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Use Audience Response Systems

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The use of technology enhanced learning within medical education is gaining increasing prominence as newer, cost-effective and user friendly tools and devices become marketed. One such tool, audience response systems (ARS), are also commonly known as personal response systems (PRS) or 'clickers'. The use of ARS has witnessed widespread success across both general higher education and medical education. They not only encourage greater interactivity with students, but also have been shown to enhance knowledge gain.

Hardware

ARS generally involves four main elements: a wireless hand-held device for every participant; a receiver that picks up signals from these handsets, a computer/ laptop and finally software, usually embedded within traditional presentation programmes, to analyse and present responses. Students use their device to respond to questions presented on screen and can select or change their answer either within a time limit or until all respondents have answered. After polling is complete, the answers from the group are presented anonymously on screen in a variety of summary formats including pie charts or bar charts. Each handset has a unique signal so that each respondent may be identified, though this function is rarely utilised.

Potential Uses

Interactivity in the large-group setting: whilst many educators question the role of lectures for promoting deep learning, they are still an often used mode of teaching delivery. ARS is frequently cited as a way of compensating for the passive one-way communication inherent to lectures and the difficulties of sustaining student concentration. Participants' attention can be maintained through the use of questions interspersed in the lecture that may either test knowledge recently presented or assess prior- knowledge on topics that are due to be explored. Students can use ARS to respond anonymously in a non-threatening setting. Such immediate feedback and grading of questions has been shown to improve retention of lecture content and students also benefit

from being able to immediately compare their answers with that of their peers;. Those who perform less well may be motivated to enhance their knowledge to align themselves with their fellow students. Interactive ARS questions that contain well-constructed distractors promote a constructivist approach to active learning with students being encouraged to form links between new and old information. In addition to increased interactivity between lecturer and students, active learning can also be encouraged through allowing student-to-student discussions prior to responding to the presented question. This is especially useful when exploring more controversial topics.

Educational Games and Simulation: as part of promoting interactivity, ARS can be used within the clinical context to develop clinical decision making. Patient cases can be used with ARS questions inserted at points of clinical decisions that require a consensus response from the group of participant students. Based on the decision taken, the case can then be advanced through one of a number of alternative options to help students develop their problem solving and clinical reasoning.

Setting the teaching agenda: Knowles' theory of adult learning suggests that adult learners show self-concept and need to be involved in the planning of their instruction. It is possible to use ARS to allow a group of students at the start of a teaching session to select a few preferred options from a wide range of potential teaching topics. In this way, teaching is informed by the needs of the students and allows the instructor to omit topics already well understood.

Creating educational structure: ARS questions can also be used by the instructor to create structure to a lecture with questions being employed between sections of learning to review content, create summaries and minimise student fatigue.

Evaluation: ARS is increasingly used as a fast and effective way of polling student feedback at the end of a teaching session. Through anonymous responses to interactive questions, instructors can quickly capture feedback data on their teaching. ARS feedback may also be a useful method in peer-led teaching programmes to allow students to evaluate their peer's teaching in a confidential and honest manner.

Formative assessment: ARS can be used to deliver a formative assessment to a large group of students without the need for individual test papers and post-assessment marking. By responding to questions on screen, students can work through a variety of question formats and content and be presented at the end with their individual score (anonymised for example by using the handset device number) with benchmarking against their peers. Instructors can then use this opportunity to cover in detail selected areas of the assessment by focussing on common areas of poor performance.

Emendation and standard setting amongst faculty: ARS has also been used outside the traditional teaching environment by faculty to address the usual time-intensive process involved when reviewing questions and setting pass-marks for assessments. Faculty members can quickly respond to potential assessment questions displayed on screen to ascertain its suitability for inclusion and generate potential grading cut-offs.

Potential Pitfalls And Issues

Technology-based challenges: include the initial acquisition cost of the hardware and software plus potential ongoing costs for replacement devices if any are misplaced or damaged. Instructors also need to be prepared to deal with the possibility of device or system failure (e.g. receiver not picking up responses, faulty handsets or software issues) and be able to alter the intended instruction if such an event occurs.

Teacher-based challenges: include the training and familiarity that is required from instructors to be able to confidently use the wide range of ARS options on the market. Teachers need to accommodate the increase in time involved when using ARS with a suggested allowance time of 3-5minutes per question.

Time also needs to be considered with regards to setting-up and taking-down equipment before and after teaching sessions. A major challenge for teachers is the time and skill required to design well-crafted and meaningful questions that can promote active learning, retention and application of recently learnt knowledge. Questions must be clearly written and unambiguous with sufficient time allocated during the teaching sessions for students to read and respond. As questions within ARS are pre-determined, teachers do not have the option of easily adding in extra interactive questions as the presentation is being delivered.

Student-based challenges: these similarly include acceptability and familiarity with the device however, as the handsets are extremely user-friendly and intuitive, this is rarely an issue. There is the potential for creating student demotivation if they repeatedly respond with incorrect answers. There are also concerns that students may view ARS purely as a novelty experience for fun and enjoyment. Whilst these experiences are important for engaged learning, educators must ensure that the use of ARS does not distract from achieving intended learning outcomes. If ARS is to be used within a teaching session, the teacher must clearly identify during the initial lesson-planning stage their purpose of using ARS technology and the optimal format, content and timing of the interactive questions to best encourage students' active learning.

Summary

As described above, there are a multitude of ways in which ARS can be used to enhance teaching and promote active learning through greater interactivity between teacher and students. Research from the literature suggests that teachers have a positive attitude and willingness to continue using ARS whilst students similarly find the technology easy to use, increases their engagement with teaching and benefits their overall learning experience. ARS is now also being used by faculty in novel ways out with the traditional classroom based teaching environment. It is important however that educators are mindful of the potential issues that may arise when using such technologies and ensure that its implementation is for pedagogical rather than novelty reasons.

Further Information

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