need to:
Students will incorporate information into their research.	8. It is important to email/save citation information for articles and books to avoid:*

was part of most instructors' participation credit. The authors decided it best to send the names of students who took the pretest and posttest to their instructors but did not include test scores, as this was irrelevant to the course grade. The library session was designed to address each question on the pretest, asking four of the eight questions outright in the session, with students answering anonymously through library supplied clickers. The other four questions from the pretest were mentioned indirectly. After the library sessions, the students took the posttest and received direct feedback after each question, whether the answer was right or wrong. Feedback contained explanations and links to further illustrate each library skill.

The feedback survey (Appendix 2) had to be manually coded by the authors, as the survey feature in Blackboard would not submit a report for all 219 participants. Some of the Blackboard grading features were helpful in determining which students took both pretests and posttests. This data was deemed the most useful in deriving a pattern in student learning. The authors were able to assess how much was learned by comparing the pretest and posttest scores. The average pretest score was 48; the average posttest score was 64. With the test only asking eight graded questions, a student incorrectly answering three questions would score 63. Of the 145 open-ended comments, 54% or 78 were positive (wouldn't change anything, thought it was fine, etc.), while 46% or 67 offered suggestions for change or thought the session was boring. Comments reflected both positive and negative attributes of the session, such as:

- "I think that y'all did a wonderful job."
- "I was able to pay attention and had no trouble following along with the lesson."
- "I enjoyed it and found it useful."
- "More hands on examples needed."
- "Make it more exciting."
- "Could improve by giving actual tours of the library."
- "You should have food."

Conclusion

The main difference between the EDLD and EDHE sessions was the emphasis on assessing student learning. In EDLD, students simply used clickers as active learning tools. The librarian would teach a skill and ask the student to use the clicker to answer a question about what was just demonstrated. Because most students were able to restate information in that manner, whether the information was learned at that time or previously, there was no formal evaluation of the session's impact on student learning. With 73% of students agreeing or strongly agreeing that clickers should continue to be used in the library sessions, the authors will continue to use these tools for engagement. A recurring suggestion in the open comments section of the survey to use the clickers in a team or game-related way is under consideration for future EDHE sessions.

After all library sessions were complete, the posttest was made available on Blackboard. For some classes this meant the posttest was available just three days after the library session; for a few others, two weeks had passed before the posttest was available. Unfortunately, the librarians could not find a way to manipulate the system to offer the test to some students while hiding it

from others, as the library sessions were held over two weeks and all students were enrolled into Blackboard as one "class." This situation probably impaired motivation to complete the posttest. In addition, not all instructors made the test a requirement. As a result, only 41% of students (219) completed the posttest. In future studies, a faster way to poll students with the posttest will need to be identified.

Continuing to embed information literacy fundamentals into the first-year curriculum at the university remains a goal for the librarians. From this experience, the authors were able develop tests, experiment with active learning techniques, and integrate information literacy outcomes into a curriculum. The relationships between the librarians and instructors developed through changing courses have allowed positive infiltration into the curriculum. The librarians and instructors will keep working together to help freshmen learn critical thinking skills required to locate, use, and evaluate information for academic research.

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Appendix 1: Library Pretest and Posttest Questions

- 1. What option does the Ask a Librarian button offer you?
 - a. A chat box to IM a librarian
 - b. A listing of librarians to contact for help with different subject areas
 - c. Phone numbers for getting assistance in the library
 - d. A place where you can make comments or suggestions on how we can do a better job
 - e. All of the above
- 2. What information can you find in a catalog record? (Check all that apply)
 - a. Information to include in a citation
 - b. A button to text the call number to your cell phone
 - c. A 3D map of the book's location in the library
 - d. Subject headings, so you can find similar items
 - e. Instruction on where to go in the library to check out the item
- 3. If you go to Articles & Databases and type words into the "Full Text Article Quick Search" box, what will your results look like?
 - a. Full text articles from some EBSCO databases
 - b. Only citations from some EBSCO databases
 - c. Full text articles from ALL databases
 - d. Abstracts from ALL databases
 - e. Full text articles from Google Scholar
- 4. If you are doing a keyword search in the Catalog for the word emotions, you get 1015 results. What happens if you repeat the search using emotions puberty?
 - a. You'll get more hits: now you have everything with the word emotions or puberty
 - b. You'll get the same number; 1015 titles still have emotions in them
 - c. You'll get fewer because it only has results with emotions
 - d. You'll get nothing because you didn't put an operator in there like AND or OR

Use the following citation to answer questions 5-6.

Stout, N., & Block, R. (2004, July). Profession on the Verge of a Nervous Breakdown. *Serials Librarian*, 47(1/2), 45-55. Retrieved August 7, 2009, doi:10.1016/j.comnet.2009.03.007.

- 5. The above citation references a:
 - a. Book
 - b. Book Chapter
 - c. Journal Article
 - d. Journal
 - e. Website
- 6. If you wanted to see if the library owned a copy of this item, the best place to search first would be:
 - a. Catalog, author search
 - b. Journals & Newspapers, title search
 - c. Articles & Databases, topic search
 - d. Google Scholar, author search
- 7. If your professor wants you to read and cite a peer-reviewed article for a paper, you need to find:
 - a. The abstract of a refereed article
 - b. The full text of a refereed article
 - c. The full text of any article
 - d. The citation of a scholarly article
- 8. It is important to email/save citation information for articles and books to avoid:
 - a. Incorrectly using APA style
 - b. Losing points on an assignment
 - c. Stealing someone else's ideas
 - d. All of the above

Appendix 2. EDHE 105 Fall 2009 Posttest Survey Results

Using clickers helped me pay attention in class:

Strongly Agree	65	30%
Agree	102	47%
Neither Agree nor Disagree	37	17%
Disagree	11	5%
Strongly Disagree	3	1%
Not Applicable	1	0%

My posttest score is better than it would have been without clickers.

Strongly Agree	26	12%
Agree	64	29%
Neither Agree nor Disagree	88	40%
Disagree	30	14%
Strongly Disagree	7	3%
Not Applicable	3	1%
No Answer	1	0%

How HELPFUL did you find this library session?

Very Helpful	47	21%
Helpful	82	37%
Neither Helpful nor Unhelpful	73	33%
Unhelpful	6	3%
Very Unhelpful	8	4%
Not Applicable	3	1%

How ENJOYABLE did you find this session?

I enjoyed it very much	26	12%
I enjoyed it alright	90	41%
Neither liked nor disliked it	75	34%
I didn't particularly care for it	22	10%
I did not enjoy it at all!	6	3%

I would recommend that the instructor continue to use clickers.

Highly Recommend	57	26%
Recommend	103	47%
Neither Recommend nor Not Recommend	47	21%
Not Recommend	6	3%
Strongly Not Recommend	3	1%
Not Applicable	2	1%