

Classroom Examples and Precious Class Time

David M. Harrison

Department of Physics, University of Toronto, Toronto, ON, Canada M5S 1A7

david.harrison@utoronto.ca

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Students always ask us to do more examples in class. However, particularly if we use techniques such as clickers and Peer Instruction, class time is very precious and for many the pedagogy associated with these activities is more important than “wasting time” on examples. Textbooks provide many examples, but they are delivered as a static “dead” document.

In this very brief note I point out that there is a simple and inexpensive way of doing examples that preserves much of the flavor of developing one in real time in class. A Tablet PC can easily substitute for a blackboard, and readily available software allows recording what is written on the Tablet in real time with an accompanying voice track. The result can then be made available via the web.

When preparing to do an example for use in a class, typically one works out the example before class and then does it again in class. Preparation for the web-based version is equally simple: work it out on paper, then click the Record button and do it again on the Tablet while discussing what is being done and why. There really isn't any need for elaborate storyboards and scripts, fancy editing, zooming and panning, etc. The same technique can be used for problem set or test solutions. The brave or talented can skip the preparation and just do it on the fly.

Disadvantages over a traditional classroom exposition are that the communication is one way: students can not ask questions in real time. Also, the “real estate” of the screen is smaller than a typical multi-panel blackboard so some scrolling is sometimes required to see what was written earlier. An advantage is that the result can be viewed and reviewed by students at any time.

The Tablet PC is the most expensive component. The software ranges from free to a few hundred dollars; I use *Camtasia Studio* from TechSmith, which is commercial and costs \$179 for educational use. A \$10 microphone is perfectly adequate. When writing on the Tablet, typically the screen covers the keyboard so a separate USB keyboard is also handy for controlling the recording, typing file names, etc.

The resulting video is about 1 MB per minute. Much of this size is the sound track: people are much more tolerant of fuzzy video than fuzzy audio.

A sample, using some questions from a recent Final Examination, is at:

<http://faraday.physics.utoronto.ca/PHY132S/Relativity/ExamSolns/ExamSolns.html>

Once I thought of this, it seemed like a very simple and obvious idea. However, I didn't think of it for a long time. Since then, I've discovered that at least one other person, Andrew Robinson at the University of Saskatchewan, had the same idea. A longer discussion of this way of doing examples and problem solutions is Robinson's paper at:

http://physics.usask.ca/~andrew/publications/whiteboards_physics_teacher_figs_in.pdf

It is interesting to note that an attempt to make textbook examples more like what students should do themselves is the introduction of hand-drawn figures in place of professional graphics in the 2nd edition of Randy Knight's **Physics for Scientists and Engineers** (Pearson Addison-Wesley, 2008).