Public Response System with SMS: A pioneering method for in-class lecturer-students communication

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University teachers, especially in the science departments are concerned by the inadequacy of traditional lectures and their inadequacy for matching current students' demands. One of the emerging solutions for these problems is the Public Response System (PRS). This article describes the first trial of using cellular phones as the response device in an application of a PRS in a class at Tel-Aviv University. The advantages and disadvantages of this application in comparison with the traditional "Clickers" are discussed.

Introduction

The traditional lecture is the most common mode of teaching in many science faculties, especially at the introductory course level. However, it has been realized that the standard 'lecture-then-test' format is failing, particularly in science departments where lectures are delivered to huge numbers of students at a time (Allen & Tanner, 2002; Weiman & Perkins, 2005). Since the attention span of almost all students is between 10 and 20 minutes, one can expect to lose most of the students if the lecture goes on for 50 minutes straight (Powell, 2003; Handelsman et al., 2004; Wankat & Oreovicz, 2006).

Therefore, teachers are seeking methods that will increase student active engagement in the learning process. Over the past decade numerous studies have shown that students who engage interactively with each other and the instructor in the classroom learn concepts better, retain them longer, and can apply them more effectively in other contexts (Handelsman et al.,2004; Wood, 2004). This is especially true for current students who have been labeled "The Net Generation". These students have grown up in a wired world, are digital, connected, experiential, and social. Their desire for immediacy affects their learning habits the way it does most of their other activities (Carlson, 2005; Oblinger, 2005).

Public response systems

An answer to these dilemmas confronting the teachers has been presented in the form of PRS (Public Response System). The system worked well to engage students in learning the subject matter and to assess their prior knowledge and misconceptions. It provided useful feedback to students as well as instructors (Duncan, 2005; Hatch et al., 2005; Duncan, 2006; Wankat & Oreovicz, 2006).

The use of PRS in university classes has gained popularity in the recent couple of years. Many universities and colleges in the US are either using it or considering the possibility of doing so. PRS enables the teacher to collect in a few minutes the student answers to a closed question presented in

class. The technique involves the use of special electronic devices, called "Clikers", which look like TV remote control units. Every student holds one such device in his hand and keys in his response to the teacher's question. Special receivers positioned in the lecture hall collect the signals from the clickers and through dedicated software send their distribution to the teacher's computer to be immediately displayed to the class on a screen.

There are a number of purposes that can be served by using PRS in a university class. The first one is giving the teacher an idea about the level of knowledge of the subject among all the students, not only those few who care or asked to answer. In every class the teacher makes certain assumption regarding the previous knowledge of background material. In man instances teachers are faced belatedly by the sad truth that this knowledge the student assumed to possess is lacking. PRS allows the teacher to present at the beginning a short qualifying test and get in a very short time representative results of all students in the class. Based on the results of this test, the teaching plan can be modified to suite the needs of this group of students. Another use of PRS is testing the degree of assimilation of the class material. At the end of every chapter or subject the teacher can test how well the students understand the material and can apply it to solving problems.

The advantages of using PRS rather than traditional written tests are the ease of use and short time required for the whole process of presenting the questions and collecting the answers. More important is the immediate grading given to each student. The minute the class results are displayed on the screen and analyzed bye the teacher, every student knows whether he got it right or wrong. The teacher has immediate answer to the nagging question; "Are they getting it at all?"

Another purpose could be polling the student ideas regarding an ambiguous question that the teacher is using in order to get their attention and involvement in the subject at hand. All these uses of PRS in class increase student in involvement in class events. They can no more hide behind the feeling that "He won’t ask me anyway". The technique allows the teacher to get later a detailed list of every student answers since the instruments have a personal identifying code.

This technology can be applied in conjunction with other teaching methods such as small group discussions and problem solving at the rate that suites the teacher's style and class needs. It is not intended to replace regular tests and quizzes or term papers. It is another tool that teachers use in class to improve their teaching and increase student attention.

The costs for fitting a lecture hall with the necessary receivers varies from place to place but runs generally around a couple of thousand dollars. On top of that each student must have the personal clicker that costs around $30. In US the students are obliged to purchase the clickers themselves. This is not acceptable in all other countries, where the universities have to carry that cost as well.

The Israeli experience

To the best of our knowledge there is only one teacher at The Hebrew University of Jerusalem, who uses PRS in his classes. Him and his students, as expressed in their answers to the course evaluation

questionnaires, regard it as a success. The clickers in this case are owned by the university and distributed to the students at the beginning of the course in return for a deposit which they get back after returning it at the end, in good working condition.

At Tel-Aviv University we encountered reluctance to invest the money needed for purchasing the equipment for fitting even one class, and for getting into the bureaucratic arrangements of clicker supply and maintenance. We decided that instead of clickers our students will send their one-digit answers by SMS using the cellular phone each one of them has in his pocket. In order to test the feasibility of such use we approached BeeContact Company (http://www.beecontact.com/) that specializes in multi SMS applications for the business community and SMS voting for the entertainment media.

A trial was carried out in a regular class in the course "Introduction to Ecology" given to biology freshmen at Tel-Aviv University held on January 16th 2006. We took advantage of the fact that the class is divided into two groups that hear the same lecture at different hours the same day. In the morning class introductory questions were presented the traditional way. Two closed questions with four possible answers were projected on the screen. A few students raised their hands and one gave immediately the correct answer. The class continued assuming that all the students knew the correct answer. In the afternoon class, the same questions were presented but this time the students were asked to send their answer as an SMS to the number provided by the BeeContact Company. From the computer on the teacher's desk we logged on the company's website that was programmed to collect these answers. Within a few minutes the distribution of the student answers was projected in the screen. To our surprise only 10% gave the correct answer this time.

A month after this trial we met Dr. Curtis Bonk of Indiana University at the 2006 Chase Conference, and presented our idea to him. He drew our attention to the "Horizon Report" (http://www.nmc.org/pdf/2006_Horizon_Report.pdf) that foresees such an application of cellular phones to be in use in a few year time.

Conclusions

PRS is a very useful technological application especially in large classes at higher education institutes. It is of value to the teachers and students alike. The costs and complications in using the traditional receivers-clickers technology may hinder some institutes from making it available to their teachers and students. The alternative use of SMS via cellular phones presents a much cheaper and more readily applied option. It combines all the advantages of the PRS including the instantaneous response and sequential detailed report of student participation. This option has of course its own price for the service provided by the BeeContact, or similar, company and for sending the SMS's by the students. However, we maintain that the avoidance of the initial investment in hardware and the flexibility of its application in every LAN-connected lecture hall will facilitate its use in institutes of higher education in the near future.

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