Using Audience Response Systems in the Classroom

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INTRODUCTION

Audience response systems (ARS) are increasingly being introduced into educational settings, having previously proved their value in business. These systems make use of hand-held numeric input devices to allow students to enter data in response to questions or statements displayed on a public screen. The captured data is displayed on a public screen and enables both academics and students to immediately see how the whole group has responded. The anonymity afforded by an ARS encourages individuals to fully participate without fear of ridicule or loss of face.

The low cost ARS technology is simple to use by both students and academics, can be used with large (up to several thousands) or small groups and has applications in all topics of study and at all levels of study. ARS are highly portable, require little set-up time and are easy to use by anyone who has had some experience with software such as PowerPoint.

AUDIENCE RESPONSE SYSTEMS

ARS comprise hand-held input devices that transmit data to a receiving device connected to a personal computer. Software processes the datum and presents it in a variety of formats to the participants for discussion. Key components of the system are:

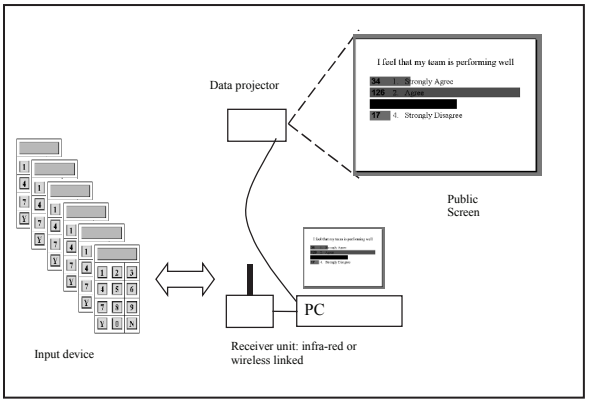
- **Hand-held input devices:** A variety of sizes and designs exist, from the credit-card size keypad with basic numeric input (Figure 1) through to systems that include a display screen to provide feedback to the user.
- **Receiver:** Utilizes infrared or other wireless communication media to collect data from the keypads.
- **Software:** Manages collection and processing of data and supports display of the data in a variety of presentational formats. The software may be embedded in other container software such as PowerPoint. The output from the system is usually displayed on a public screen via a data projector (Figure 2).

ARS IN HIGHER EDUCATION

Draper and Brown (2004, p. 20) suggest that "The dream of personal teaching is really about adaptive teaching; where what is done depends on the learner's current state of understanding." ARS can provide timely feedback to support this adaptive teaching goal, but Draper and Brown make the point that this can only be achieved through ap-

Figure 1. Credit-card size kepdad (Source: KEEpad Pty Ltd)

Figure 2. ARS components



propriate pedagogic design and action and not through the technology alone. In one-to-one or small group settings the learning facilitator may have a sense of the current state of the learner if the learner feels sufficiently comfortable in revealing it. With large groups in more formal settings the availability of cues to the learning facilitator can be more limited. The immediate feedback that an ARS offers can publicly identify differences or similarities of opinion within groups and provide a trigger for further discussion or analysis of data and re-adjustment of pacing or content. Audience Response Systems can be used with both large (hundreds of participants) and small groups (Banks, 2006) to support lectures, workshops, seminars, and to explore a wide range of subjects. They can be used at undergraduate and postgraduate levels, and within traditional and post-modern paradigms. Subject areas that value discussion, debate, multiple interpretations and direct challenges to accepted wisdom can benefit from this technology, but equally an ARS can be used in subject areas where demonstration of understanding of a fixed body of knowledge is vital. ARS can be used for formative and summative assessment, in the gauging of preliminary level and subsequent stages of understanding of a subject and in the exploration of the concepts that underpin critical issues.

Mitchell (2001) suggests that ARS can be used for mechanistic purposes such as monitoring class attendance via individual handsets, providing instant marking and feedback and for gathering data that can be used to support research activities related to classroom processes. McCabe, Heal and White (2001) used an ARS to support computer-assisted assessment (CAA) approaches with mathematics students and consider that it not only reinforced existing CAA activities but also served as a valuable tool for motivating higher levels of student learning. Hunt, Irving, Read and Knight (2003) used an ARS in a first-year information systems unit, in a decision-making subject in a third-year psychology course and also with second-year BS Pharmacy students. In the pharmacy course questions were posed via the ARS and the resulting answers were displayed and discussed by the whole group. A key issue here is that what is being sought is not necessarily a 'correct' answer but instead an examination and exploration of all possible answers and the reasons that individuals give for selecting a specific answer. The students expressed enthusiasm for the system, particularly in its ease of use, the ability to discuss answers immediately after making their choice and in the way it helped students identify where further reading was required. Importantly they also found it to be both easy and fun to use.

Post graduate HRM and MBA students using case-based approaches supported by an ARS indicated that the level of participation and number of ideas generated and explored was greater than usual and that the influence of individual personalities was greatly reduced. (Jones, Gear, Connolly, & Read, 2001). The students also observed that the technology was simple to use and to some extent became 'invisible' to the users. Williams (2003) notes that students on an MBA course using an ARS were strongly in favor of the technology and had negative views about passive learning approaches that simply involved reading or listening. Uhari, Renko and Soini (2003) reported that 80% of students studying a pediatrics course felt that an electronic voting system helped improve their learning and enhanced questioning during lectures. Witt (2003) found that 87% of students studying statistics for a psychology course saw more benefits than disadvantages in the use of keypads. Judson and Sawada (2002) reported that students consistently indicated that they are more likely to attend class, are challenged to think more deeply and feel that staff using such technologies learn more about them as individuals.

The anonymity afforded by ARS provides an opportunity for engaging students in sensitive subject areas where they may normally be reluctant to raise their hands. For example,