Screen Capture of Mathematics Examples with Voice Over using a Tablet Laptop

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Pedagogical and technical problems:

- Students learn from examples best, if these examples are available at the right moment, when the individual student is ready to interact with the material. By contrast, a conventional lecture format presents examples while the students are typically working on the homework on earlier material.
- Students' notes from an example presented in a lecture do not convey all information given at the time, because a lot of it is contained in the verbal explanations along with working out the example.
- An additional technical problem in various subjects, particularly in Mathematics, is that students like to see material worked out starting with a blank sheet, because that is how they will have to solve homework and test problem. To this end, formally typeset mathematical formulas in a slide presentation (typically leaving out some intermediate steps and with more written text than expected on a test) do not serve as realistic models.

The present context is a lower-division Mathematics course, Math 221 Introduction to Linear Algebra, at UMBC, but the pedagogical problem is typical of many topics on many educational levels.

Technical and procedural solutions:

- A tablet laptop is used in class to hand-write lecture and examples starting from a blank sheet in Microsoft OneNote. A lapel microphone is connected to the laptop's audio input.
- The software Camtasia is used to capture the OneNote window and simultaneously record the voice over from the microphone. The movie is then produced into a file in flash format. At this point, it is possible to edit the movie, e.g., cutting portions or subdividing it into smaller movies.
- The resulting movie in flash format is posted in Blackboard for viewing at any time during the semester, whenever a student is ready to study the material. Added benefits are that the completely worked out examples are also available for review before a test, and that the students can pause or fast forward the example as desired, e.g., while trying to solve it themselves.

In Summer 2006 and 2007, this solution was implemented in a hybrid course, where students were required to watch the on-line material in lieu of lecture time. Particularly non-traditional students reported satisfaction with this format. Only one student per semester has ever reported technical difficulties with the flash movies posted, which could usually be traced back to a lack of reliable internet access.

Example: You can see an example of a taped example with voice over by following a link on my homepage or directly visiting http://userpages.umbc.edu/~gobbert/teaching/math221/.

Note on other information on technology in Mathematics: The Department of Mathematics and Statistics will host the workshop "Undergraduate Years and Beyond 2007", where representatives from the McGraw-Hill Company as well as experienced faculty will present information on advanced technology usage in lower-division Mathematics. For more information and to attend, please visit http://www.umbc.edu/circ/hosting/UMBCMCGHWorkshop2007/ or contact Dr. Nagaraj K. Neerchal at nagaraj@math.umbc.edu.