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Media Enhanced Teaching and Learning

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Experience has shown that one of the most successful ways to deliver mathematics lectures is by working through handwritten notes and examples. I (in this article, 'I' refers to Joel Feinstein) am interested in ways that technology can enhance this process. Tablet PCs offer a modern approach to chalk and talk that can replicate most of the best features of writing on a board while allowing improved delivery, such as being able to annotate existing notes and insert graphics such as circles and lines into diagrams. Using a tablet PC opens up new opportunities, such as integrating software into lectures and recording onscreen content as video with synchronised sound for later viewing and distribution.

Since 2006-7, I have used a tablet PC and a data projector to display slides which I annotate during classes. In 2007-8, I also made audio recordings (podcasts) of all of my classes. For more details concerning my early use of a tablet PC and audio recordings (podcasts), see [1].

Since 2009-10 I have been recording screencasts of my classes (movies of everything that is displayed on the screen during my classes, with synchronized sound). Along with other resources, I make the annotated slides and recordings from classes available to the students from the module web pages as soon as possible after each class. Classes which have been recorded in previous years are not recorded again, but the earlier recordings are made available to the students. For more details concerning my implementation of using a tablet PC to produce screencasts, see [2].

Many of the resulting screencasts are suitable for publication as open educational resources. I am making resources available directly through my blog and/or through several of the University of Nottingham's channels [3].

Feedback from students is extremely positive. Many of the positive features identified in student feedback are as in [1]. However, the screencasts appear to be even more popular than the audio recordings were. Selected specific feedback:

- Students find it very helpful to have access to the annotated slides and the recordings shortly after each class. In particular, if they suspect that there may be a mistake in their written notes, they can immediately check the annotated slides online in order to avoid wasting time.
- Students who miss classes, for example through illness, strongly appreciate the opportunity to have access to the annotated slides and the recordings at times convenient to themselves. They find this far superior to having only a copy of the notes.

- Students appreciate having the opportunity to revisit portions of the classes where they feel that they may have missed some useful spoken explanation. This is especially helpful for students who are not native English speakers.
- Students find large and clear writing helpful. This makes using the tablet particularly effective in rooms with large data projection screens. This has benefits for students with dyslexia.

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The following issues are worth considering, however.

- A data projector can only display one screen at a time. If necessary you can scroll back through the preceding material, or display the slides at a smaller scale. Even so, the amount of material visible at one time is far less than there would be on a good set of blackboards/whiteboards.
- The microphone generally only picks up the voice of the teacher, and not the students’ responses and questions. It is best to repeat what the students say both for the sake of the recording, and also for other students.
- While many students appreciate and take advantage of the materials available in order to improve their understanding, other students may stop attending classes, and may fall behind. As a result, some students may end up doing worse than they would have done if less material had been made available. One way to address this problem may be to have appropriate class tests or assessed coursework to discourage students from falling too far behind.

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At the University of Nottingham, the popularity and success of my use of technology in teaching mathematics inspired several other members of staff in the School of Mathematical Sciences to use tablet PC’s in their own teaching and to record screencasts. Now a group of colleagues in a number of disciplines have begun using

Camtasia to record video materials to support their teaching. The University of Nottingham Media Enhanced Teaching and Learning (METAL) project, which Claire Chambers and I lead, aims to build and support the growing community of staff involved in creating audio visual teaching material by distributing 100 Camtasia licenses and running staff development workshops on this technology to disseminate ideas concerning good practice and to discuss methodologies. Recordings of sessions from the METAL workshops are available via my blog [4].

References

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2. Feinstein, J., 2010. Using a tablet PC and screencasts when teaching mathematics to undergraduates. *In*: M. Robinson (ed.), N. Challis (ed.) and M. Thomlinson (ed.), 2010. *Maths at University: Reflections on experience, practice and provision*, pp. 118-120. Birmingham: More Maths Grads.
3. Nottingham Educational Resources. *Explaining mathematics blog*. Available via: <http://explainingmaths.wordpress.com/university-of-nottingham-videos/>
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The following article is based on a METAL workshop presentation and looks at lecture capture technologies, how they are used and their effectiveness.