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[ARTICLE]

CLICKING WITH YOUR AUDIENCE

Evaluating the use of personal response systems in library instruction

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ABSTRACT

University of the Pacific librarians used personal response systems (PRS) or clickers in first-year mandatory library instructional sessions to assess their effects on student engagement and retention of learning outcomes. Students who utilized clickers during their library sessions reported greater enjoyment and encouragement to participate (n=291). Students in the sessions not utilizing the clickers achieved better learning outcomes than their counterparts who utilized clickers (n=326). The implications of these results are discussed, specifically within the context of pedagogy and tailoring instruction to the Millennial generation.

INTRODUCTION

Librarians, as do other educators, need to understand and appreciate the learning preferences of their students. A substantial number of current students belong to the millennial generation which is composed of individuals born from 1982 to 2002 who have never known an existence without access to personal computers, portable electronic devices, and the Internet. Millennials tend to share these main character traits: feeling special, being sheltered, having confidence, preferring team or group activities, favoring the conventional, feeling pressured, and needing to achieve (Howe and Strauss, 2000). Traits of particular importance to educators are Millennials' confidence, group orientation, and their perception of being special.

As a cohort, these qualities have major implications on library services and facilities when coupled with Millennials' desire and expectation of technology. Holliday and Li (2004) describe Millennials as "consumers of education," expecting a certain level of their needs to be incorporated into instruction and learning. This expectation may be in sharp contrast to the current infrastructure and instructional methodology. Library instruction, often delivered through one-shot sessions, may seem out of touch to Millennials if it does not incorporate technology in a meaningful and entertaining manner.

PEDAGOGICAL APPLICATIONS OF CLICKERS

Although the use of personal response systems (PRS or clickers) is not new, recent technological advances have increased their popularity in the classroom. In their "Seven Principles for Good Practice in Undergraduate Education," Chickering and Gamson (1987) list "contacts between students and faculty," "reciprocity and cooperation among students," "active learning techniques," "prompt feedback," and "respect for diverse ways of learning" as critical elements of successful pedagogy. Recent articles explore how PRS enhance the application of Chickering and Gamson's principles. Based on their extensive experience and a review of the literature, Premkumar and Coupal (2008) assert that the effective use of PRS can increase student engagement and encourage class discussion and peer-based learning. Trees and Jackson (2007) observe that clickers support a variety of pedagogical approaches and offer a useful alternative to the lecture, while Nelson and Hauck (2008) note that clickers can be used in lecture "as a way to change the rhythm of the class and prevent the lecture from becoming stagnant." Martyn (2007), in a comparison of two active learning classrooms, finds that clickers allow professors effectively to gauge students' levels of understanding and provide prompt feedback. Madigan and Sirum (2006) and Collins, Tedford, and Womack (2008) agree that clickers foster an active learning environment. They find that PRS allow professors spontaneously to adjust their presentations based on rapid evaluations of students' understanding. The authors caution, however, that any connection with learning outcomes is anecdotal, at best.

In fact, very few articles empirically document the effects of the devices on students' learning. Yourstone, Kraye, and Albaum (2008), in a study of four sections of a business class, report improved assessment results in the classes using clickers. However, the causes of the result are inconclusive. Martyn (2007) and Kennedy and Cutts (2005) discover no

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significant difference in learning outcomes, despite student testimonies of enjoyment. Nelson and Hauck (2008) report that with the use of the clickers, student perceptions of their performance, preparedness, learning, and interest were significantly higher. These authors and others recommend that future studies about clicker technology address learning assessment.

CLICKERS AND LIBRARY INSTRUCTION

The use of clickers in information literacy (IL) instruction is an emerging area of interest in the library literature. Librarians typically welcome pedagogical enhancements that address troubling issues in library user education: faulty assumptions as to students' base level of understanding, the difficulty of creating an active learning environment in a one-shot class, and overcoming perceptions that library instruction is dull. Osterman (2007) observes that there are two great fears in library instruction: boring students with repetition and/or losing them by teaching above their knowledge zone. Based on a survey of academic librarians, Connor (2009) agrees that the use of clickers can prompt greater classroom interactivity through an assessment of students' understanding of IL concepts. Petersohn (2008) proposes clickers as classroom management devices with the potential to reduce off-task behavior during one-shot sessions. Hoffman and Goodwin (2006) explore the relationship between student enjoyment of the PRS devices and an increase in class participation and discussion. In a survey of more than 400 students, Matesic and Adams (2008) report that the use of clickers not only improves class participation but even stimulates an increase in the students' use of the library. Following a case study at Gettysburg College, Wertzberger (2008) documents an increase in class participation and reinforcement of content, but little benefit for assessment.

To date, the results of assessment studies are inconclusive. Using pre-and post-tests, Petersohn (2008) finds that clicker classes show higher post-test achievement. However, Dill (2008) concludes that although students are more engaged in PRS classes, their quiz results do not demonstrate greater information retention. Authors Corcos and Monty (2008) and Hoffman and Goodwin (2006) encourage librarians to conduct PRS research that is aligned with student learning.

The review of the literature poses a number of interesting questions. Could clickers address some of the problems inherent in library instruction or is it gratuitous technology? How can librarians use clickers effectively in the classroom? Can use of PRS lead to enhanced IL skills, especially among the Millennial generation of students? Answers to these questions might be found in an exploration of the connection between PRS, engagement, and assessment.

In spring 2009, University of the Pacific librarians used personal response systems or clickers as part of the required first-year library sessions to investigate the effects of clicker usage on student perceptions and learning. This paper assesses and compares the levels of student enjoyment and engagement between library sessions that did and did not use clickers. It also examines any possible correlation between greater student enjoyment and achievement and retention of library core concepts.

BACKGROUND

University of the Pacific is a medium-sized

private university located in Stockton, California. All incoming first-year students (900+) are required to take two Pacific Seminars during their freshman year. The theme of the Pacific Seminars is "What Makes a Good Society?" During the fall, in Pacific Seminar 1, the students read, reflect, and write about seminal works of literature. During the spring semester, in Pacific Seminar 2, they connect these timeless philosophies with contemporary social issues. As stated in the catalog, the "Pacific Seminar 2 is composed of different topical seminars that examine in-depth one or more issues of a good society that were introduced in Pacific Seminar 1… The objectives of the course are to:

- Develop critical thinking through writing, reading, and discussion of important social issues
- Develop academic research skills
- Develop social awareness and political engagement" (http://www.pacific.edu/x9303.xml)

A scholarly research paper is one requirement of the Pacific Seminar 2 curriculum. The role of the library has evolved since the inception of the course. During its first year, Pacific Seminar 2 students received asynchronous library instruction through an online tutorial. In the second year, the Pacific Seminar leadership team asked the librarians to provide in-class instruction for all sections. The librarians created a brief list of learning outcomes designed to yield transferrable and sustainable information competency skills. The objectives are:

- Students will know multiple ways to get help
- Students can navigate the library's website to find services and resources
- Students understand the ethics of information
- Students understand the construction of a search strategy
- Students can identify a citation
- Students can distinguish between popular and scholarly materials

In addition to the librarians' goals, many professors had discipline-specific requirements, including introductions to specialized databases, critical evaluation of websites, and examination of core journals. At the end of each library session, students completed a brief evaluation measuring their achievement of learning outcomes. The Assessment Office tabulated and analyzed the results, which proved to be inconclusive. In year three, both teaching and library faculty had higher expectations for the library workshops. In response to the logistical dilemma of more than forty workshops conducted in a short time frame, the library dean agreed to fund a second classroom. Informed by readings about the Millennial mindset and emerging pedagogical technology, the new classroom included a computer for every student, a SmartBoard, and access to personal response systems. While the original learning objectives were retained, the assessment exercise was expanded. The librarians also agreed to conduct a comparative study of the use of clickers for teaching effectiveness and assessment.

METHOD

Because the Pacific Seminar 2 library instructional sessions covered a diverse array of topics and would be taught by eight different librarians, the authors sought to normalize the content and some aspects of the delivery. The librarians reached a consensus on learning outcomes and developed a nine question assessment tool

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to determine students' mastery of those core concepts (Appendix A). The librarians devised a Likert scale to measure students' corresponding levels of engagement and enjoyment of the library session.

The librarians created warm-up questions to invite class participation and assess the students' familiarity with library services and resources (Appendix B). All non-clicker and clicker sessions followed the same procedure: 1) warm-up questions, 2) core library content, 3) assessment of library core concepts, and 4) Likert scale rating student perceptions of the library session. The librarians' sessions were distributed as evenly as possible between the two classrooms.

Non-Clicker Sessions

In the non-clicker sessions, librarians asked students to respond to the warm-up questions by a show of hands. At the end of the instructional session, the students were given a paper assessment to test for understanding. Students also responded to a written Likert scale, during which they scored, among other things, their enjoyment and the degree to which they felt that they were encouraged to participate.

Clicker Sessions

In these sessions, students responded to warm-up questions using clickers. At the end of the instructional session, students used the clickers to answer the assessment questions. As students responded to the questions, the librarian could gauge their current understanding of concepts, correct any misconceptions, and reemphasize major points. Students were given a paper-based Likert scale to report on their experiences, as were the students in the non-clicker sessions.

RESULTS

Of the forty Pacific Seminar 2 library workshops, six sessions were eliminated due to data collection inconsistencies stemming from implementation difficulties. The remaining thirty-four sessions were used in the statistical analyses. There were eighteen library instructional sessions in the non-clicker classroom (Classroom NC) and sixteen sessions in the technology-rich classroom (Classroom C).

Assessment

In Classroom NC, students consistently answered all of the questions on the paper assessment. In Classroom C, students did not consistently answer all assessment questions using the clickers. Just as a non-response on a paper assessment would be marked incorrect, a non-response in Classroom C was coded as incorrect.

Assessment results of the library concepts were analyzed using paired t-tests. Student retention of library concepts from the two different classrooms was compared. Out of a possible nine points on the assessment, the students in Classroom NC had a mean score

TABLE 1 — ASSESSMENT MEANS FOR CLASSROOM NC AND CLASSROOM C

		Assessment Mean (Maximum 9)	**Standard Deviation**
Classroom NC	n=326	7.82	0.95
Classroom C	n=291	6.92	1.82

of 7.82 while students in Classroom C had a mean score of 6.92. The students in Classroom NC scored significantly higher in the assessment than the students who had their library session in Classroom C (p value < 0.001).

Likert Evaluations

Every student in both Classroom NC and Classroom C was given a paper Likert scale to evaluate his/her perceptions of the library session. The students were asked to record their opinions of the following statements on a scale of 1 to 5, 5 being the highest:

1. I found the library session enjoyable.
2. I found the library session to be useful for my research project.
3. The session was well organized.
4. The session was well presented.
5. I learned new information.
6. I was encouraged to participate.

In terms of student perceptions regarding the library instructional session, questions 1, 3, 4, and 6 were found to be statistically significant and higher in Classroom C. The students in the technology-rich Classroom C found the library sessions to be more enjoyable, organized, well-presented, and participatory.

TABLE 2 — LIKERT MEANS FOR CLASSROOM NC AND CLASSROOM C

Question	**Mean**		**Standard Deviation**		**p value**
	Classroom NC	***Classroom C***	***Classroom NC***	***Classroom C***	
1) I found the library session enjoyable.	3.57	3.85	1.02	0.97	0.0006**
2) I found the library session to be useful for my research project.	4.30	4.38	0.75	0.79	0.213686921
3) The session was well organized.	4.39	4.52	0.71	0.66	0.0188*
4) The session was well presented.	4.34	4.52	0.76	0.72	0.0023**
5) I learned new information.	4.21	4.27	0.94	1.01	0.417969578
6) I was encouraged to participate.	3.78	4.04	1.10	0.99	0.0022**

Notes:
1) Number of responses ranged from 324 to 329 in the non-clicker classroom and from 286 to 293 in the clicker classroom.
2) P-values are based on two-tailed tests of the null hypothesis of no difference between classrooms. * indicates significance at the 5% level. ** indicates significance at the 1% level.

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DISCUSSION

For many years, University of the Pacific librarians collected instructional evaluations. Students frequently reported that they did not enjoy the library sessions and were not encouraged to participate. The librarians hoped that the use of the clickers, along with the Millennial mindset, would spur a sense of engagement and involvement. The analyses of student engagement reported in the Likert scales reveal that students did find the workshops using clickers more enjoyable and participatory. Surprisingly, students also found the sessions better organized and presented, though the authors suspect this is a result of their appreciation of the technology. In fact, on several of the paper scores, the students wrote positive comments about the clickers. Although the authors did not attempt to measure use of the SmartBoard, the overall technological richness of the new classroom may have contributed to the liveliness of the sessions.

The librarians found many teaching benefits to using the clicker assessments. The difficulty of having students engage in a one-shot library instructional session was ameliorated by the anonymous, risk-free nature of the clickers. Students could visually observe right and wrong answers and the online display often prompted class discussions. There was an instant feedback/assessment loop; however, there was not a verifiable connection between enjoyment and information retention as students in Classroom NC showed higher levels of overall achievement. The authors agree with earlier scholars that the causes of this result are difficult to isolate and warrant further study. Variations in length of time for response, perception of greater accountability (although the assessments were not signed), and the simplicity of implementation may be contributing factors to the observed result. The investigators strongly encourage further study of the relationship between clickers and learning assessment, as well as the benefits and future directions of both clicker and related technology in library instruction.

Observed Assessment Values

The students in the non-clicker classroom performed better on the library assessment than the students who used clickers.

The observed higher mean in the Pacific Seminar 2 non-clicker classes could have stemmed from the advantages of taking a paper assessment. Benefits to taking a paper assessment include the ability to use the assessment itself as a resource and the ability of the test-taker to self-regulate order and pacing during an examination period.

Paper assessments allow students to view all of the questions from the very onset, making the exam itself a resource. Clickers do not allow for the perusal of all questions, as each question is handled separately. Clickers require responses as they are posed and do not cue students to forthcoming questions. Finally, a student may go back and review responses before handing in the paper assessment.

Assessments in print format allow test-takers to allocate their time judiciously during examination periods. With clickers, questions must be answered at the aggregate level and within a particular time frame which may unduly stress students who require varying amounts of time to respond appropriately. The seemingly high stakes nature of clickers may affect various groups differently. Kay (2009) investigated gender perspectives on clicker technology. Many students (primarily female) complained of the use of clickers in a summative

assessment manner. Students stated, "I realized I cannot work well under pressure when the clickers were used" and "although the clickers seem to control a test situation, they became stressful to use on a time constraint." The structured nature of the questioning may cause students to reply in a timely, rather than thoughtful, manner to avoid negatively influencing the pace of the lesson. This forced tempo for question and answer periods may unsettle students who are accustomed to self-pacing.

Observed Likert Values

Students in the technology-rich Classroom C reported statistically higher degrees of enjoyment. They also viewed the library sessions in Classroom C as more organized, well presented, and participatory than the students in Classroom NC.

Millennials, with their fascination and embracement of technology, could view clickers as new and interesting devices. The novelty and fun factor associated with these PRS may have affected how the students viewed the library session. Another aspect to the Millennial mindset is their expectation for content customization. Millennials are used to influencing how services are deployed. By inputting responses via clickers, students were actively contributing to the librarians' presentations. This aspect may have impacted the students' enjoyment as they viewed that their session had become tailored to their needs, complete with their previous experiences accounted for, considered, and included.

Perceptions of better organization and presentation in the clicker sessions could have stemmed from the mix of pedagogical approaches. Librarians often use a combination of teaching techniques, including lecture and guided demonstration. Incorporating clicker questions and allocating time for specific question and answer periods could help to divide the library session into more manageable sections. Hoffman (2007) indicates that the use of clickers can restart the attention span of students, a possible factor in students' view of the sessions' organization and presentation.

Students in Classroom C also felt more encouraged to participate during their library sessions. It is important to note that several authors, like Hoffman (2007) and Deleo, Eichenholtz, and Sosin (2009), have observed 100% participation in their library sessions. This is a marked change from general library sessions where librarians report low participation and audience input. Though this study did not analyze the relative participation rates for students in Classroom NC and Classroom C, Pacific librarians anecdotally reported low rates of participation (via hand-raising) in Classroom NC and high rates of anonymous clicker participation in Classroom C.

CONCLUSION

The Millennial generation has always had ready access to technology. As a result, students expect to see technology embedded in instruction. The library faculty at the University of the Pacific chose to incorporate clickers, or personal response systems, into instruction to address the needs of students who demonstrate the Millennial characteristics of confidence and team orientation. With the clickers' ability instantly to poll the audience, library faculty used warm-up questions as icebreakers in order to foster a more collaborative and engaging environment. The clickers were a starting point for the library session, allowing librarians to use the students' prior knowledge and experiences as the

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foundation for what would be covered. The risk-free nature of the clickers encouraged Millennials to contribute to their learning experience.

In addition to encouraging student engagement, the librarians wanted to use the clickers to increase the retention of information presented. Although the study revealed that students in the clicker classrooms reported greater enjoyment and encouragement to participate, those in the non-clicker classrooms demonstrated greater learning retention. The authors have offered several explanations for the results of their study and they encourage future scholars to continue to explore the relationship between innovation and successful learning outcomes. As technology continues to infuse the educational environment, personal response systems are one of many opportunities to transform library pedagogy.

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