Introducing Classroom Feedback Systems

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ABSTRACT

Personal Response Systems, or clickers, are wireless in-class polling devices which allow an entire class of up to 2000 students to respond to questions and immediately receive feedback on an individual basis. The following paper will briefly describe the background in which clickers were developed. It will further describe the devices and provide a rationale for their use, as well as a brief review of literature. The report will also consider student responses to use of the devices in one EFL setting, as well as discuss the devices’ implications for materials designers. Finally, current developments in the mobile phone market will be considered to suggest that such devices have the potential to become a standard part of higher education instruction.

Keywords
Classroom applications for emerging technology, Delivery Systems, Innovation for education, Polling technology

1) INTRODUCTION

Polling devices, such as eInstruction’s Interwrite PRS, make it possible for students to participate more actively in lectures and receive automatic feedback about their progress. Polling devices, or clickers, enable instant feedback and are increasingly becoming a standard feature in many classes in North America. They are often sold together with a text, especially in the sciences, a fact that should not be lost on materials developers and textbook publishers in the English as a Foreign Language (EFL) and English as a Second Language (ESL) field. It is timely and desirable that future EFL/ESL materials development consider the potential of the devices to, among other things, pre-test student knowledge, to assess the impact of instruction, to promote peer discussion and to deepen underlying knowledge of important concepts. However, the technology unto itself does not enable an improved learning environment. It must be used together with progressive approaches to instruction which put the learner at the center of the process and allow for the most efficient use of polling technology. It is central to this approach that the devices not be used to incessantly pepper students with questions, rather they should be used discreetly and strategically.

2) BACKGROUND

Horowitz (1988) describes the emergence of early polling technology at IBM Corporate Management Development center in a paper, which also considers the impact of the interactive capability of such devices on the design and delivery of courses, and the potential for improving instruction. As part of a quest to improve instructional techniques, the organization undertook a six month classroom observation trial. Instructors were classified as either ‘facilitative’, which involved the use of more spontaneous dialogue, Q&A using Socratic questioning methods and encouragement of active participation, or more oriented to the ‘traditional lecture style’, which involved a straightforward presentation of material in a teacher-fronted manner. Analysis showed that the lecture style was more effective to cover all of the syllabus material in the allotted time, however the facilitative style was more effective at maintaining student interest and attentiveness. Further observation of student behavior in these 2 classroom environments scored attentiveness, according to an index whereby 100 would indicate attentiveness of every student at every point.
The traditional lecture style index indicated just under half of the class was attentive at any given time, with an index of 47, whereas classes taught with the facilitative style had an index of 68. Furthermore, short-term retention was 19 percent higher amongst students who learned in a facilitative lecture after 3 days. IBM then deployed an early version of polling devices similar to those discussed in this paper. Attentiveness rose to an index score of 83, and retention improved from 19 percent to 27 percent. Students were asked to compare interaction and feedback as accomplished by either the use of student response systems or via conventional Q&A techniques, and stated an overwhelming preference for student response systems (6.6 out of 7).

3) PERSONAL RESPONSE SYSTEMS

Personal Response Systems (PRSs) are in-class electronic polling systems which use radio-frequency handheld devices connected to a laptop computer via a USB hub. Set up time for the system takes no more than a few minutes in any classroom. Student remote controls associated with this system allow for every student to respond to every question that their teacher asks (see Figure 1). It should be noted however that this paper does not advocate over-use of this potential, rather it suggests that less-frequent, strategic use of the devices will maintain student engagement and generate more considered responses. Student responses are aggregated and stored in computer files that can be made accessible in real time, both for grading purposes and for educational research to improve the quality of teaching. An example of a teaching question used by the authors in recent language classes to Japanese students is “What do you know about the Muslim world?” Students were asked to rate their knowledge in increments of 10 between 0 and 100. Using PRS, the response of every student is compiled and results are immediately available for display as a pie graph, a bar graph or a histogram, and make for the basis of more extended and meaningful discussion and instruction in the target language, or baseline data for planning future lessons. In this case, results revealed that students largely perceived that they had very little knowledge of the topic (see Figure 2). The PRS system is also used in lecture courses to more deeply involve students in learning material, to give quizzes, to administer surveys, and even to verify attendance.

At the beginning of a class, the instructor activates a ‘class’ using the software associated with the voting system (in this case eInstruction’s Interwrite PRS) which allows for any number of ‘sessions’. Each session can be saved as a data file for further review in PDF, CSV or other formats. The session files can also be exported to classroom management systems, such as Blackboard Learning System, WebAssign and WebCT. Instructors can therefore view responses to a given lesson in real-time or after a lesson, at a global level or on a student-by-student basis. Such features are of great value to reflective practitioners and materials designers who review their instruction and the impact of teaching materials used. They are also useful in situations where teacher accountability is an issue, and can be referred to during parent-teacher conferences and other such review processes. Saved files can be a valuable source of data when reviewing a class or a particular student’s performance.

4) RATIONALE

PRS units allow teachers to better fulfill the expectations of learner-centered pedagogy and constructivist principles in numerous ways. They allow an instructor to monitor student understanding of complex concepts, reveal common misperceptions and promote subsequent group discussion. Students receive much more feedback and the devices allow them to remain anonymous, which can be an important feature in classrooms with students who come from sociocultural contexts, such as Japan, where speaking out in a large group may be problematic. Such students often have difficulty asking or answering questions in class or venturing opinions because of fears of ‘sticking out’ or diverging from the group, to the point where Albon and Jewels (2007) found that some students were actually willing to be wrong in order to feel accepted within their cohort. With this in mind, systems such as Interwrite PRS allow for students to respond to questions anonymously and without fear of
creating disharmony or ‘losing face’. Furthermore, the devices allow students to see how other members of a group respond to a question.

5) TYPES OF QUESTIONS

A variety of question types are available to survey prior knowledge, student attitudes and opinions and to follow up instruction. Formats include multiple-choice, true or false, numerical, survey, serial, and short answer forms (text to 11 letters), and work is ongoing to recognize other input forms such as phrases and even sentences. Multiple choice questions can be readily used with TOEIC and TOEFL questions, which often present plausible yet incorrect answers, also known as distractors, alongside the correct answer. Such distractors can be a valuable opportunity for instructors to deepen student knowledge by explaining why plausible but incorrect examples are not satisfactory answers. Numeric questions can be used to have students assemble parts of a sentence in correct order. True or false questions can be used to good effect if the question introduces an element of surprise and stimulates subsequent conversation.

6) LITERATURE TO DATE

An extensive review of literature to date is beyond the scope of this paper. Interested readers should refer to Roschelle et al (2004) or Fies & Marshal (2006) for extended reviews. However, what becomes clear in the literature is that, while both lecturers and students perceive positive outcomes from using the technology, studies to date have not been able to substantiate those benefits in any rigorous fashion. Furthermore, Penuel et al (2006) noted that none of the dominant theories of education are able to accommodate all of the experiences reported by instructors using polling devices and this has resulted in “major gaps in the knowledge base guiding research and development in the area of audience response systems” (p. 188). In the field of Second Language Acquisition (SLA) such research is virtually non-existent. Euline Cutrim Schmid (2007, 2008) has written about the use of Promethean’s ACTIVote polling system in ESL classes. She found that the devices had a positive impact on affective aspects of classroom dynamics and that the anonymity factor was also an important highlight. However, she concludes that research in this area is still in an early stage and that further long-term studies need to be undertaken.

7) STUDENT RESPONSES TO SURVEYS

The popularity of the game show “Who wants to be a Millionaire?” gives some indication of the attractiveness of polling technology when questions incorporate a game-like element. Judson and Sawada (2002) have reported on decades of studies which have shown that polling technology has been perceived as an interesting and beneficial feature amongst students. Similarly, the students implicated for this paper (n = 250) responded positively to use of the devices. They were all able to use the technology without excessive difficulty. They rated their ability to understand the devices with a mean of 3.49 on a 5-point scale, with 1 being “not at all” and 5 being “I fully agree”. They perceived the use of the devices as enjoyable and interesting (average = 4.25). Moreover they were clearly able to see a place for such devices in language instruction (4.11), although they were somewhat less optimistic for their use in other subjects (3.78). These findings lend credence to the plausibility of Wagner’s (2005) prediction that language instruction will be one of the areas leading advances in e-learning areas such mobile-based education.

8) A MOBILE FUTURE

Already there are clear indications that the polling technology described in this report will migrate to mobile phones (e.g. Day, Sas, Dix, Toma, Bevan & Clare 2007, Paulos, Joki, Vora & Burke 2007, Pitt, Kamara, Sergot & Artikis 2006, Illsley, Kaldor, Berglund & Feinbier 2005). The mobile phone has become the most widespread electronic device in human history. Studies have found that 100% of Japanese university students had mobile phones (MacLean & Elwood, 2008, Thornton & Houser, 2005) and this will soon be the case in many countries, if it is not so already. Already a popular television program in Japan, Fuji Television’s Manningen, has adapted polling
technology in a game show quiz format in which tens of thousands of viewers vote using their mobile phones. It is quite possible that polling could become a standard procedure in higher education in the near future. To be effective, such mobile learning programs will require new digital communication skills, new pedagogies, and new practices. They will also require a thorough consideration by materials designers and publishing firms. Further research as to how to deploy this new technology in language classrooms is therefore needed.

REFERENCES


**APPENDIX A: PRS RF System Architecture.**

![Diagram of PRS RF System Architecture]

**APPENDIX B: PRS Display Format**

![PRS Display Format Image]