

Incorporating Clickers into the Redesign of a Large Enrollment Psychology Course

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Overview of the Course for which Clickers were Used: Introductory Psychology

The Introductory Psychology course at the University of Southern Maine (USM) serves about 1,000 students a year (at a school with undergraduate enrollment of approximately 10,000 students). Most students taking this course are not psychology majors, but many are required to take the class as part of their major. Other students take the course to fulfill a distributed education requirement. The course is relatively large in comparison to others on campus and the student preparation for and knowledge of a psychology course is quite varied. Classes are taught on three campuses, and at outreach locations in the area.

Motivation for Using Clickers

Ten years ago, approximately 25%, of our students were not completing the Introductory Psychology course successfully. This value includes drops, failures, and withdrawals (DFW). We embarked on a broad course redesign to lower the DFW rate. In doing so, we hoped to reduce costs associated with instruction and administration of this large service course. First, by eliminating one section, the affected instructor(s) could teach an additional upper-level course. Second, by reducing the total number of annual Introductory Psychology sections from 10 to 9, we hoped we could free up faculty time for other academic activities (research, service). Our course redesign involves a series of activities and technologies, including regular pre-course quizzing and the use of a classroom response system. The integration of these two assessment tools has proven to increase learning and student preparation.

We knew that quizzing tends to increase the time students spend preparing for class (Daniel & Broida, 2004). From our own experiences, we recognized that students who expect to be tested on their reading material were more likely to actually read course/text material than students who had no such expectation. We also know that taking class time to quiz students reduces the amount of time available for other, more collaborative in-class activities. In addition to the time

required to administer in-class quizzes, we also lost class time as students argued about why X was the correct answer, rather than the one that some of the more verbal students had selected. Finally, in-class quizzes also require additional instructor time to both grade the quizzes and to enter them into the course grade book. For all of the above reasons, we were not interested in quizzing students in class.

Ten years ago at USM, all Introductory Psychology classes were primarily lecture driven. Grades were typically based exclusively on the results of 3 exams. There was some deviation in the way in which courses were administered by individual faculty. Some instructors used a cumulative final; others did not. Some provided extra credit for attending some classes; others did not. By the end of the semester it was not uncommon for 40% or more of the students to skip most classes. We recognized there was a problem and that ongoing assessment might help. We also recognized that quizzing would require considerable effort on the part of the faculty, none of whom had any real interest in changing how they taught or approached this course.

I tried a variety of quizzing schemes over several years, and grades in classes where quizzing was involved were higher than in most other classes. I eventually found a web-based system that enabled repeated quizzing of students. Using a product called Bravo!, I could select items at random from a large test bank and present those items to students. Students were able to then take quizzes repeatedly, seeing different items each time.

The effect on our classes was powerful. By requiring students to complete chapter quizzes *before* lecturing on the chapter, students were coming to class having read and better understanding the chapter material. We revised our lectures because we no longer had to assume my students had not read the chapter prior to coming to class. We now had time to do other things and introduce additional information in lecture.

We tried several iterations of quizzing over the years. It became clear that students needed to receive the highest grade they earned on the quizzes, rather than the first or most recent grade. If the first grade was used, there was no incentive to retake the quizzes. If the most recent grade was used, there might be a disincentive! This is because a student might get lucky on a quiz,

performing well without truly understanding the material. Using the highest grade provides no disincentive to taking the quizzes repeatedly, and thereby gradually mastering the material. For this quizzing approach, large numbers of quiz items are required; students attempted to memorize answers rather than learn the material when too few questions were presented. Similarly, random selection of items was necessary to discourage student cheating.

As our quizzing methods progressed, our department received a grant from the National Center for Academic Transformation to redesign our introductory psychology courses using web-based quizzing. Many of the faculty involved in teaching the introductory course agreed to use a common text and the same materials. Unfortunately, shortly after receiving notice of that grant, Bravo! ceased to exist and was replaced by WebCT. The effects using WebCT were the same as with Bravo; quizzed students tended to do better in class. More students earned A's in sections requiring pre-lecture quizzing than had been awarded by the instructors prior to the redesign, proportionally more A's were awarded than in sections that were not redesigned, and students were less likely to drop, fail, or withdraw than those who were not quizzed. In other words, the redesign was successful (Daniel & Broida, 2004).

It should be noted that not all instructors using this system use it the same way. Some allow an infinite number of quiz attempts; others limit the number to as few as 3. Some give the students up to 3 hours to complete the quiz (which ranges in length from 10 to 30 items, depending on the instructor). This enables students to look up answers that they do not know. In contrast, some limit the time allowed to as little as 10 minutes for a 20-item quiz. The idea here is to assess what a student knows, not what they can learn. All instructors provide feedback once the quiz is complete, indicating on which page the correct answer can be found. Some indicate the correct answer when students select an incorrect response. We have not examined the effectiveness of these various strategies, if only because they are confounded with the text used and the instructor.

Implementation

Adding clickers as part of the assessment “package”

Though quizzing worked well, we noted that we continued to have a problem with attendance. Specifically, some classes had fewer than 40% of the students attending class regularly by the middle of the semester. Also, we noted that students were often having a hard time staying alert in some lectures, and clearly not understanding what was being said in these still primarily lecture-based classes. We needed a way to reward attendance and to help students focus for what is up to 150 minutes of lecture/class time. We wanted to ensure we were both encouraging students to prepare more for lecture and also engage more in lecture. As a result, many of us have incorporated a classroom response systems (clickers) for in-class formative assessment and to encourage students to more actively engage in the lecture.

Results and Conclusions

We have thoroughly enjoyed incorporating a classroom response system into Introductory Psychology. Clickers help us to know when students understood what was said—or when they didn't. The opportunity for ongoing formative assessment (for faculty and students) was remarkable. Students are surprised at how often they were selecting incorrect answers. Further, the act of picking up the clicker, thinking about the correct answer, selecting it, and waiting to see how the selected answer corresponded with the answers selected by their classmates led to dishabituation in the students. In other words, student attention increased in lecture! Most students reported being better able to pay attention through the entire class period than they were before clickers were introduced (Broida, 2005).

Further, those of us using clickers at USM found clickers engaged students in the material at a level we'd not seen in our introductory psychology courses prior to the redesign. Instead of (the same) 2 to 5 students answering every question we posed in class, we found that 10 to 20 were verbally responding. And, because everyone was “clicking in” their votes, all of our students were more likely to spot when they had misunderstood a concept or idea. The number of students asking questions in class, before class, and after class doubled or tripled, depending on the instructor. The amount of e-mail sent to the instructors by students also increased. In other words, students were more actively engaged in class and in the course content in general.

Again, instructors within our department use a variety of strategies for incorporating clickers into their sections. Some faculty use clickers primarily to take attendance. Some instructors do not base grades/points on the number of correct answers, but instead on the number of times the clicker is used in each class period (therefore rewarding broad participation rather than specific answers). Others give all students the same number of points, regardless of how many times they vote. Other faculty give every student who votes a set number of “participation” points each day, but also award additional credit for answering questions correctly. For example, every student who participates/votes is assured of 5 points, while those who answer 80% of the questions correctly receive an additional point, and those who answer all of the questions correctly receive a total of 7 points. These strategies seem to produce less anxiety and in-class hostility than when the number of correct responses is the sole basis of a grade.

Combining clickers and quizzing has resulted in an additional drop in the DFW rate, which is around 15% at the present time in those classes using both clickers and quizzing. Classes that combine clickers and pre-lecture quizzing typically have more students earning As and Cs than classes that use only pre-lecture quizzes. One may assume this increase in grades could be simply the result of more liberal grading based on clicker use; the non-accuracy-based scoring systems we use would tend to inflate grades. However, in analyzing grade patterns when clicker grades are removed indicates the same grade pattern. The frequency with which A’s and C’s would be received does not change appreciably when clicker grades are removed, and are higher than they were when quizzing was the sole element of the redesign.

It should be noted that the time savings associated with quizzing is eliminated by the use of clickers. Clickers do not save class or instructor preparation time; incorporating clickers thoughtfully in class will actually require more of your and your lecture time. The time required to present and discuss answers to the questions is about the same as what was gained by requiring students to familiarize themselves with the material before coming to class.

It is important to note that clickers are not a good vehicle for summative or reading quizzes. In our redesign, reading or other content quizzes using clickers did not prove successful; students attempted to cheat by noting how others responded to questions presented

for clicker responses. Interestingly, the number of correct responses went down when students attempted this method; they may have been cued as to how to respond by someone who knew less than he or she thought they did. **Thus, clickers do not replace on-line quizzes, but serve as a useful complement to the online, pre-lecture quizzing approach.**

References

Broida, J. (2005) Classroom use of a Classroom Response System. Prentice Hall: Boston MA.

Daniel, D. B. & Broida, J. 2004. Using web based quizzing to improve exam performance: Lessons learned. [*Teaching-of-Psychology*](#). 31 (3), 207-208.