ABSTRACT

Student engagement is very important for learning. It is increasingly seen as an indicator of successful classroom instruction. There are several techniques to enhance student engagement. Some of the strategies for success include creating and maintaining a stimulating intellectual environment. Technology-based tools such as clickers can be very useful. But they can also be expensive. This paper presents the experiences and the effectiveness of various audience response systems to keep students actively engaged in the classroom, especially in challenging courses such as Operations Management.

KEYWORDS: Audience Response Systems, Classroom Response Systems, Clickers, Polling Instruments, Student Response Systems

INTRODUCTION

Student engagement refers to a student's willingness, need, desire and compulsion to participate in, and be successful in, the learning process promoting a higher level thinking for enduring understanding. Engaged students make a psychological investment in learning. They try hard to learn and take pride not simply in earning a grade, but in understanding the material and incorporating or internalizing it in their lives.

Student engagement is extremely important for learning. It is increasingly seen as an indicator of successful classroom instruction, and as a valued outcome of education system reform. There are several techniques to enhance student engagement. Some of the strategies for success include creating and maintaining a stimulating intellectual environment, monitoring and responding to demographic subgroup differences and their impact on engagement.

Operations Management is one of the core courses in the College of Business. It is known to be a challenging course because it deals with a variety of new operations concepts and quantitative methods. There is a great chance for students to tune out or sleep through a course if the course is challenging and if it is mostly lecture-based. How do we keep them ticking? Clickers may come to the rescue. This paper presents various classroom response systems and their effectiveness.

LITERATURE REVIEW

There have been several studies on the use of clickers. Lecture-based courses may put the students to sleep. A research study by Kolikan, Drane and Calkins (2010) states that there are three major problems for students in lecture-based classes: (1) lack of awareness of their own difficulties; (2) inability to pinpoint what it is that they do not understand; and (3) embarrassment
to admit difficulties due to lack of awareness that other students have difficulties too. Teachers want to create a “more learner-centered classroom” (Ioannou and Artino, 2010). And teachers found that students paid more attention and more engaged when clickers were used in the class (Abate, Gomes and Linton, 2011; Chan et al, 2011; Filer, 2010; Thompson, Switky and Gilinsky, 2012). “Research has shown that actively engaged students will absorb and retain more content” (Berry, 2009). Student response systems (SRSs) are reported to increase student interest, interaction, and engagement and result in “deeper” learning (Fortner-Wood et al, 2013). Clickers allow anonymous participation. This capability was perceived as a critical feature that allows even shy students to become actively engaged in classroom activities. Also, even when students had the wrong answer, they tended to speak out, possibly due to the fact that, after reviewing the histogram, they knew that many other students had the same misconceptions” (Ioannou and Artino, 2010; Reyerson, et al. 2011).

The negative side of clickers is if the students find clickers to be an additional expense (Berry, 2009), or if they do not like clickers and do not find them to be useful, they may be less effective (Trew and Nelson, 2012). Some teachers also may not like to use clickers. They do not like the pressure to use new technology. They question if technology is serving the purpose or the purpose is serving the technology (Drabinski et al, 2011). Overall the results are very positive for the use of clickers to engage students in the classroom.

**Figure 1: Clickers**

![Clickers](image)

**MY EXPERIENCE WITH CLICKERS**

There are several companies that offer clickers. The purpose of this paper is not to compare clickers from various companies. I had the opportunity to use clickers from TurningPoint. A sample of clickers is shown in Figure 1. These clickers were easy to use, easy to carry for students. Occasionally, there may be a problem of battery running out, in which case a student cannot participate unless there is an extra one carried by the professor. Although these clickers
can be used on any desktop screen, I used only in PowerPoint. I found it easy to copy multiple-choice questions (Chan et al, 2011) from a test bank and develop slides for clicker use. The system automatically records the grades. This could also be used as a roll call system. There is no need for a separate attendance taking. The primary purpose to use clickers was to motivate them to study chapters before they are discussed in class. The clickers’ questions were treated as quiz questions. I found this to be not very effective. As Chan et al (2011) also indicates that students did not like it very much. So, clickers may be good as a feedback mechanism for both students and teachers as well as for discussion in some cases, but not very effective to administer quizzes. Another negative about clickers is they are expensive. If only one or two professors use them, students may not like spending that extra money. If the clickers adopted campus wide and used in many classes, then they are worth for the students.

**ALTERNATE RESPONSE SYSTEMS**

**Web-based**

There are several ARS that are web-based that are less expensive than hand-held clickers. Instead of using the clickers in class, students can log on and use their laptops to respond to the surveys. The negative side of that may be distractions caused by being online. There is also a study done by Reyerson, Mummey, and Higdon (2011) who used Twitter in a classroom. Students were engaged with the movie under discussion in twitter. I am not sure if it will work for serious subjects.

**Smartphone**

Another alternative is using the smart phone to access ARS and respond to surveys. Chan, et al (2011) state that “While Clickers is one of the latest technologies promoting interactive learning, mobile phone applications will be another formative assessment tool gaining importance in education, as evidenced in the Horizon Report. 39 Students will be able to use mobile and online platforms such as Twitter and Podcasts to discuss with peers, compare research results, retrieve reference data, ask questions and provide feedback to teachers.” (Reyerson, Mummey and Higdon, 2011) state that the instructors should “make it clear to students that networking and back channel conversations are to be avoided, and tweets should be directed to the instructors, not to other students” in order to avoid distractions. But it is very tough in practice.
qCards

There was an interesting ARS where students respond by holding the response cards called qCards in a certain position (as shown in Figure 2), and the web-cam interprets the responses. It costs nothing to the students.

Response Cards

I have come up with even low-tech solution. At the beginning of the semester I give my students four cards with printed letters A, B, C, D or numbers 1, 2, 3, 4. I ask them to respond to the multiple-choice questions by raising their cards. All I want to see is their response. It serves the purpose and it works effectively. We could use only two cards with these four letters or numbers printed on both sides of the two cards.

CONCLUSION

Keeping students engaged is very important. Based on my research and my own experience, clickers and response cards are very effective in enhancing student engagement and increasing interaction. These tools may not be very effective for administering quizzes, but they are effective for feedback and the follow up discussion.
REFERENCES


