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...and hundreds of 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
Outline

• preparing for class
• provoking thought
• resources
Preparing for class

During ionotropic synaptic transmission of a chemical nature, the action potential is generated due to the opening of voltage-gated channels. The movement of calcium ions across the cell membrane leads to the release of neurotransmitters into the synaptic cleft. The neurotransmitters then bind to receptors on the postsynaptic membrane, causing a change in the membrane potential and ultimately leading to an action potential in the postsynaptic neuron.
Preparing for class

nameless faces

\[ U = \frac{1}{2} CV^2 \]
\[ = \frac{1}{2} \left( \frac{0.01 \text{ F}}{\text{m}^2} \right) \frac{2\pi \left( 0.5 \text{ cm} \right)^2}{(0.1 \text{ m})^2} \left( 90 \times 10^{-3} \text{ V} \right)^2 \]
\[ = 6.4 \times 10^{-1} \text{ J} \]
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
Preparring 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
- resources
What to do in class?
Provoking thought
Provoking thought

Focus on depth, not breadth
Provoking thought

Some hurdles:

• finding materials
• collecting and managing feedback
• providing materials to students
Provoking thought

1. 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

   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:** 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 as in page...
Provoking thought

Benefits:

- active engagement
- continuous feedback
Outline

• preparing for class
• provoking thought
• resources
Resources

Books with ConcepTests:

- Physics (Prentice Hall)
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- Physics (Prentice Hall)
- Chemistry (Prentice Hall)
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- Physics (Prentice Hall)
- Chemistry (Prentice Hall)
- Astronomy (Prentice Hall)
Books with ConcepTests:

- Physics (Prentice Hall)
- Chemistry (Prentice Hall)
- Astronomy (Prentice Hall)
- Calculus (Wiley)
Information on Just-in-Time-Teaching:

- Prentice Hall book
- http://www.jitt.org
Resources

Videos:

• Thinking together
• From questions to concepts

http://www.ankerpub.com
Course management:

http://deas.harvard.edu/ilt
Summary

• enables new modes of learning
• helps instructor address student needs
• facilitates workflow
Summary

Students’ conclusion:

“Professor 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