Student Response Systems for Active Learning

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INTRODUCTION

The importance of a student's involvement in learning is well documented and well known. It is easy to sum up research related to active learning by simply saying, "students who participate in the learning process learn more than those who do not" (Weaver & Qi, 2005, p. 570). Active learning seeks to create a learner-centered environment and engage students as active participants in their education. The opposite of this is passive learning, which is thought of as the traditional way of teaching where the professor is a subject matter expert whose role is to convey the knowledge to an audience of students (Barr & Tagg, 1995).

While the success of active learning is well documented, some instructors may find it difficult to fully engage students as active learners in the classroom. Active learning requires student participation, which is easier for some students than it is for others. Larkin and Pines (2003) found theF common practice of calling on students to promote active learning in the classroom resulted in a "clear and unmistakable pattern of avoidance behavior as reported by both male and female students" because many students seek ways to avoid the psychologically unpleasant situation of providing the wrong answer and looking foolish. Larkin and Pines (2003) argue that if a student's emotional and cognitive resources become directed towards avoiding the immediate threat of being called on, then arguably the practice of calling on students may reduce active learning, which was the intended goal of calling on the student in the first place. Fortunately, educational technologies are able to assist in this challenge.

Debevec and Shih (2005) support the value of computer-assisted presentations and multimedia used in the classroom in terms of helping students remember what they were learning, enhancing their interest in learning the subject, and improving their understanding of course material. Research in the area of science and math educa-tion argues that technology has the potential to change how and what students learn (Roschelle, Pea, Hoadley, Gordin, & Means, 2000). While adding technology into the classroom is not a panacea for the challenges of teaching and learning, it does lend itself to accommodating different learning styles. Debevec, Shih, and Kashyap (2006) argue that some students in their study benefited more from classroom technology than others. "Some students chose a more technology-driven route while others chose a more traditional route and both were able to able to maximize their performance given that they attended class and gained the benefits of the multimedia presentation and discussion" (Debevec et al., 2006, p. 305F). As it is important that we develop each and every student to their full potential; we can not overlook the fact that many students may need the benefits of educational technology to succeed.

STUDENT RESPONSE SYSTEMS

Student response systems (also known as personal response systems, clickers, audience response systems, electronic response systems, classroom performance systems, and group response systems) are "computer-based systems that allow audience members to participate in presentations by submitting their responses to interactive questions using hand-held devices or response pads" (Turning Technologies, 2006). Roshcelle, Penuel, and Abrahamson (2004) place student response systems in the category of a classroom network which "uses specific software designed to enhance communication between teacher and students" (p. 51).

Generally, a student response system contains several components: a receiver, software, and clickers. The clickers, which are similar to a television remote control, communicate with a receiver by infrared or radio signals and feed the results to the instructor's computer. Software allows the students responses to be recorded,

analyzed, and graphed (Zuckerman, 2005). The instructor can display responses on the screen, post them on a course site, or save them for reference (Heyboer, 2005). Responses that are posted for the entire class to see generally remain anonymous, but the instructor can keep track of individual student answers.

Using Student Response Systems (SRS) in the Classroom

Student response systems have become one of the most popular teaching tools for giving quizzes, taking attendance, and encouraging classroom discussion. According to Lowery (2005), student response systems are commonly used to (1) improve class attendance and preparation, (2) promote comprehension, (3) create active participation, (4) increase peer or collaborative learning, (5) enhance learning and enrollment retention, (6) and result in greater student satisfaction. Research shows that teachers use response system technology for both instructional and assessment purposes. Many use it to stimulate peer and classroom discussion. As in higher education, there is a sense that both peer and classroom discussions are important to making the system more effective in the classroom (Penuel, Crawford, Boscardin, Masyn, Debarger, & Urdan, 2005).

In a lecture style setting, instructors often use the responses systems in a way similar to a game show. As a means of formative assessment, instructors will scatter questions throughout a lecture based on the material being presented and allow students to answer using the clickers. After everyone has responded to the question, the software automatically tabulates the results. The results are then shown in a variety of formats based on the instructor's preference, often shown as a percentage or count illustrated with a chart or histogram. Through this immediate feedback, an instructor can determine how many students do not understand the material and plan accordingly to review this material either immediately or at a later date. The goal is for students to be more involved and create an active learning environment that results in immediately feedback so that instruction can be tailored to meet student needs. Instructors who have used student response systems say that the main benefit is helping professors instantly gauge whether or not students understand the material being presented (Heyboer,

2005). In essence, the use of SRS allows for every lesson to be customized for the participants in the room at that time. This type of instruction can truly enhance the effectiveness of the instructor.

In addition to questions offered in a lecture-based environment, SRSs are also used to take attendance. By connecting clicker serial numbers with student names, the instructor can ask students to ring in with the clickers at the start of class. This will result in an instantaneous role call as well as a count of the students present in the class. An effective way of taking attendance with the SRS is to ask a general question at the beginning of class. Some instructors prefer to ask a question related to a current event or a review question from the last class. This approach is effective because it takes attendance while also providing a review of material from the last class and testing the "clickers" to ensure that all are working properly before the main portion of the lesson begins.

In addition to polling students to test material comprehension and taking attendance, SRSs are widely used for administering quizzes. Instructors can set up questions with points attached for every answer that the student answers correctly. In this instance, the instructor would have to set up the system so that "clickers" are associated with a specific student. There are various benefits to administering test with the use of the SRS. For example, instructors are able to manage the time spent answering each question. This is especially helpful for instructors who are attempting to prepare students for a licensure exam as some licensure exams only allow students one minute for each question without the opportunity to backtrack to check answers already submitted. With the use of the SRS, the instructor can utilize a setting on the system that starts a timer when a question is shown, then when the timer reaches "zero" the polling for that question will be closed. The instructor can then proceed to the next question and the student is unable to return to questions previously answered. This format is utilized to simulate the environment the students will be subjected to when they take a licensure exam.

Another benefit of using the SRS for administering quizzes is that students receive immediate feedback. After the quiz has been administered the instructor can return to the slides that were utilized during the quiz and display the answers generated by the class. Answers are displayed with a percentage or count of how the class responded to that question as well as some type of

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