“LectureTools”
Promoting student engagement in large introductory classes through laptop-based, interactive instruction

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IT in the Classroom

- Leverage the opportunities of modern IT and today’s technologically adapt students
- Enhance learning environment through student-centered lecturing
- Stimulate classroom engagement through discourse
- Encourage inquiry and critical thinking
- Promote student ownership of learning environment
LectureTools gets you through class ...
Initial Goal: Interactivity

- Beyond keypad “clickers”

- Spatial questions and responses (vs. text-based)
- Prioritizing /ordering responses (vs. selecting one)
- Associations (linkages)
- Etc.
With Lecture Tools

- Students can ask questions during class
- Students respond to quizzes (textual & image based)
- Students self-rank difficulty of topics
- Student take notes and can mark-up slides, synchronized with lecture slides
- Students can access podcasts
- E-textbooks can be integrated
Instructor View

LectureTools

User: Ben van der Pluijm
Course: Global Change 1: Physical Processes

Select Lecture

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<tr>
<th>Select Lecture</th>
<th>Active Lecture Dates</th>
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Add lecture

Guidance

LectureTools is built on the hypothesis that students learn better when they have opportunities to:

1. Assess their understanding as material is being presented,
2. Pose questions and get feedback during lecture,
3. Reflect on their learning outside of class.

Inherent in this approach is a need to redesign lectures to facilitate "ConceptTests", questions posed to the class that require their response as either a means to introduce a topic or to test their understanding.

As instructor you will be able to upload your lecture slides (from PowerPoint or Keynote) and animations (e.g., Flash, QuickTime, Shockwave, MPG) and design ConceptTests (e.g., multiple choice, ordered lists, image-based) within LectureTools. You can then rearrange the slides and activities and present them within LectureTools with the ability to draw on any slide using your mouse or pointer (on Mac or PC).

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Value of Note-taking

- Promote key skills:
  - critical listening (analysis)
  - Extract essence of arguments
  - inquiry-based learning
- Promote ownership of leaning process
GC1: Lecture 8
Regulation of Climate on Earth

Climate Regulation
We will address the following topics:

- What determines planetary temperature? Can we explain planetary temperatures by their distance from the Sun, or are there other factors?
- How has Earth's temperature changed in the past? What are the main controls on Earth's temperature through time?
Participation (tracking)

- Tracking of class of 160 students
- Excl. non-LectureTools laptop users
- "stayers"
### Participation (survey)

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Impact of Note-Taking (standard exam)

Effect of Note-taking Amounts (Exam 1)

R² = 0.0747
Open Laptop Exam

- More complicated (challenging?), essay-based questions
- Average of B/B+ achieved, as opposed to need for (confidence-building) “curving”
- Significant improvement in quality and wording of responses (critical analysis)
Do you feel that the use of your laptop in class has affected your learning?

- Significant positive effect
- Somewhat positive effect
- No effect
- Somewhat negative effect
- Significant negative effect
How do you feel that your use of laptops in this class has changed the time you spend on tasks unrelated to the lecture?

- Significantly increased time on tasks unrelated to lecture
- Has had no effect on my time on tasks unrelated to lecture
- Significantly decreased time on tasks unrelated to lecture
Contradictory Responses?

- Students feel they learned more
- Students report more distraction

Possible Explanations:
- Students are really good at multi-tasking
- Students are really bad at self-assessment
Transformed Classroom

- >80% personal laptops, little need for university equipment
- New classroom functionality available
- More lively, engaging classroom setting
- Not possibly (nor necessary) to cover conventional amount of material

Teach Less, Learn More
LectureTools gets them to class …
Try it!

www.lecturetools.org
The classic model of classroom instruction before a passive audience may not sufficiently motivate students to learn and critically think through the arguments being developed in today’s science classes. Concepts in most introductory science courses are still best illustrated using visualizations and/or demonstrations, but even the most stunning of images or spectacular exhibits offer only passive participation in the students’ learning process. Coupling the widespread availability of web-enabled laptops of today’s technologically adapt audience with interactive spatial concept challenges and other student feedback systems, we use discourse and critical analysis to improve the student’s capacity to examine scientific information, while encouraging greater engagement and ownership of the learning material. We will discuss our implementation and evaluation efforts of the IT-enhanced classroom, supported by the open-source program LectureTools (http://www.lecturetools.org), which uses web-based technologies for note-taking, PowerPoint mark-ups, animations, interactive quizzes, image manipulation and classroom feedback in large introductory classes at the University of Michigan. While successful and well-received by the students, our experiences also show that use of computers and interactive, wireless response systems requires a rethinking of the standard lecture approach and goals. In the web-enabled classroom it is neither possible nor necessary to cover the conventional amount of material in each lecture, as student multitasking (listening, note-taking, discussion and activities) is encouraged. While these changes to the classroom environment require that instructors teach in a more lively classroom setting and integrate hands-on activities in lecture materials, they result in a more active learning environment that better engages today’s students.