Google Docs and SurveyMonkey™: lecture-based active learning tools

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What problems were addressed? Lecture-based courses are coming under increasing scrutiny as medical pedagogy transitions to more active learning modalities such as case-, problem- and team-based learning. These approaches enable students to progress beyond the acquiring of factual knowledge and achieve a depth of understanding through solving complex problems alongside their peers.[1] Further, the practice of filming and archiving lectures is reducing the incentive for students to attend class, and medical schools are adopting 'flipped classrooms' in which students view taped lectures outside of class in preparation for active in-class learning. However, many courses remain lecture-based, and there is a need to explore whether social technologies can contribute to more active learning environments during lectures.

What was tried? At Penn State College of Medicine, we sought to promote greater student engagement in a semester-long, lecture-based course for 154 Year 1 students by integrating two interactive technologies – Google Docs and SurveyMonkey™ – into 22 hour-long lectures. Before the semester, course lecturers were asked to provide one or two discussion prompts and one or two survey questions relevant to their topic and to identify 'pause points' in their lectures to reflect on student responses. Before each class, discussion prompts and an active link to survey questions were posted into a shared Google Doc and students were encouraged to bring laptops or tablets to class. During class, dual projection screens displayed, respectively, the faculty member's PowerPoint presentation and a laptop feed that course co-directors used to toggle between Google Docs and SurveyMonkey™ during lectures. Within the Google Doc, students were able to respond anonymously to discussion prompts and pose questions for lecturers. The active link to SurveyMonkey™ posted within the Google Doc enabled students to provide real-time responses to survey questions that lecturers then integrated into their presentations. Student usage was not mandatory and those who participated were required to use professionalism.

What lessons were learned? Consistently, half of the class participated in the Google Doc and SurveyMonkey™ activities, with engagement increasing throughout the semester. Both technologies generated student-driven content for the lecturer to address and prompted online conversations among students during lectures. Because the Google Doc enabled students to post anonymously, questions were often directly challenging to lecturers. Students also shared links to relevant news articles pertinent to lecture topics. Contrary to initial concerns, no unprofessional incidents were observed. SurveyMonkey™ was an effective tool, but response rates were occasionally low, which limits the ability to extrapolate results to the class. Future efforts might solicit survey data from students before the lecture. For both technologies, pause points to reflect on student-generated content were most effective when woven into lectures by faculty staff, with periodic assistance from course co-directors.

It was difficult to elicit survey and discussion prompts from lecturers before the semester, and course co-directors frequently developed and prompted active learning content. The use of a split-screen in the lecture room (i.e. two computer feeds) meant that course co-directors sometimes had to share the podium with the speaker when reflecting on shared content, which was awkward. Another practical challenge, of course, is that encouraging students to use Internet-ready devices during a lecture risks their distraction from other online content. Ultimately, although they are perhaps less interactive than case-, problem- and team-based learning, social technologies such as Google Docs and SurveyMonkey™ can introduce active learning aspects into lecture-based courses.

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Touch-pad mobile devices for blended learning in immunology practicals

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What problems were addressed? Attention to the improvement of undergraduate practical education is being actively investigated and interactive learning strategies, which encourage peer discussion, are central goals.[1] A major challenge confronting instructors in the undergraduate classroom concerns how to engage students in problem-solving activities. Some students are reluctant to disclose what they know or to ask questions, and this makes the recognition of any misconceptions they may have challenging. The situation becomes more difficult when students need exposure to hands-on experience during laboratory practical sessions (practicals). New strategies are needed to provide opportunities for students to engage in the learning process and to foster a sense of ownership towards their work.

What was tried? We developed blended immunology practicals for Year 2 pharmacy students. Each laboratory session involved the combined use of digital tablet devices and in-class group exercises. Each group of four students was handed an iPad to use alongside their existing touch-

pad mobile devices. The laboratory practical session was divided into three parts: (i) a 10-minute briefing by the instructor to introduce students to the main tasks of the laboratory session; (ii) a period in which students were set loose to work on the tasks, and (iii) a period during which students reported their findings and discussed the implications of their results. Students used the iPad to take notes, access learning resources, browse the Internet and navigate course notes. Various multimedia capabilities that are inherent to the iPad and smart phones were utilised to capture and annotate digital images, and record laboratory procedures. Materials generated by students were displayed on an interactive whiteboard for whole-class discussion by wirelessly streaming the iPad content using an Apple TV.

What lessons were learned? Data sourced from a final anonymous module evaluation survey completed by 40 students showed that 99% of respondents agreed the laboratory activity was interesting, and 74% agreed the wireless devices facilitated better use of limited laboratory space compared with laptop or desktop computers. More than 95% of students felt they had gained more confidence in giving and receiving feedback and 94% indicated that they would prefer iPad materials to textbooks, provided the cost of the materials was reasonable. Students' favourable perceptions do not seem to depend on the effect of exposure to a novel learning activity because their motivation remained high for these classes in relation to that for laboratory sessions in which iPads are not provided.

The incorporation of touch-pad mobile devices into practicals enhanced students' engagement and enjoyment of the laboratory exercises. Using these devices was a valuable way of focusing students on one task at a time and was superior to the use of laptop or desktop computers. When students were made aware that their material would be reviewed and used as resources in the laboratory in the future, they were motivated to capture and discuss relevant and useful material. The blended learning approach using digital tablets was highly appreciated by our pharmacy students and resulted in significant interest in the subject. This approach was a suitable tool to complement traditional undergraduate practical teaching to meet the challenge of increasing the willingness of less confident students to share the results they obtain.

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Using videogames facilitates the first visit to the operating theatre

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What problems were addressed? First experiences of practice in the operating theatre with real patients are always intimidating for students. The high pressure inherent in a dynamic environment in which many health professionals are working simultaneously causes stress to novices who are without a defined role. Students, conscious that they may interfere with surgical activity and compromise the patient's safety, tend to remain passive in order to avoid the 'humiliation' of making mistakes. As a result, novices feel they are unproductive and this may have a possible negative impact on their future career decisions.

The knowledge, skills and attitudes of the novice may be improved by implementing a theatre induction curriculum.[1] Although the use of educational games has not been validated for this purpose, we hypothesised that a game-like simulation that served to introduce the operating theatre would efficiently improve the perceptions and performance of novices.

What was tried? We developed a game-like simulation (freely accessible at http://e-adventure.appspot.com/redirect/operating-theater-game-es) in which the real environment is reproduced using pictures and short videos. An avatar or iconic representation of the user is displayed to show how the student progresses with equipment.

In the game, students are instructed through practice in how to act in the surgical block with reference to being correctly equipped, interacting with patients and relatives, entering and leaving the theatre, maintaining sterility, leaving the theatre if they feel sick and assisting in small tasks (e.g. tying the surgeon's gown, positioning the lamp, handing materials, etc.). Moreover, the game includes detailed information about: (i) structure of the surgical block and its spaces; (ii) common elements of theatre, and (iii) scrubbed and non-scrubbed surgical personnel. After completing the game, students are given feedback on their performance to acquaint them with any errors they have committed. The first prototype of the game was evaluated by experts (i.e. formative evaluation) using Likert scales to assess the game's utility, application and feedback. Comments received were used to continuously improve successive versions of the videogame. Now the game is being validated with students. For this purpose, a prospective and randomised study is presently being conducted. Half of our novices play the game on the day prior to their first experience in the operating theatre; the other half (the control group) have no access to the application. On the day after their first theatre experience, all students fill in a questionnaire that includes a series of items about the different aspects contemplated in the game.

What lessons were learned? Thirty-one experts (34.5%) returned questionnaires with comments. Experts included health professionals (with > 20 years of experience in operating theatres), less experienced professionals and final-year students. All checked items scored > 6 points on average (of a maximum of 7) and most comments were highly favourable. Further, data on initial student perceptions of