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Promoting active learning using Audience Response System in large bioscience classes

Nikolaos Efstathiou *, Cara Bailey [1]

University of Birmingham, College of Medical and Dental Sciences, School of Health and Population Sciences, Nursing and Physiotherapy, 52 Pritchatts Road, Edgbaston, Birmingham, B15 2TT, United Kingdom

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SUMMARY

This paper considers the challenges of bioscience teaching and learning in pre-registration nurse education. Effective learning requires active student participation which is problematic when teaching large groups of students. New technologies, such as the Audience Response System (ARS), have been introduced to increase student participation and support them in the understanding of complex bioscience concepts.
Within one university department, an evaluation was undertaken to identify the perceptions of pre-registration nurse students on the use of ARS in the teaching and learning of bioscience. Our findings concur with others that ARS increases student participation and aids in identifying misconceptions and in correcting them. Students found ARS very useful and wanted ARS to be used in additional modules too. Although ARS did not seem to motivate students to study adequately before attending the relevant sessions, it increased discussion among students and awareness of their level of knowledge compared to their peers. Further research is required to identify the effectiveness of ARS in the teaching and learning of bioscience and its impact on the performance of the students in their final assessments.

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Introduction

For a long time it has been recognised that as nursing practice becomes more autonomous, there will be an increasing need to apply bioscience knowledge in practice (Eraut et al., 1995). Despite the emphasis on social and behavioural sciences in the 1980s nursing curricula, it has been widely acknowledged nowadays that bioscience knowledge is essential for nursing competence and should form a substantial part of the knowledge base of nurses (Clancy et al., 2000). However, Davies et al. (2000), after reviewing recurring research literature on the teaching and learning of bioscience, report that many nursing students find the concepts difficult to understand and question their relevance to practice. Teaching students about bioscience can be challenging because of the often large student groups and the likelihood that students will be at different academic levels. Motivating students and maintaining their concentration can also be difficult. This paper describes the use of Audience Response System (ARS) in teaching bioscience within nursing education in one academic setting and reports our experience of using ARS with a cohort of first year degree nursing students.

Teaching and learning bioscience in nursing

The difficulty of teaching and learning bioscience in nursing is multifactorial. It has been suggested that the level and depth of bioscience taught to nursing students is inappropriate and that many teachers are not adequately prepared for teaching this topic (Akinsanya and Hayward, 1980; Courtenay, 1991). The widening of entry criteria for nursing courses has also contributed to the difficulties in teaching and learning bioscience, as student nurses are not always well grounded in science before entering higher education and there are increasing numbers of mature students who have no scientific background (Larcombe and Dick, 2003; Montgomery et al., 2009). In addition, bioscience is most often taught in large classes to first year nursing students creating a further challenge because of the complex concepts that need to be explored and the students' lack of confidence in learning (Al-Modhefer and Roe, 2009).

In our Institution, bioscience is taught in the first year of the degree nursing programme, primarily by university nursing lecturers and experienced nurses. Three Biological Sciences modules contribute approximately 25% of the theory component in the first year. All teaching time is devoted to lectures and a limited time on small group tutorials. The didactic lectures are mostly delivered via PowerPoint presentations and it has been increasingly observed that some students fail to comprehend much of the lecture material and tend to focus too much on the details instead of understanding the main concepts, observations supported by other authors with regard to the teaching and learning of bioscience (Cain et al., 2009).

* Corresponding author. Tel.: +44 121 41 58587; fax: +44 121 41 43158.
E-mail addresses: n.efstathiou@bham.ac.uk (N. Efstathiou), c.bailey.2@bham.ac.uk (C. Bailey).
[1] Tel.: +44 121 43657; fax: +44 121 41 43158.

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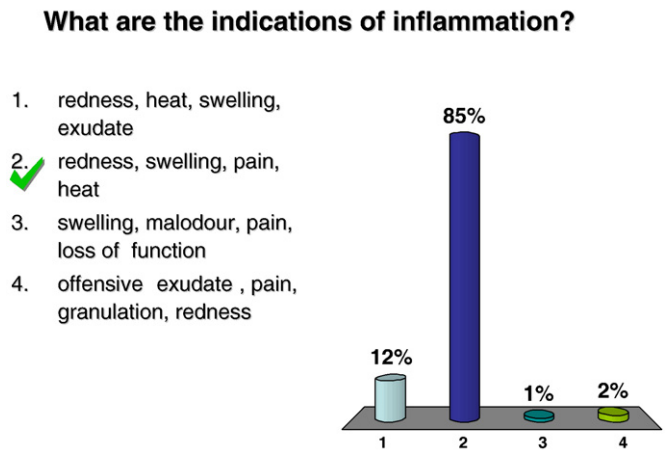

Fig. 1. Example of ARS question.

The lecture is the most common method of teaching bioscience as it is perceived to be efficient and economical with large classes of students (Al-Modhefer and Roe, 2009). Students also tend to favour lectures as the teaching method for bioscience at the first year of their training. Al-Modhefer and Roe's (2010) study suggest that when nursing students come into university for the first time, they appear to favour a didactic approach to lectures, with a preference for clear, organised instruction. Although these results from a single higher institution cannot be generalized, further evidence supports lectures as the favourable means for teaching and learning bioscience. Davies et al. (2000) report that in their institution 72% of the students agreed that lectures contributed to their learning and understanding of bioscience. However, lectures have been criticised as outdated and ineffective due to the passive role of students and information overload (Biggs and Tang, 2007). Zurmehly and Leadingham (2008) acknowledge that during lectures students can only concentrate for 20 to 30 min and there is limited information exchange between teachers and learners compromising students' learning. Thus, lectures, because of their length, their limited opportunities for student participation and questioning, are regarded as a poor and less effective teaching method.

It is suggested that fundamental components of effective teaching, which could apply to the teaching and learning of bioscience, include variables that encourage active student learning and enthusiasm, provide opportunities to learn, integrate ideas, promote questioning and give feedback to students' responses (Zurmehly and Leadingham, 2008). Active student participation has been associated with gains in educational achievement (Narayan et al., 1990). In our case, because of the large classes (approximately 120 students), 'hand rising' was one of the common methods used to increase active student participation. However, this method has disadvantages as participation can be unequal in favour of the most knowledgeable or confident students who are most willing to respond (Graham et al., 2007).

The use of ARS in education

The challenge remains to engage and motivate students who mostly belong in a technology driven generation and in particular nursing students who expect and respond favourably to media-enriched learning (Jones et al., 2009). A new approach in engaging students who are reluctant to engage or shy to take the risk is the Audience Response System. This system has only recently been introduced in nursing education.

ARS was first introduced at Stanford University in 1996 and it was an expensive and difficult to use system (Kay and LeSage, 2009). However, more affordable and user friendly devices have been made available and now numerous universities use this system (Abrahamson, 2006). An ARS is a technology that allows students to respond electronically using a handheld piece of equipment, usually with a 10-digit numeric keypad, to questions that lecturers pose in class. Lecturers present multiple choice or true/false questions to the class using PowerPoint presentations. After each student responds to the lecturer's questions using the keypad, the responses can be swiftly graphically displayed in the PowerPoint presentation, allowing students to relate their performance to the rest of the class (Gauci et al., 2009). The format of the ARS session resembles the popular television show 'Who wants to be a millionaire' where the contestant has the opportunity to 'ask the audience' to answer the question on hand held computerised devices.

The major benefit of using ARS is the potential it offers to reinforce learning (Bunce et al., 2006). Studies have confirmed that students enjoy using the system (Beekes, 2006; Bunce et al., 2006), that they feel as if the lecturer is more aware of their needs (Knight and Wood, 2005) and its use has a positive effect on learning outcomes (Caldwell, 2007). Kay and LeSage (2009), after synthesising the evidence surrounding the use of ARS, report that this technology improves attendance in higher education classrooms and students tend to be more attentive and interested or engaged during lectures. Hu et al. (2006) suggest that the anonymity it provides increases student participation and allows students to be active members in the classroom and participate in the learning process. Students are able to answer in privacy, concealing potential embarrassment if they are wrong compared to more traditional approaches of a show of hands. Students have praised the opportunity to compare their answers with the rest of the group (Bunce et al., 2006) even when they are wrong they like the reinforcement that they are "not alone" (Beatty, 2004). Another advantage of ARS is that based on student feedback gathered throughout a class, any misconceptions can be identified and explanations can be offered immediately altering the static lectures in interactive lectures guided by student input (Kennedy and Cutts, 2005). The technology is relatively easy to operate and requires only an intermediate level of computer skills allowing the lecturer to focus on the pedagogy rather than the technical operations (Parsons, 2005). Weaknesses include technology malfunctioning or the availability of the remote devices (Kay and LeSage, 2009). In addition, inexperienced teachers may find it difficult to provide instant feedback or alter their instructional strategies (Hu et al., 2006).

In recent years, a number of studies have focused on the use of ARS in nursing education. According to Nichol and Boyle (2003), ARS has been successfully used in a variety of teaching environments applicable to

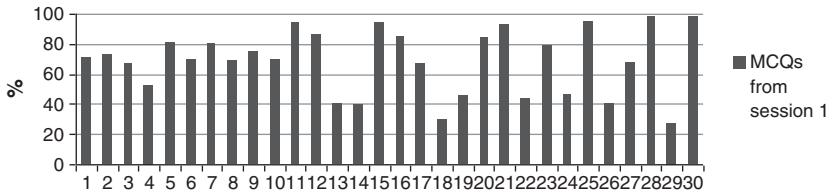

Fig. 2. Percentage of students answering correctly questions at session 1 (module 1).

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