

Why do we give lectures?

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Before the invention of paper, lecturing was state of the art technology, but what purpose does it serve now? Why don't we just find a good textbook, or put up detailed lecture notes on the Web? And if we insist on giving lectures, can't we just webcast?

As a member of my department's teaching committee, I see lectures where the lecturer reads aloud from notes that are projected on screen, and where the students follow by reading the printed version of the notes in front of them. What is the point of such lectures? Should we just cancel lectures, and instead ask the students to read notes on the Web or watch webcasts?

My answer is no! I believe that we can make our lectures worthwhile. However, we need to ask ourselves how we can add value. What can we give the students that they cannot get from the notes?

First of all, we can provide a bit of human touch. Even in a large lecture theatre, it is possible to interact with the audience. With a cordless microphone, I can walk around asking questions. If people are chatting, I immediately head towards the trouble spots. By asking simple questions, I can immediately gauge whether the students are lost.

Unfortunately, it is easy to get carried away with active learning. What do I do when I realise that people are lost? Do I just move on, or do I keep repeating myself? Some students complain that I repeat myself too much, and that my lectures seem unorganised because I often get sidetracked during interaction with students.

Secondly, I am a firm believer in visualisation. My two General Education Modules, GEM1506K *Heavenly Mathematics: Cultural Astronomy* and GEM1518K *Mathematics in Art and Architecture* are both essentially about geometry. The astronomy module requires that the students grasp some fairly complicated three-dimensional geometry, which is notoriously hard for many.

Together with the Centre for Instructional Technology and Applications (CITA) at the Faculty of Science, I have developed interactive Java applets that illustrate some of these concepts. However, the best way to explain something is often to keep it simple. I always try to find ways to visualise the concepts using simple props, our bodies or thought-experiments. For example, I make students act out the motion of the Sun, Earth and Moon, or I use soft toys like a polar bear and a tiger to demonstrate the difference between what the sky looks like to observers at the North Pole and the equator. In that way they can experiment at home or with each other. It also helps them understand that in spite of the apparent complexity, the basic ideas are often surprisingly simple.

In the 'mathematics in art' module, one of the homework is to make paper models of the Platonic and Archimedean solids. We use these polyhedra throughout the course to illustrate the concepts.

My courses lend themselves easily to visualisation exercises, but I believe that it is possible to create demonstrations for concepts in many other areas. I always start each semester by telling my students that "I'm not afraid of looking stupid, and I hope you're not either!" When the students catch on to this idea, the lectures start getting exciting!