

really good stuff

Interactive learning with voting technology

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Context and setting We describe here the feasibility of an interactive voting modality to enhance learning in lectures for doctors and medical students. In reply to questions posed by the lecturer, participants respond using wireless keypads while a computer-assisted device displays a histogram describing the distribution of answers, thereby providing instant feedback to the lecturer and the audience. The modality appears logical, feasible, acceptable and congruent with current theory of adult learning but there are still very few studies probing its effectiveness in either general education or medicine. It may particularly fit educational challenges that demand departure from attitudes, intuitive diagnosis or pre-conceived notions – by making them explicit.

Why the idea was necessary Traditional lectures, which aim to transmit knowledge to a passive audience, have limited ability to maintain attention and to promote change in practice behaviour. Innovational modes, such as problem-based learning and case discussions, are being used for their active learning component that stimulates the audience to think and participate. While stimulating attention, the anonymous mode of a voting system allows both doctors and medical students to reach a non-threatening realisation of knowledge gaps, essential for effective learning. In contrast to the deterministic messages often inherent in expert lecturing, this modality facilitates probabilistic thinking, listening to alternative options and recognition of misconceptions, all of which are major ingredients of modern clinical learning.

What was done We tried 2 existing interactive teaching systems with infrared-based communication technology, each costing around \$5000 for a system

1 with 100 transmitters (). Using questions put to the audience during lectures, the electronic interactive voting system was tested to provide real time information about knowledge, understanding or attitudes. A mass of experience has accrued over the last 3 years from over 25 lectures attended by nearly 500 doctors (including residents, board-certified specialists and primary care doctors) and from several courses taken by more than 400 students. The system promoted the use of case discussions and problem solving exercises. Voting technology helped shift lectures to an interactive mode that promoted group thinking and provided instant feedback to the teacher and the audience.

Evaluation of results Experience with medical students showed that interactive teaching facilitated probabilistic thinking, such as the application of likelihood ratios in diagnosis: at the end of a session, most students would correctly combine pretest and test information and refuse to interpret a test result without a pretest probability. Evaluation of the interactive response system revealed that most attendees felt that the system promoted interest and participation in the lecture to a great or very great degree. The introduction of such a teaching aid requires the development of a training programme to expose faculty to the principle of active learning and provide them with the skills needed to utilise the equipment efficiently, including how to structure a lecture with appropriate questions. Today's technology allows an affordable voting system – as an electronic, group version of the Socratic method – that facilitates interactive teaching, thereby enhancing lecturing in medicine. Our experience indicates that this modality may improve the quality of clinical learning and deserves further evaluation.

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