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...and hundreds students in dozens of courses
Large lectures
Large lectures

universally loathed by students and faculty alike

(but here to stay!)
Large lectures focus on delivery of information
Large lectures

not delivery of information

but assimilation of knowledge
Large lectures

instructor: busy delivering information
Large lectures

instructor: busy delivering information

students: busy taking down information
Large lectures

instructor: can’t address individual student needs

students: no time to think
Technology

not a magic bullet
new method for delivering old content
Interactive Learning Toolkit

Use technology to

- facilitate new modes of learning
- increase interaction
- help instructor address student needs
Interactive Learning Toolkit

The Interactive Learning Toolkit helps you implement innovative teaching ideas, such as Peer Instruction and Just-in-Time-Teaching, and to monitor your students' learning. Our goal is to help you focus on teaching by streamlining the organizational work that accompanies the teaching of a course. Select materials for class use from a large class-tested database and organize (and possibly share) your own materials. Administer your courses, design course Web pages, and interact with your students online.

Access to the site is restricted to registered users. If you are not registered, please register now.

This site is supported by a grant from the National Science Foundation and by the Division of Engineering and Applied Sciences at Harvard University.
Outline

• preparing for class
• provoking thought
• additional tools
Preparing for class

A membrane separates conducting fluids inside and outside an uncollapsed area, a type of nerve cell. A
uncollapsed area has a capacitance of 0.01 F per square meter of surface area and is a cylinder 2.5 x 10⁻² m in
radius and 0.5 m long. If the potential difference across the membrane is 90 mV, how much electrical energy is stored in

\[ U = \frac{1}{2} CV^2 \]

\[ = \frac{1}{2} \left( \frac{0.01}{\text{m}^2} \right) \left( \frac{3.14 \times (0.05 \text{ m})^2}{2} \right) \left( 90 \times 10^{-3} \text{ V} \right)^2 \]

\[ = 6.4 \times 10^{-11} \text{ J} \]

\[ \Delta V = 90 \text{ mV} \]
Preparing for class

nameless faces
Preparing for class

nameless faces

faceless names
Preparing for class

how to move information transfer out of classroom?
Preparing for class
Preparing for class

web-based pre-class assignment

JUST-IN-TIME TEACHING: Blending Active Learning with Web Technology
Preparing for class
Preparing for class

Benefits:

• prepares students for class
• helps instructor address individual student needs
• increases student-faculty interaction
• connects names and faces
Outline

• preparing for class
• provoking thought
• additional tools
What to do in class?
Provoking thought
Provoking thought
Provoking thought

Some hurdles:

• finding materials

• collecting and managing feedback

• providing materials to students
A permanent magnet is dropped through a long aluminum tube, as shown. As the magnet drops, electric currents are induced around the tube. Compared to a freely-falling magnet, the magnet through the tube drops more slowly.

1. more slowly.
2. exactly the same way.
3. faster.
4. Need more information.

Hint: consider the effects of induced currents through strips ahead of and behind the dropped magnet.

**Answer:**

1. In a loop of the aluminum tube just below the magnet, the flux is increasing as the magnet gets nearer. This induces a counterclockwise current producing an opposing magnetic field which repels the magnet. In a loop above the magnet, the flux is decreasing, so a clockwise current is induced, producing a magnetic field in the same direction as the magnet's field, thus attracting the magnet upward. So the net effect is to slow the magnet down.

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2. Consider the arrangement shown below. Conducting rod AB is lying on a U-shaped conductor, making good electrical contact. The arrangement is placed in a magnetic field (into page).
Provoking thought

Benefits:

• easy preparation

• automatic student Web page generation

• management of data
Outline

- preparing for class
- provoking thought
- additional tools
Additional tools

- forums
- e-mail
- gradebook
- cloning
- reminders

and much more!
Additional tools

Interactive Learning Toolkit is:

• a learning management system
• a content management system
• a course management system
Additional tools

Resources:
ILT video (www.ankerpub.com)
Books on PI and JiTT (Prentice Hall)

ILT site: deas.harvard.edu/ilt
Summary

- enables new modes of learning
- helps instructor address student needs
- facilitates workflow
Students’ conclusion:

“Prof. Mazur is not teaching us anything. We have to learn it all ourselves.”
Support:

- NSF-Distinguished Teaching Scholar Award
- NSF-Assessment of Student Achievement Award
- Harvard DEAS Information Technology Group
- Prentice Hall
- Apple Computer

for a copy of this presentation:

http://mazur-www.harvard.edu