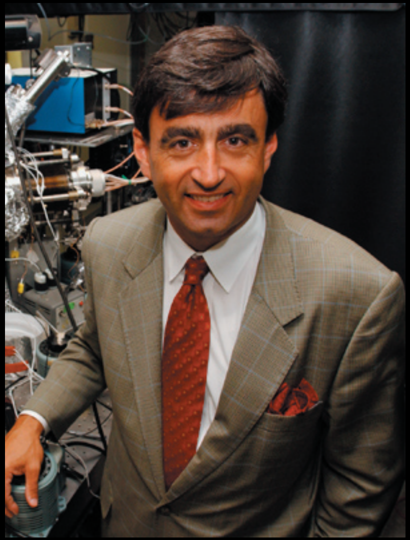
Using technology to facilitate learning in large lecture classes

University of Colorado
Boulder, CO, 22 April 2004



Eric Mazur

Veronica McCauley

Suvendra Dutta

and also…

Programming:

Michael Tucker
Jean Moreau
Olaf Jonmarker
Vijay Salagala
Juston Payne

Editing:

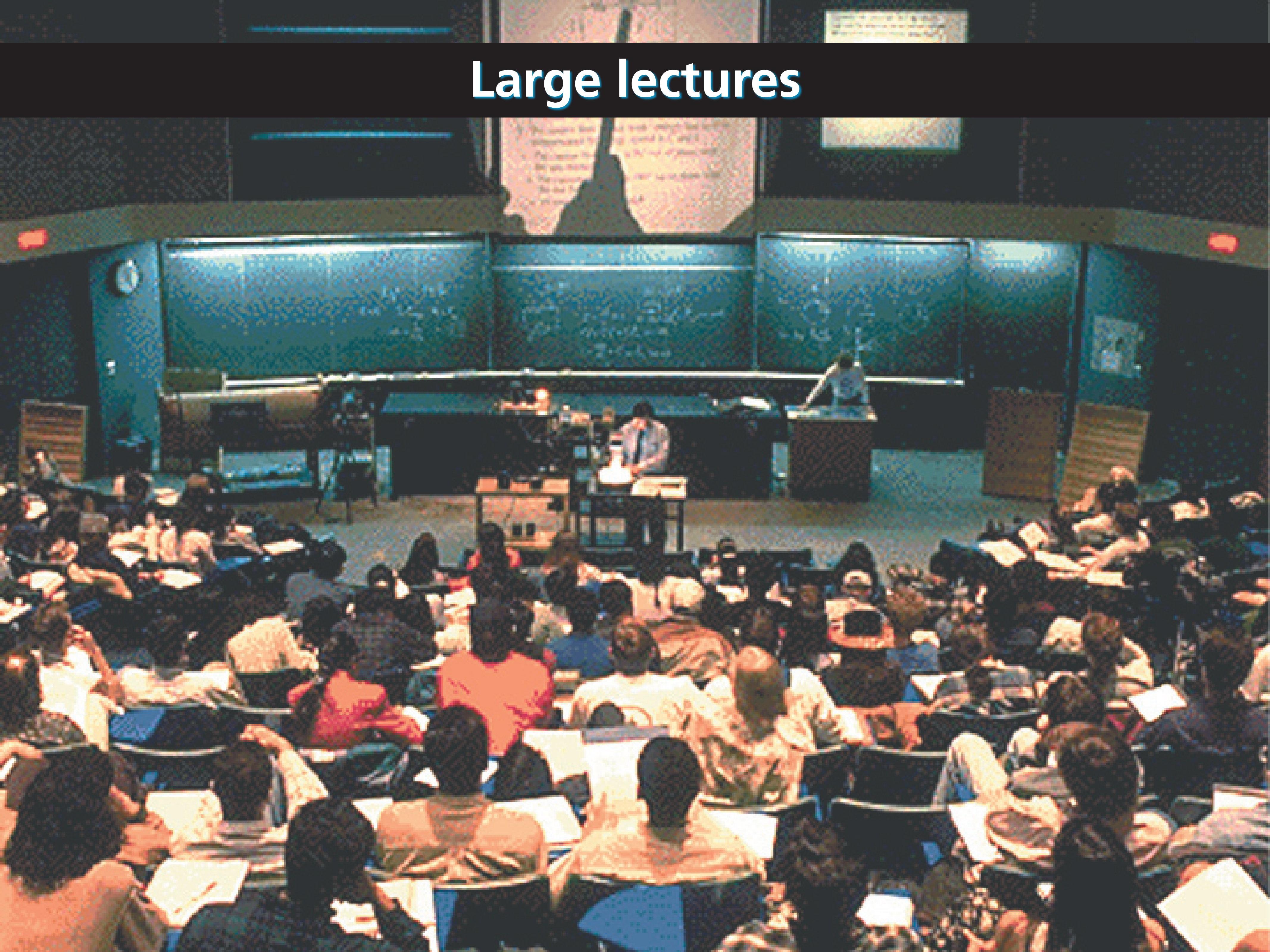
Prof. Ed. Ginsberg (UMass Boston)
Prof. Peter Dourmashkin (MIT)
Prof. Chris Gould (USC)

Beta testing:

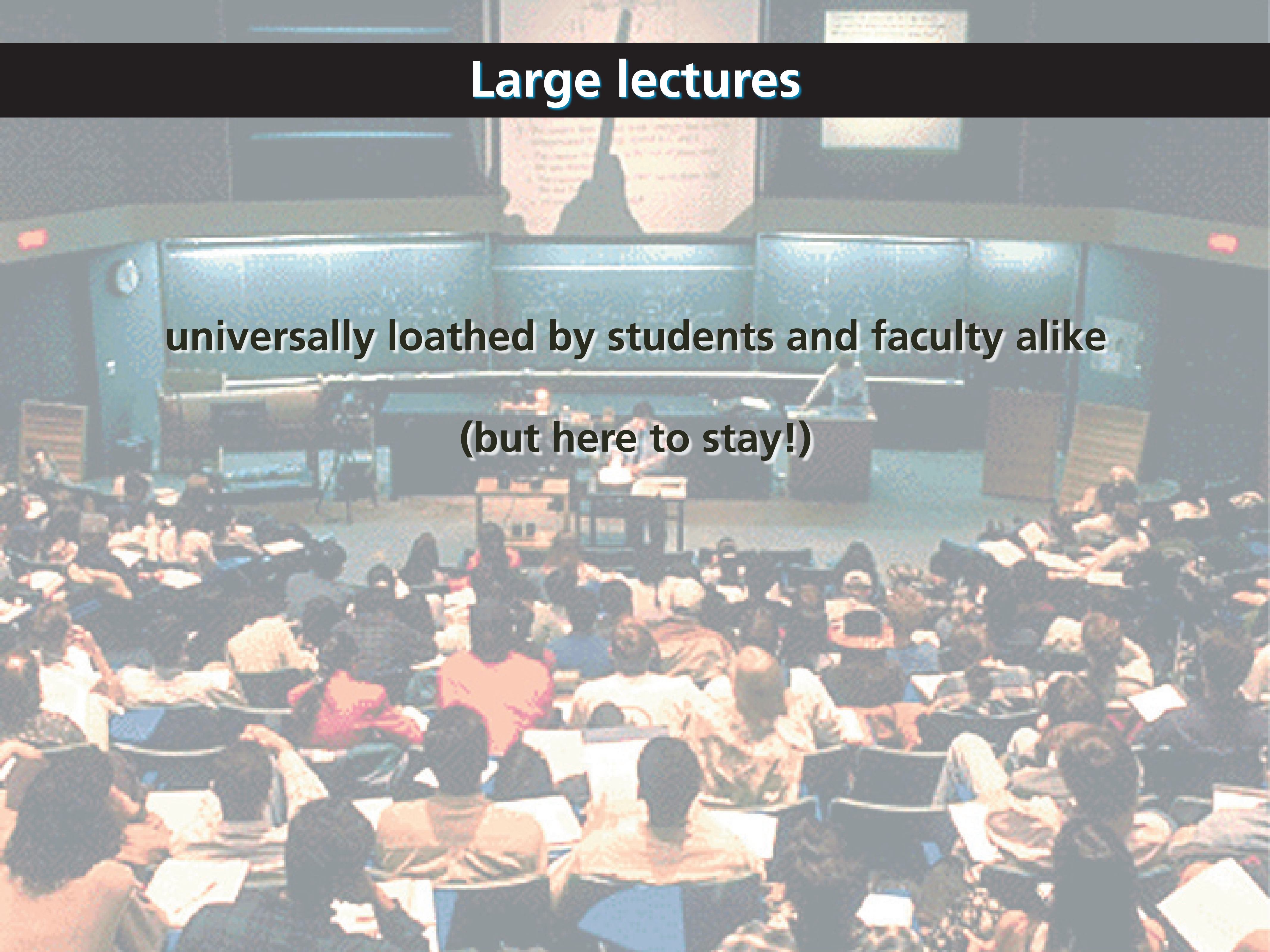
Prof. John Belcher (MIT)
Andrew McKinney (MIT)
Sue Gautsch (USC)
Prof. Catherine Crouch (Swarthmore)
Prof. Clifford V. Johnson (USC)

…and hundreds students in dozens of courses

Large lectures



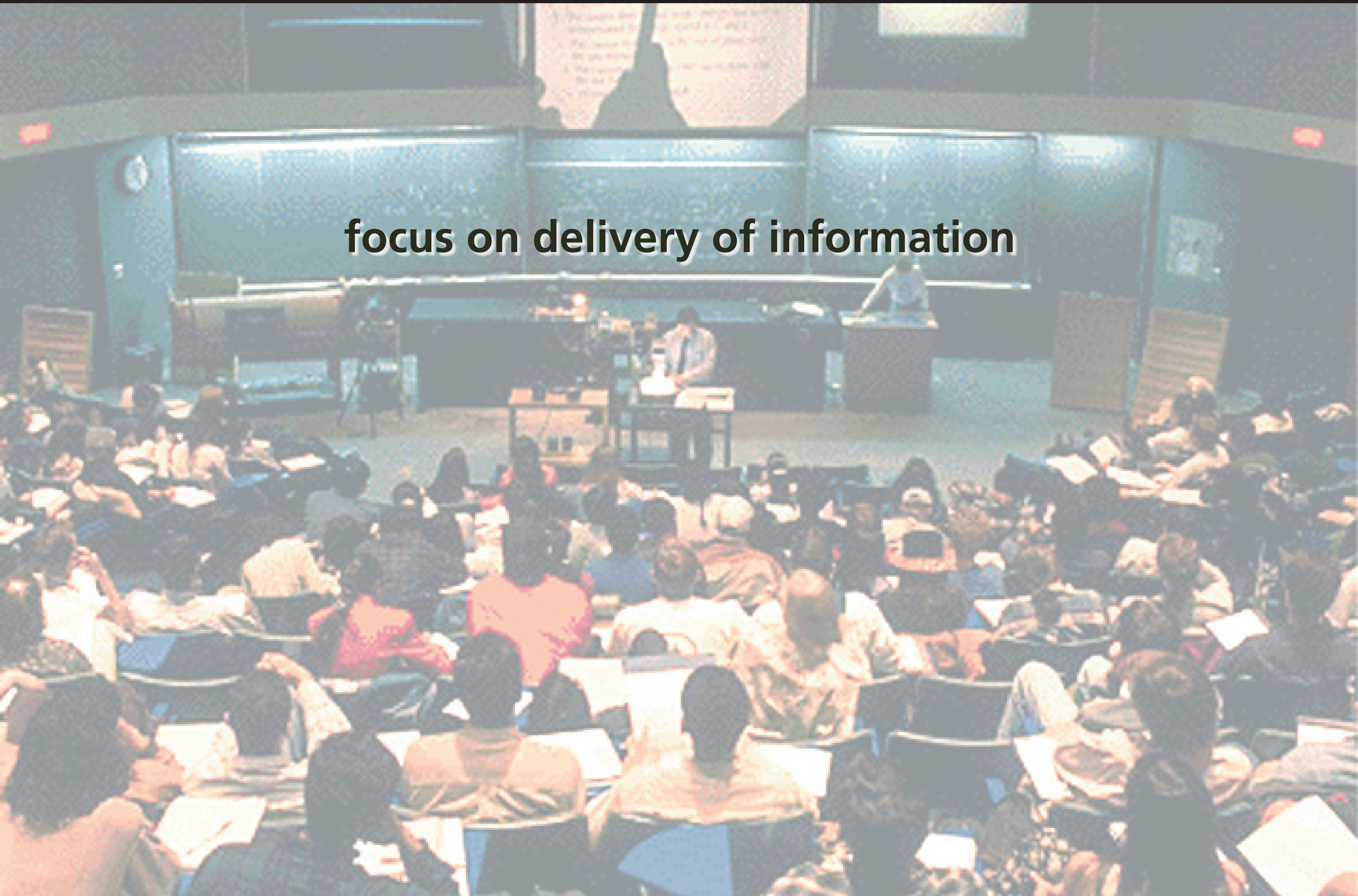
Large lectures



universally loathed by students and faculty alike

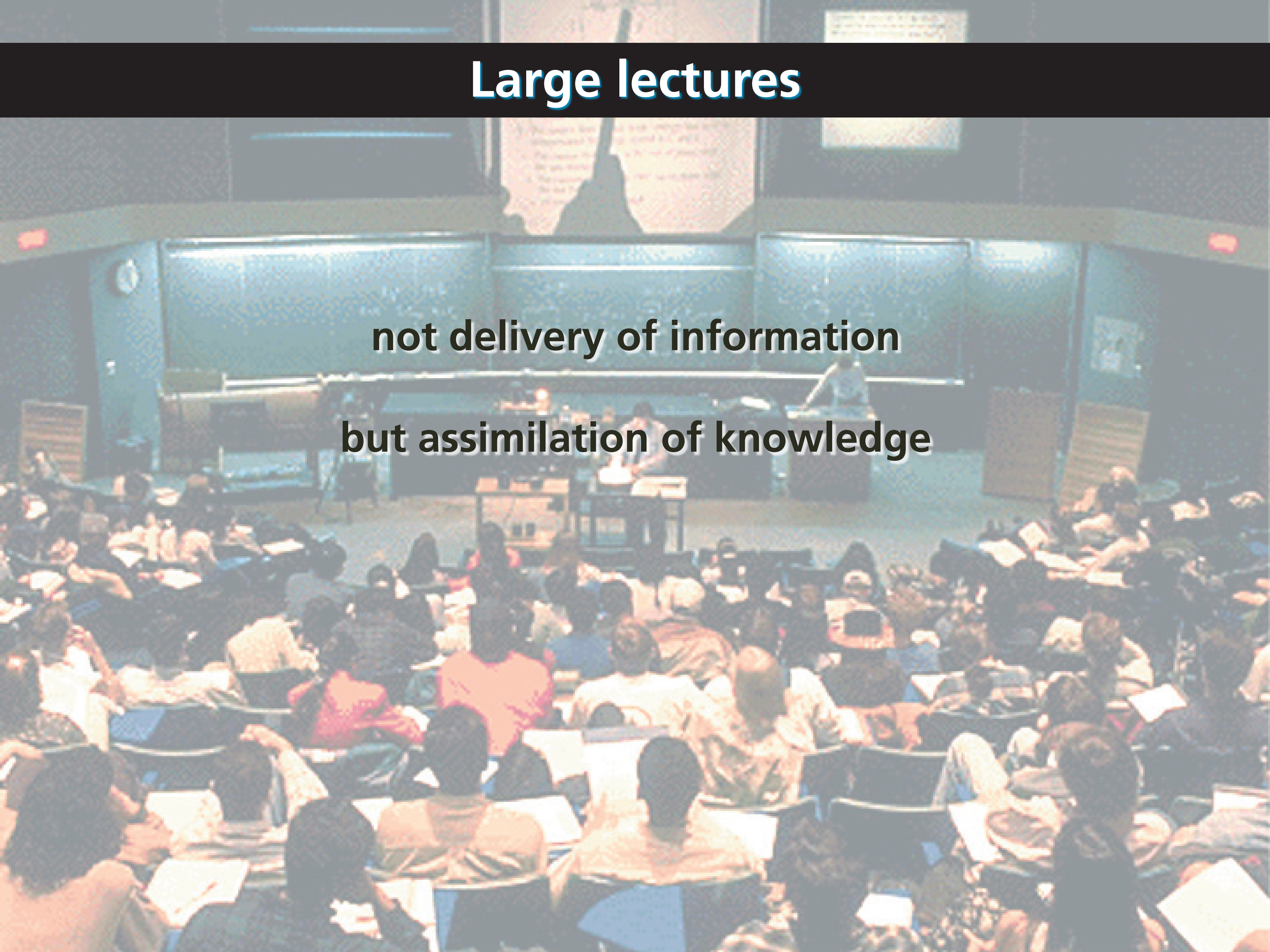
(but here to stay!)

Large lectures



focus on delivery of information

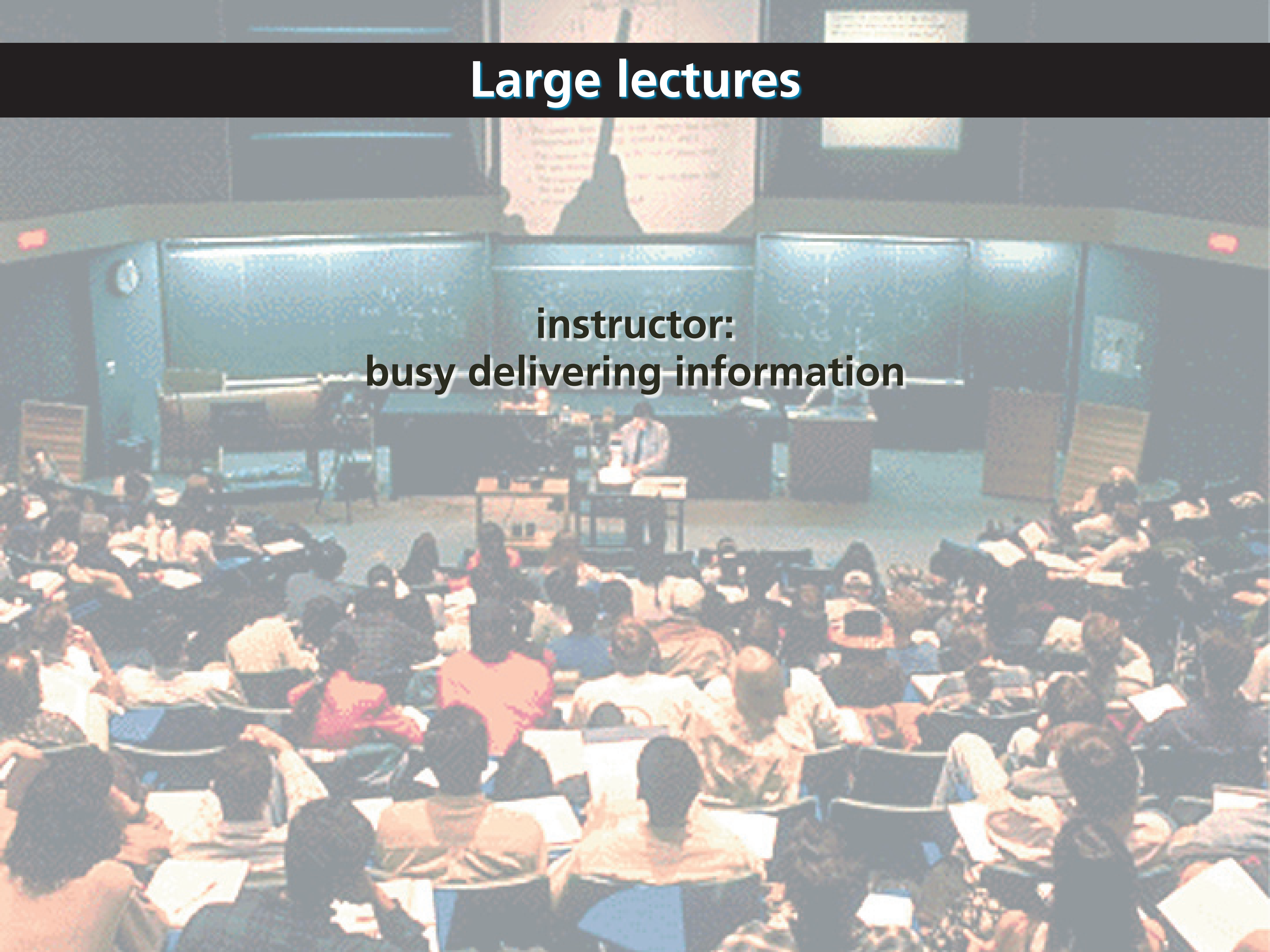
Large lectures



not delivery of information

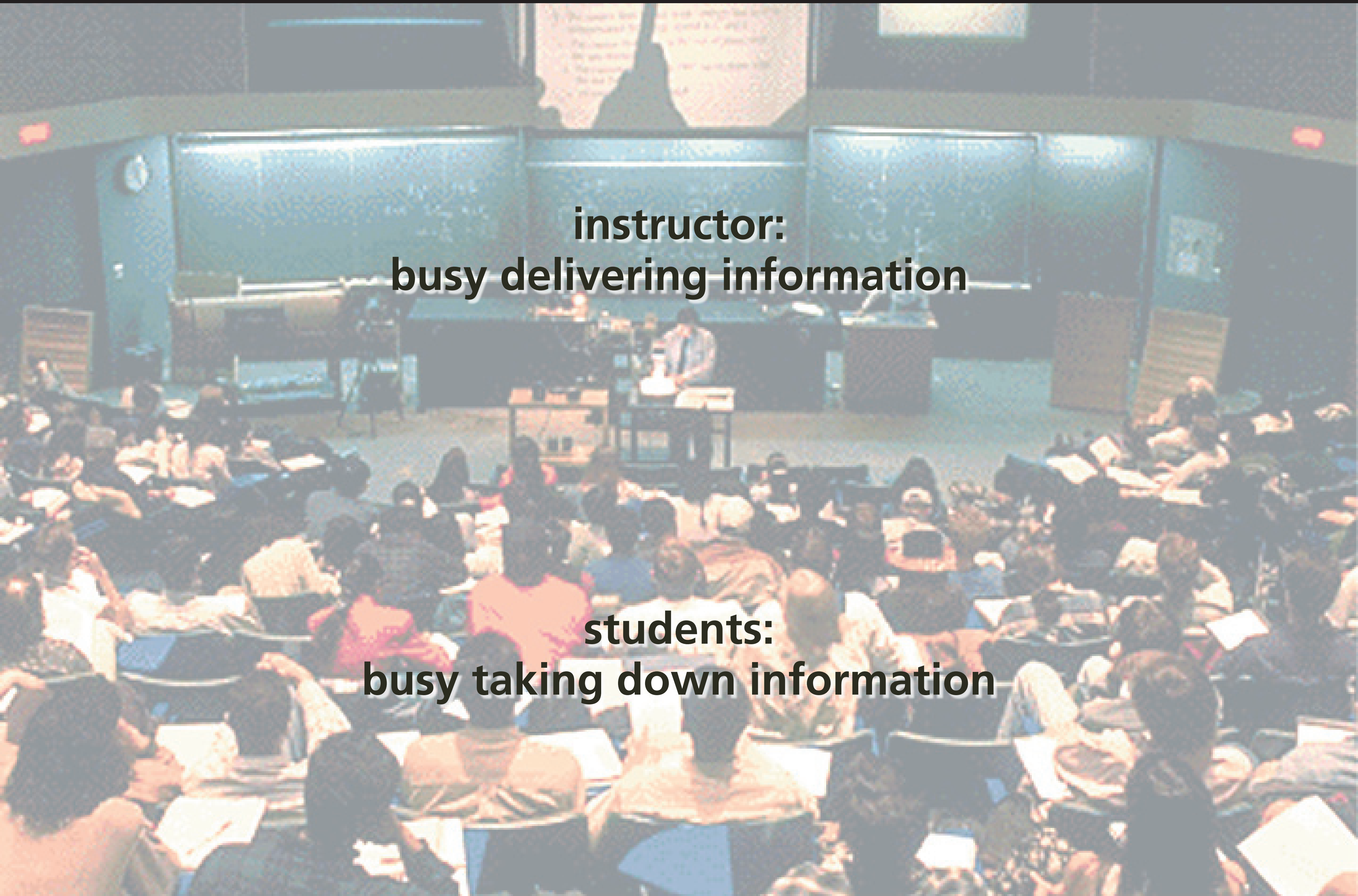
but assimilation of knowledge

Large lectures



instructor:
busy delivering information

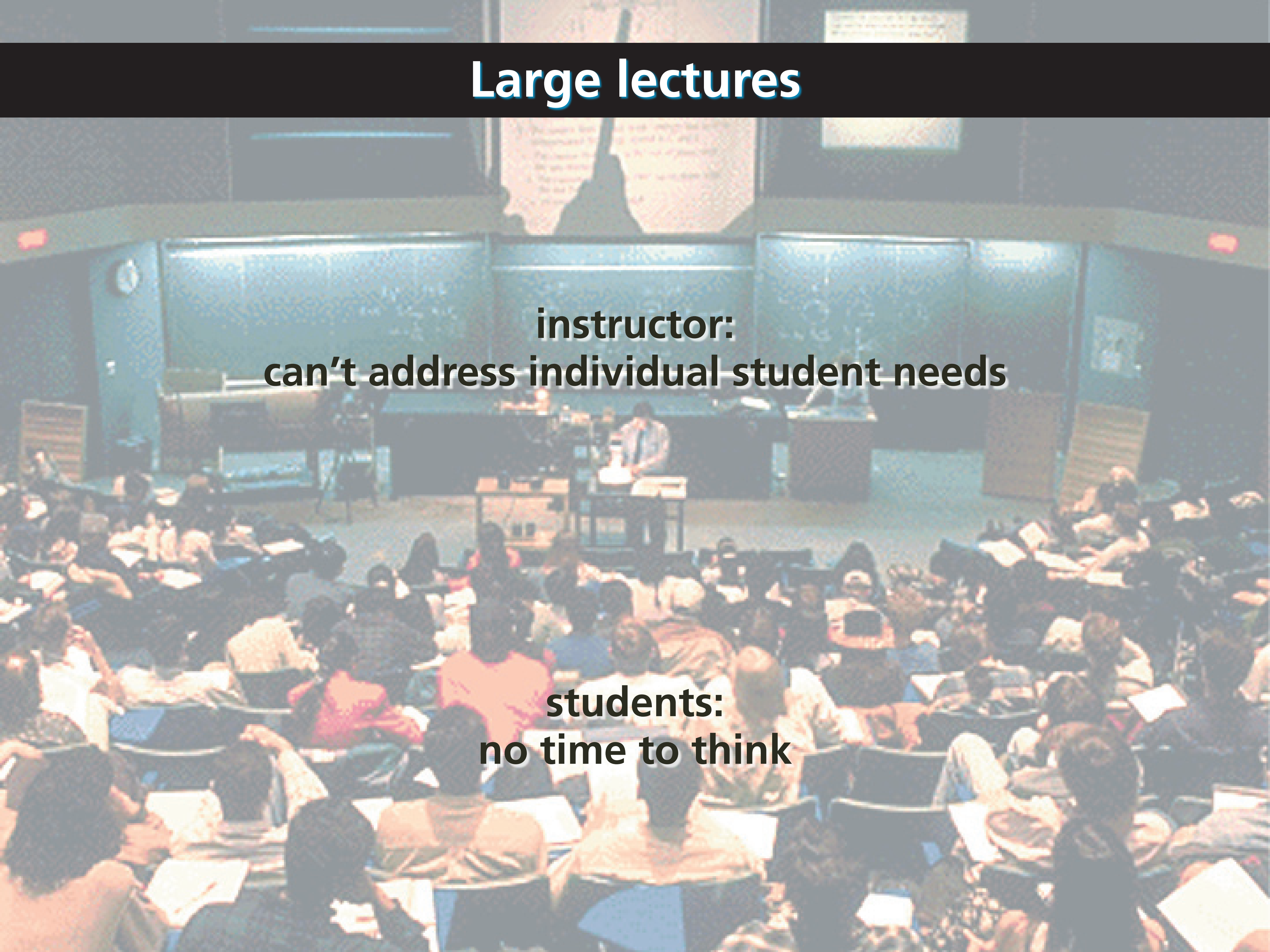
Large lectures



instructor:
busy delivering information

students:
busy taking down information

Large lectures



instructor:
can't address individual student needs

students:
no time to think

Technology

Technology

not a magic bullet

Technology

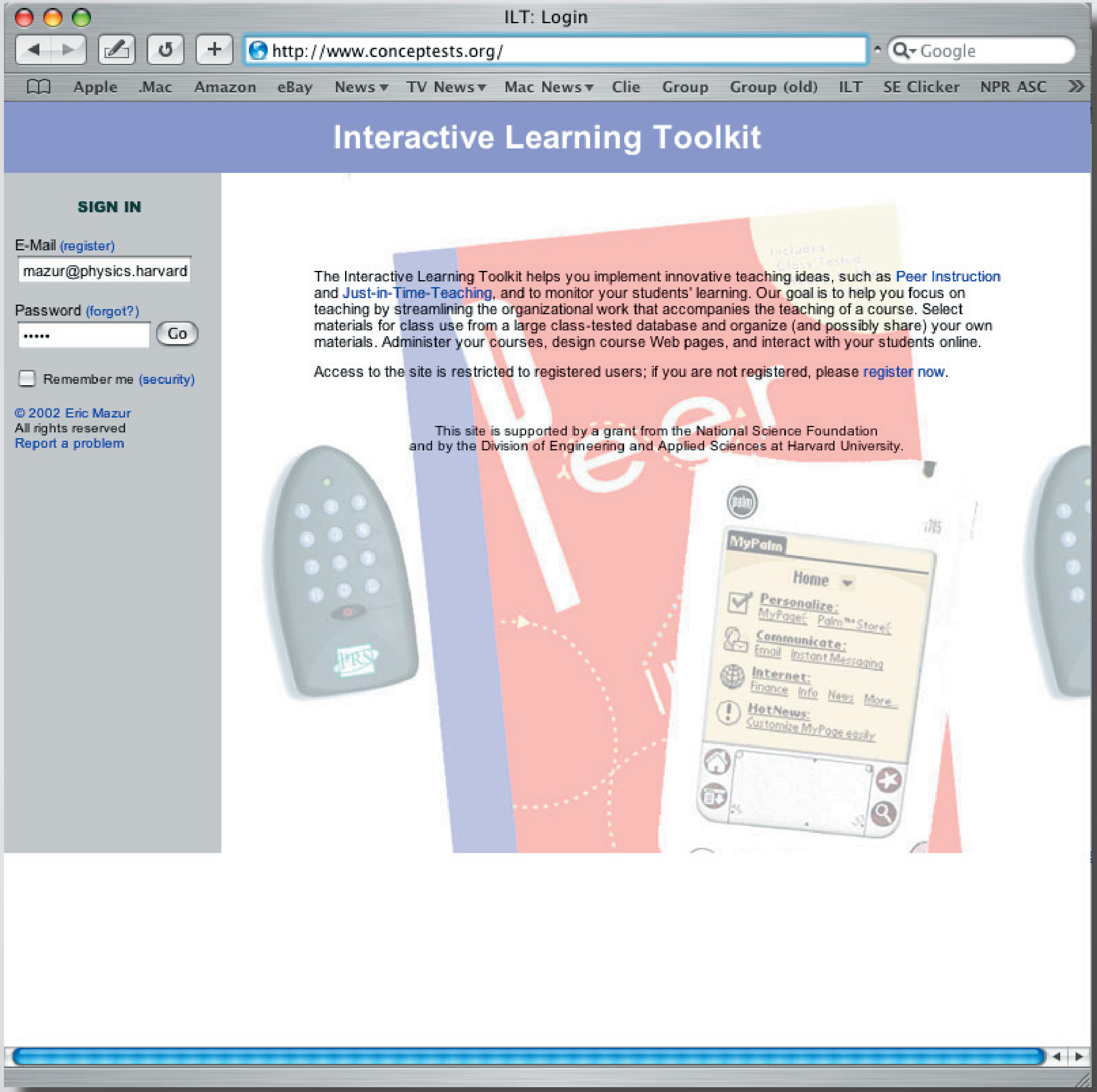
new method for delivering old content

Interactive Learning Toolkit

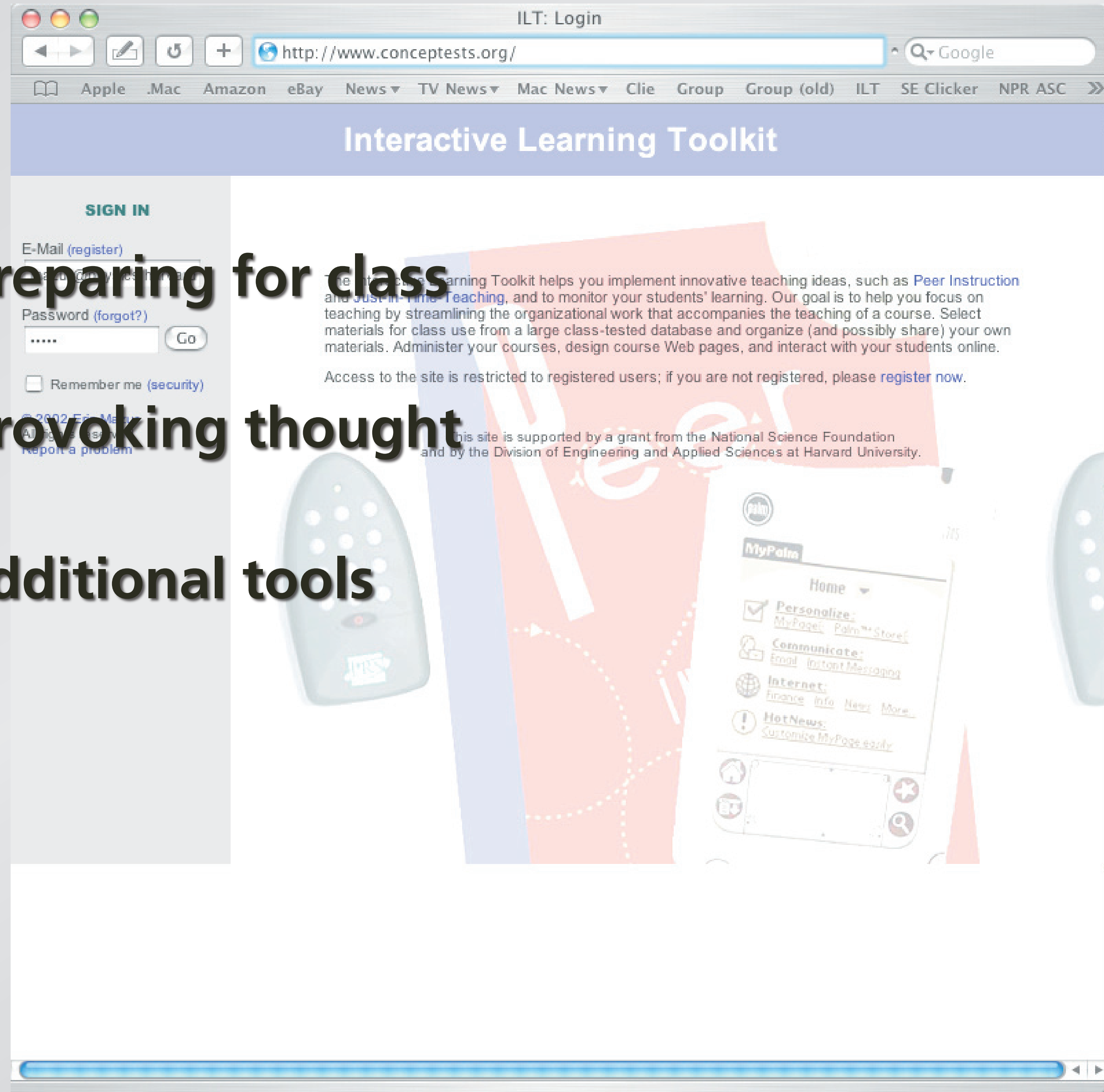
Use technology to

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

Interactive Learning Toolkit

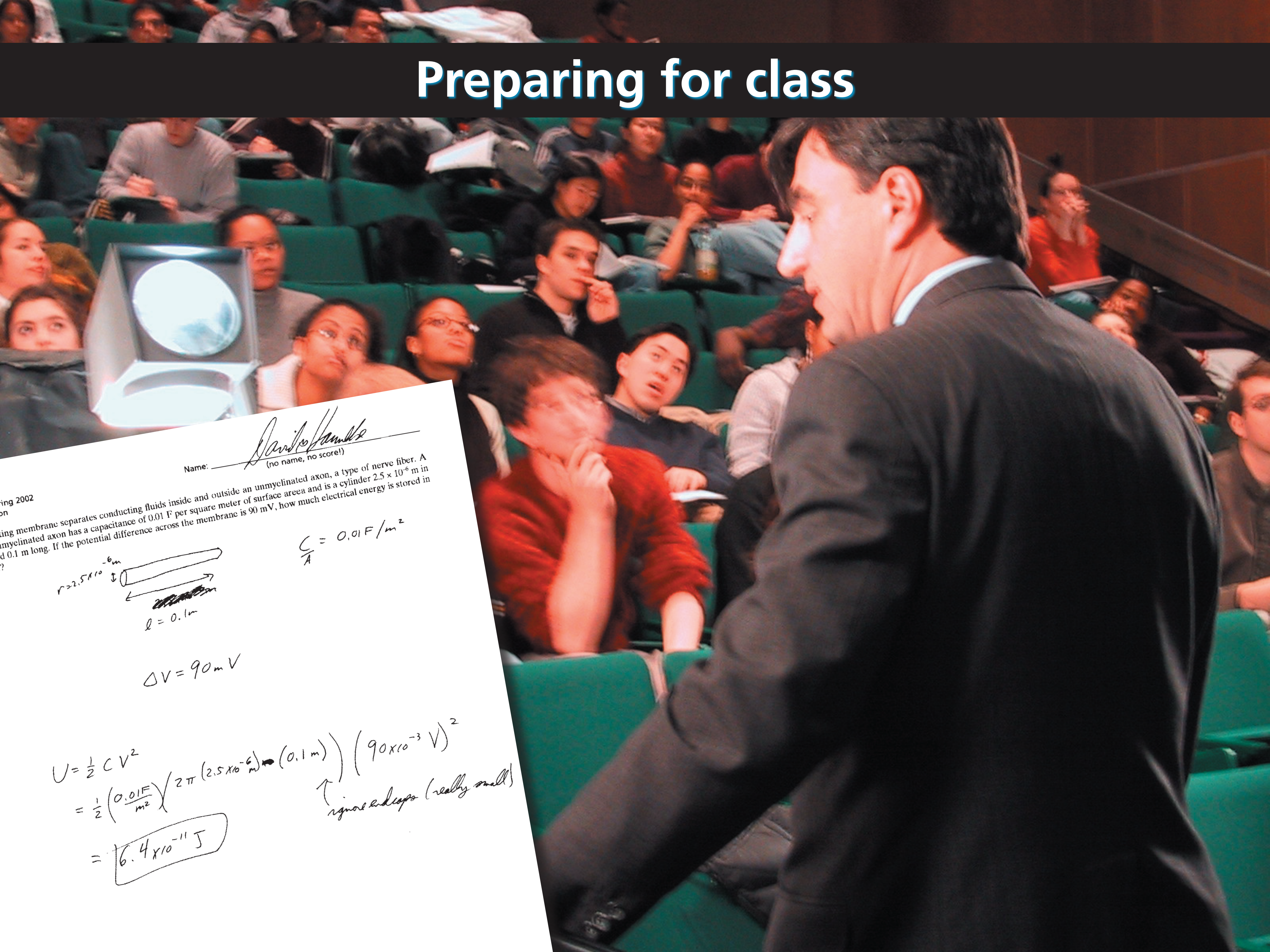


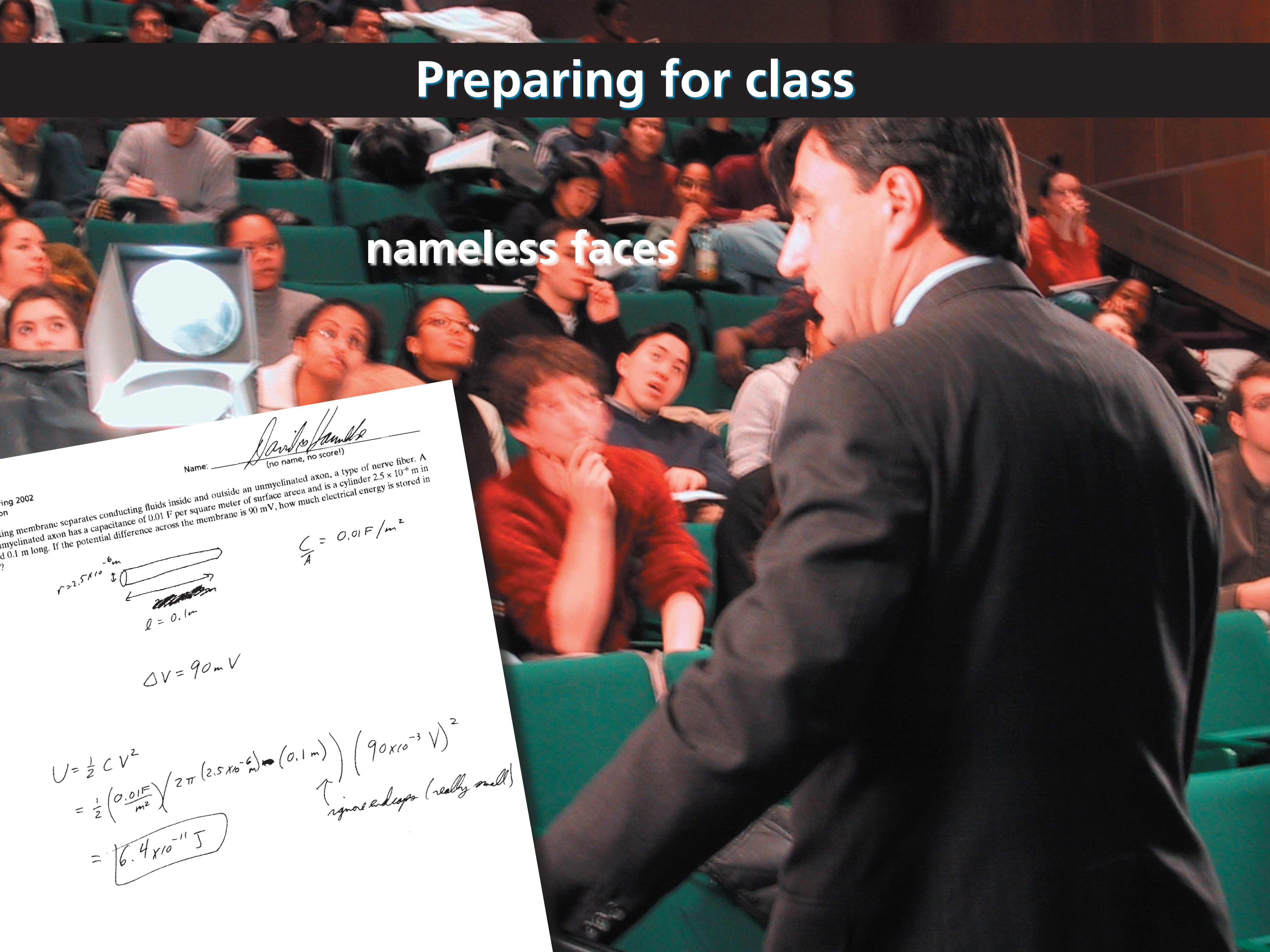
Outline

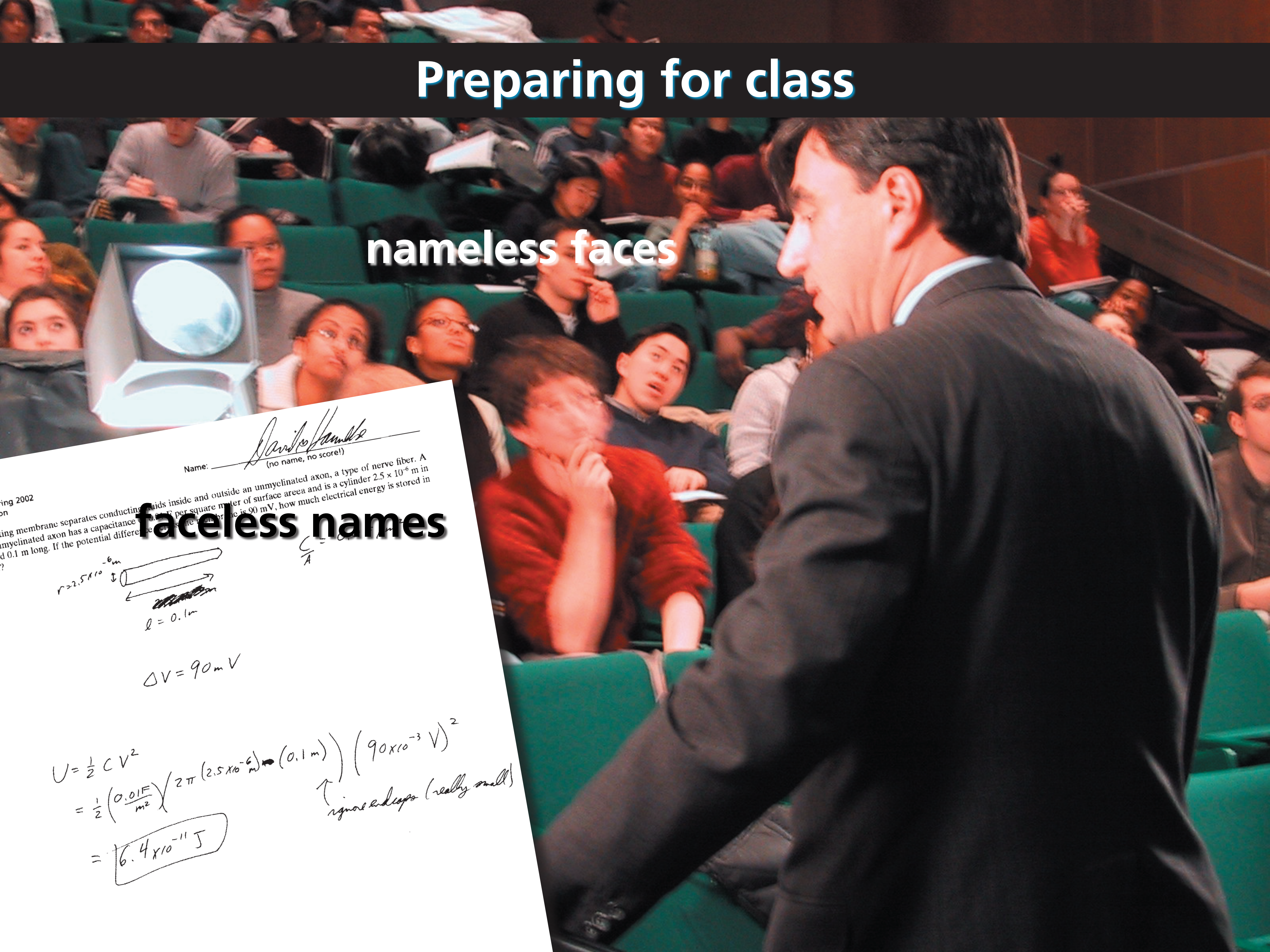


- preparing for class
- provoking thought
- additional tools

Preparing for class

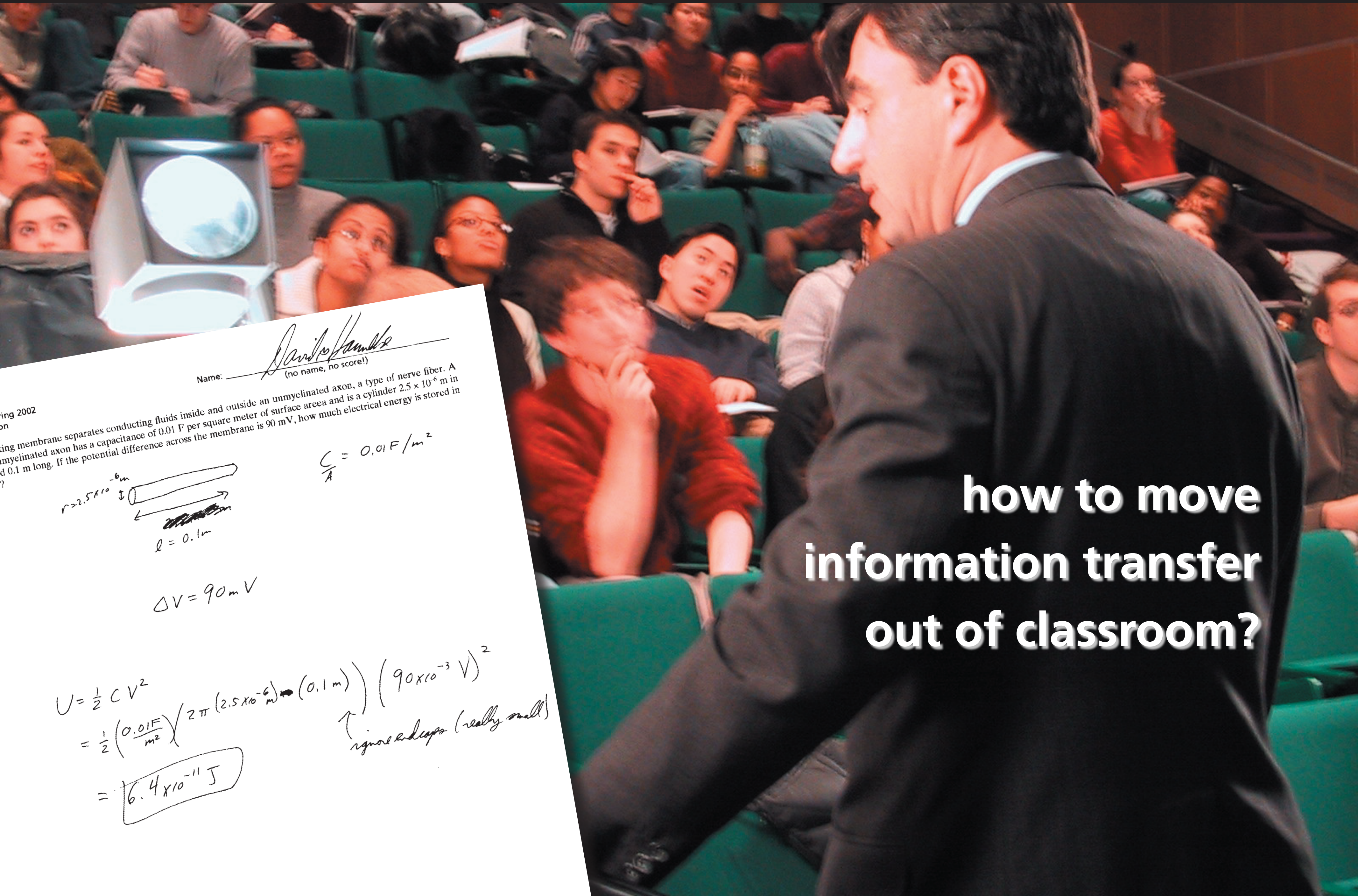



Preparing for class
nameless faces
Name:
(no name, no score!)
ring 2002
on
ing membrane separates conducting fluids inside and outside an unmyelinated axon, a type of nerve fiber. A
unmyelinated axon has a capacitance of 0.01 F per square meter of surface areea and is a cylinder 2.5 × 10^-6 m in
d 0.1 m long. If the potential difference across the membrane is 90 mV, how much electrical energy is stored in
C/A = 0.01 F/m^2
r = 2.5×10^-6 m
l = 0.1 m
ΔV = 90 mV
U = ½ C V^2
= ½ (0.01F/m^2)(2π (2.5×10^-6 m)(0.1 m))(90×10^-3 V)^2
ignore endcaps (really small)
= 6.4×10^-11 J

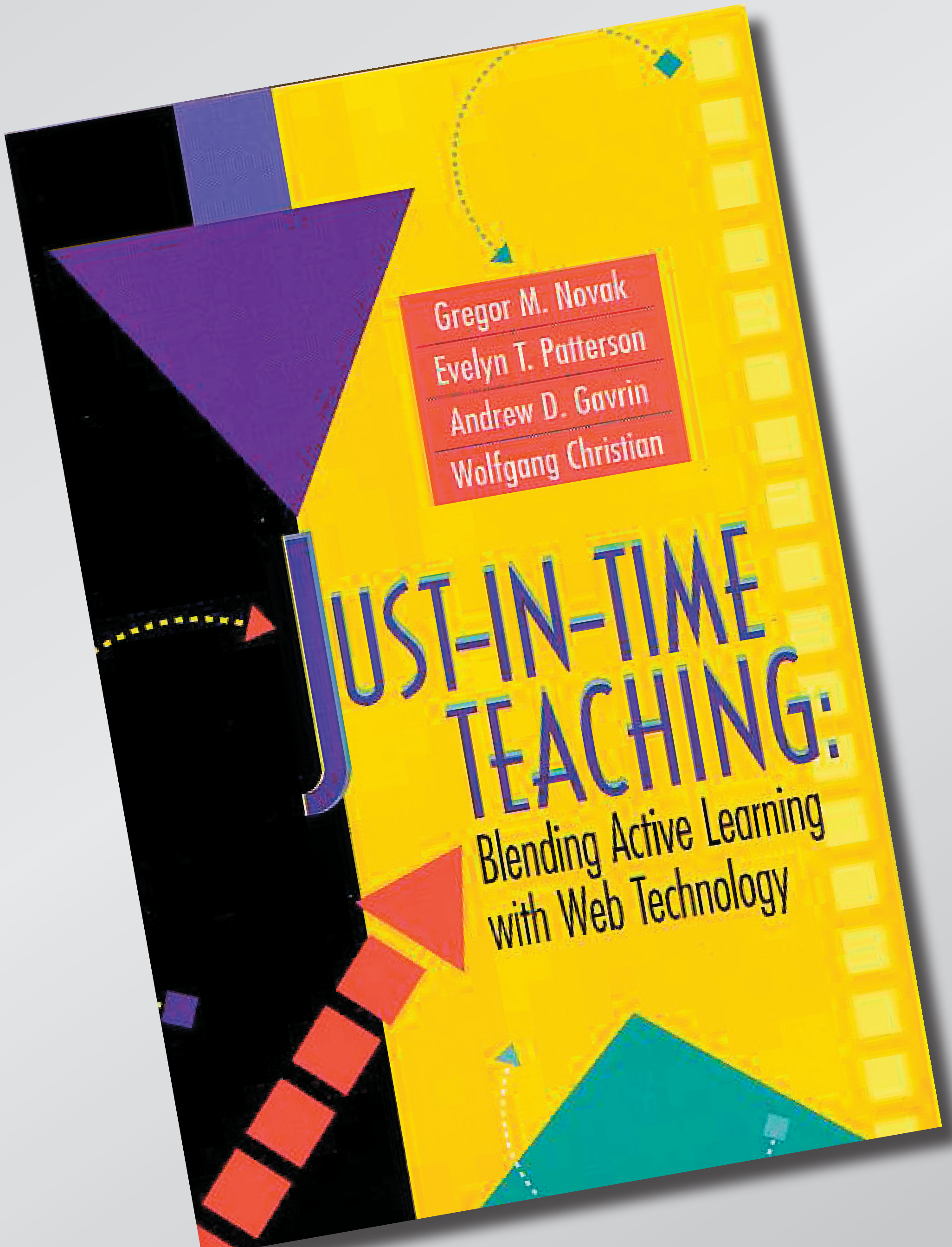


Preparing for class
nameless faces
faceless names
Name:
(no name, no score!)
l = 0.1m
ΔV = 90mV
U = ½ CV²
= 6.4x10⁻¹¹ J
ignore endcaps (really small)

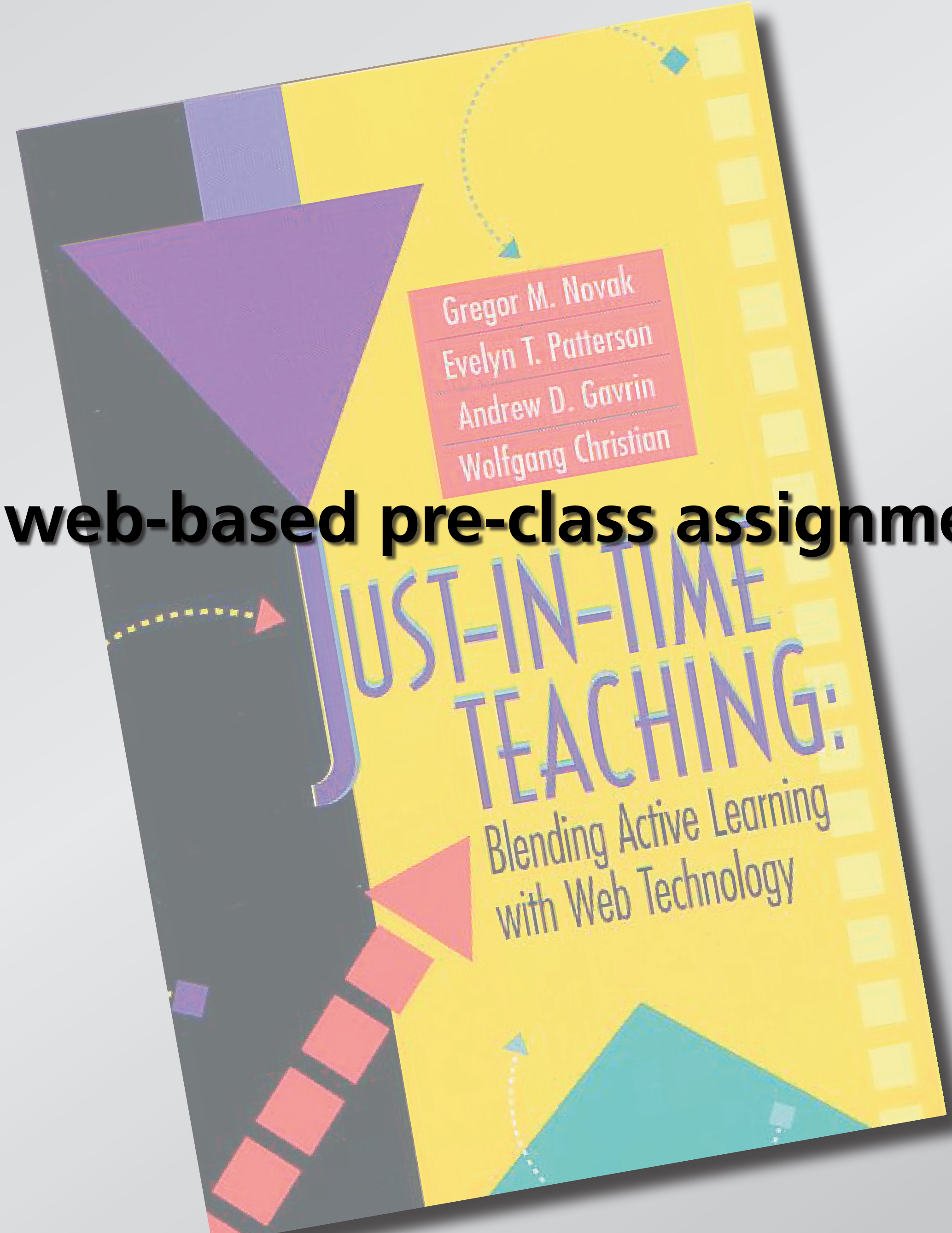
Preparing for class



Preparing for class

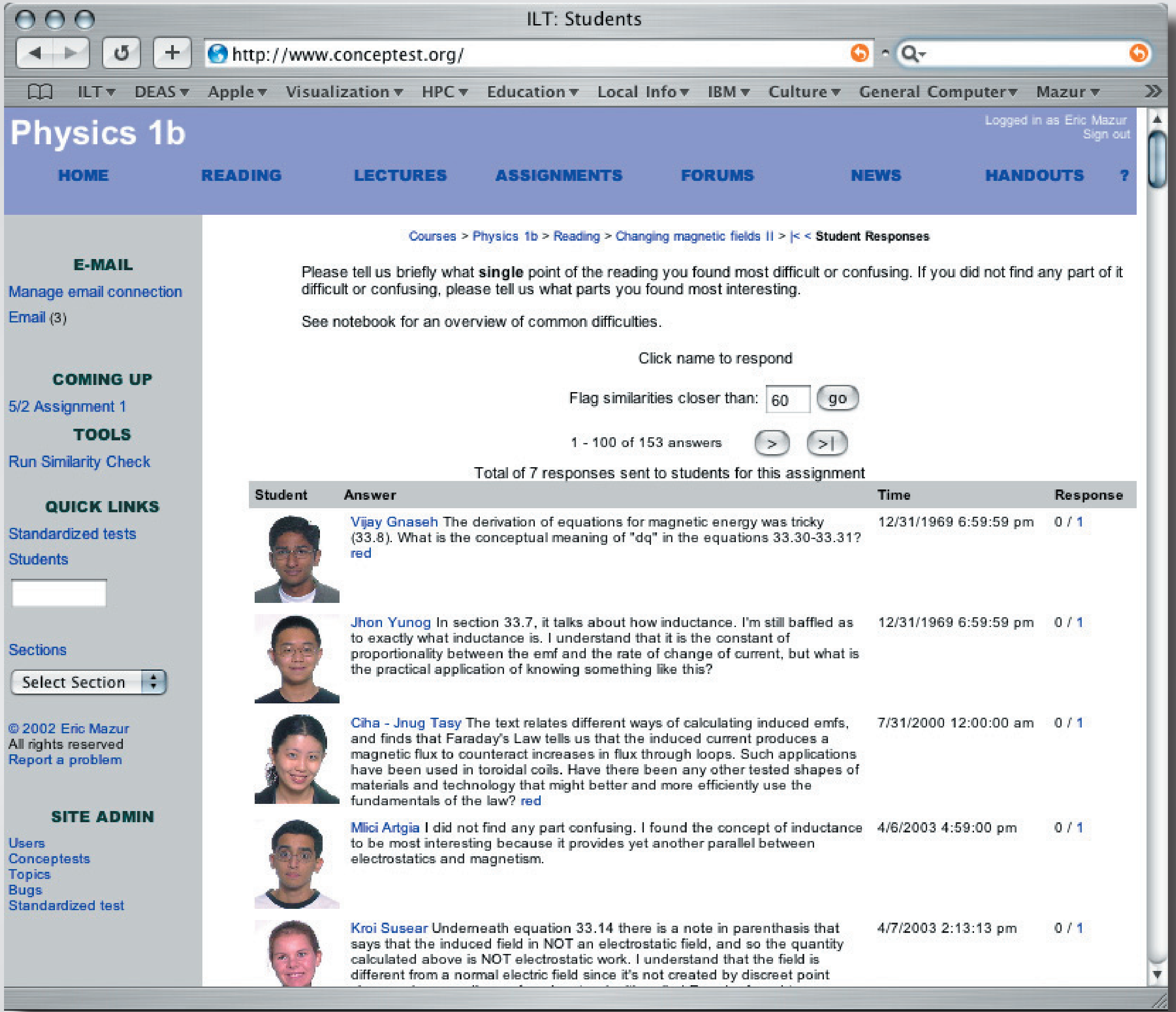


Preparing for class



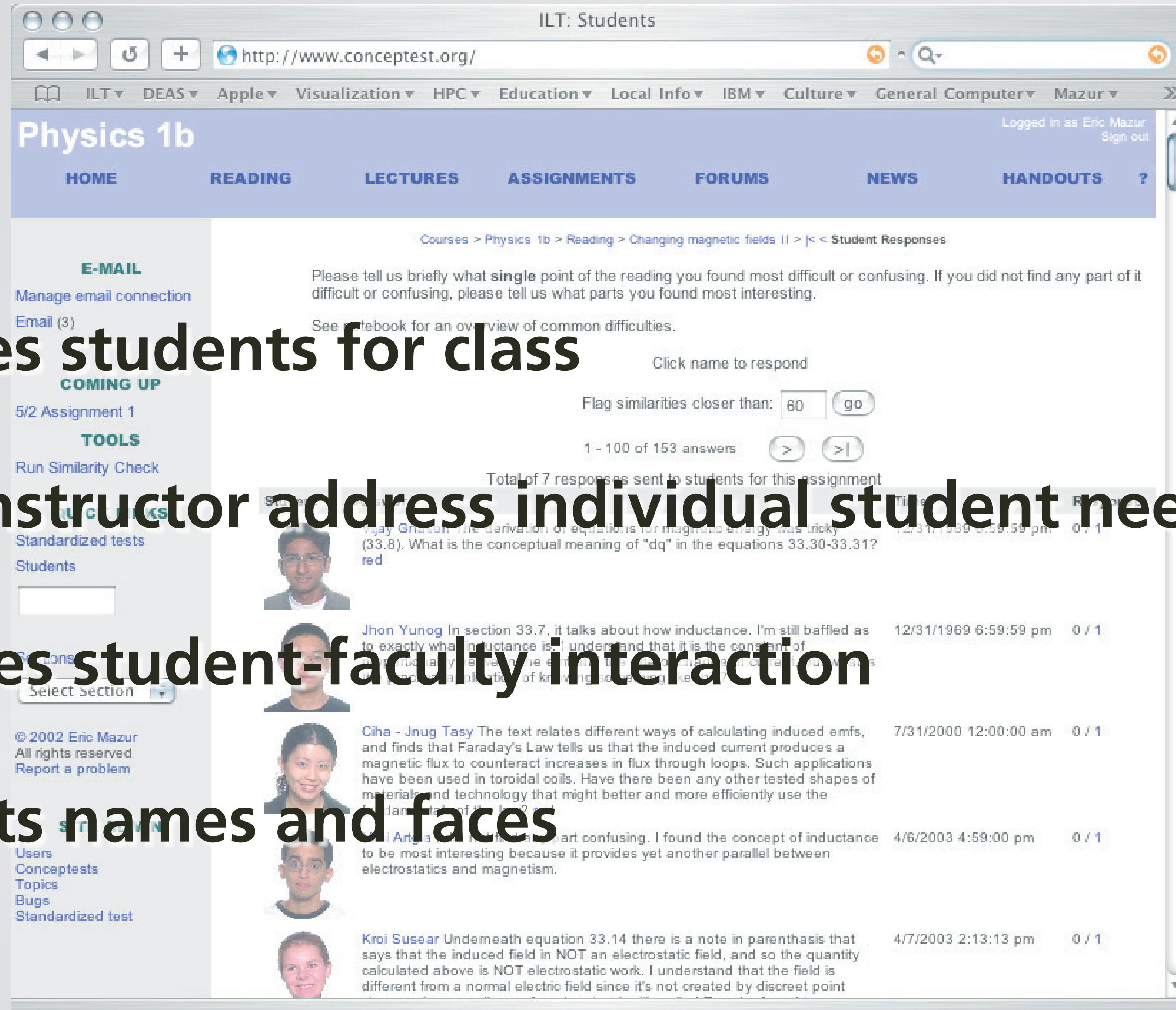
web-based pre-class assignment

Preparing for class



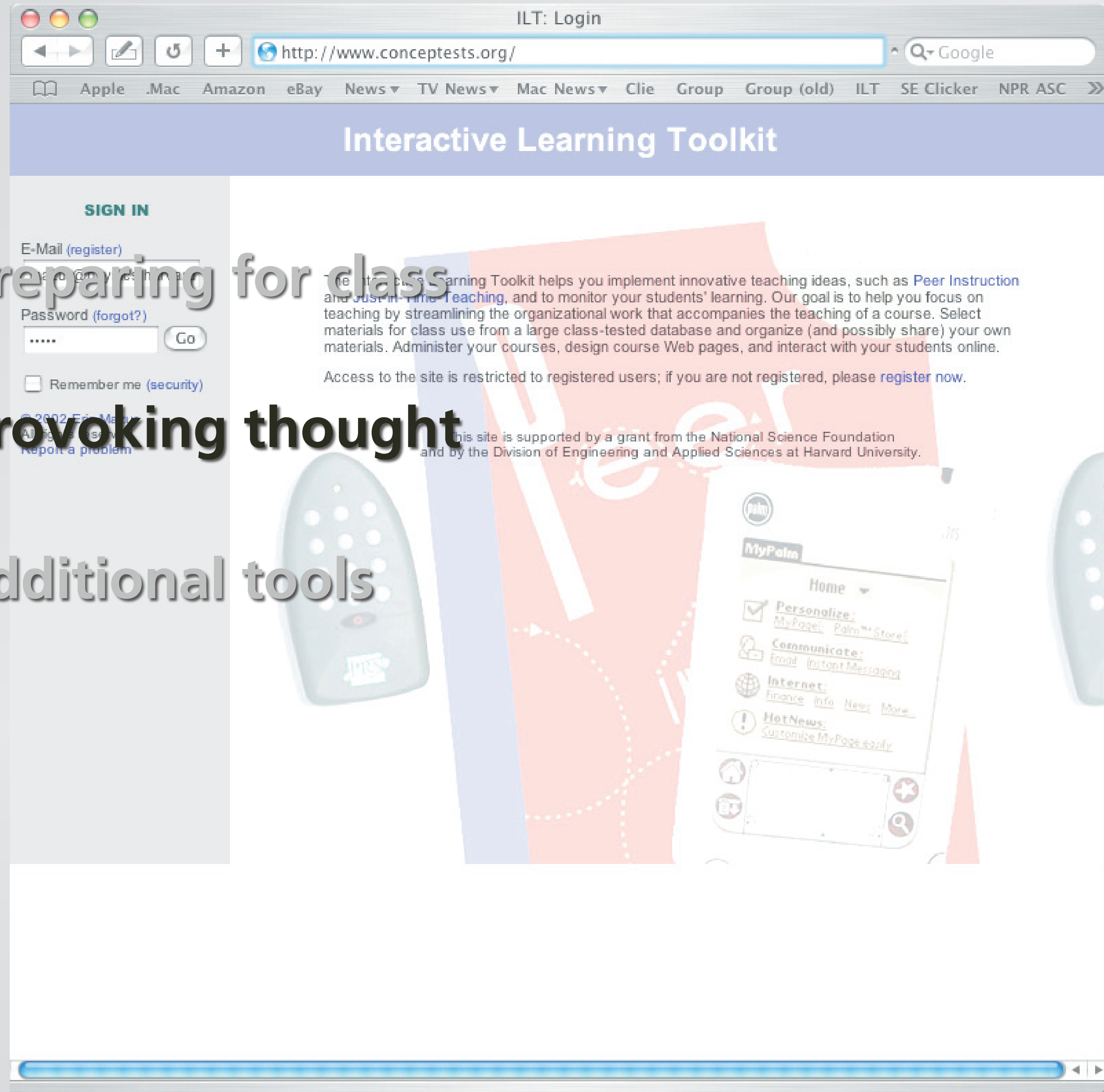
Preparing for class

Benefits:



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

Outline

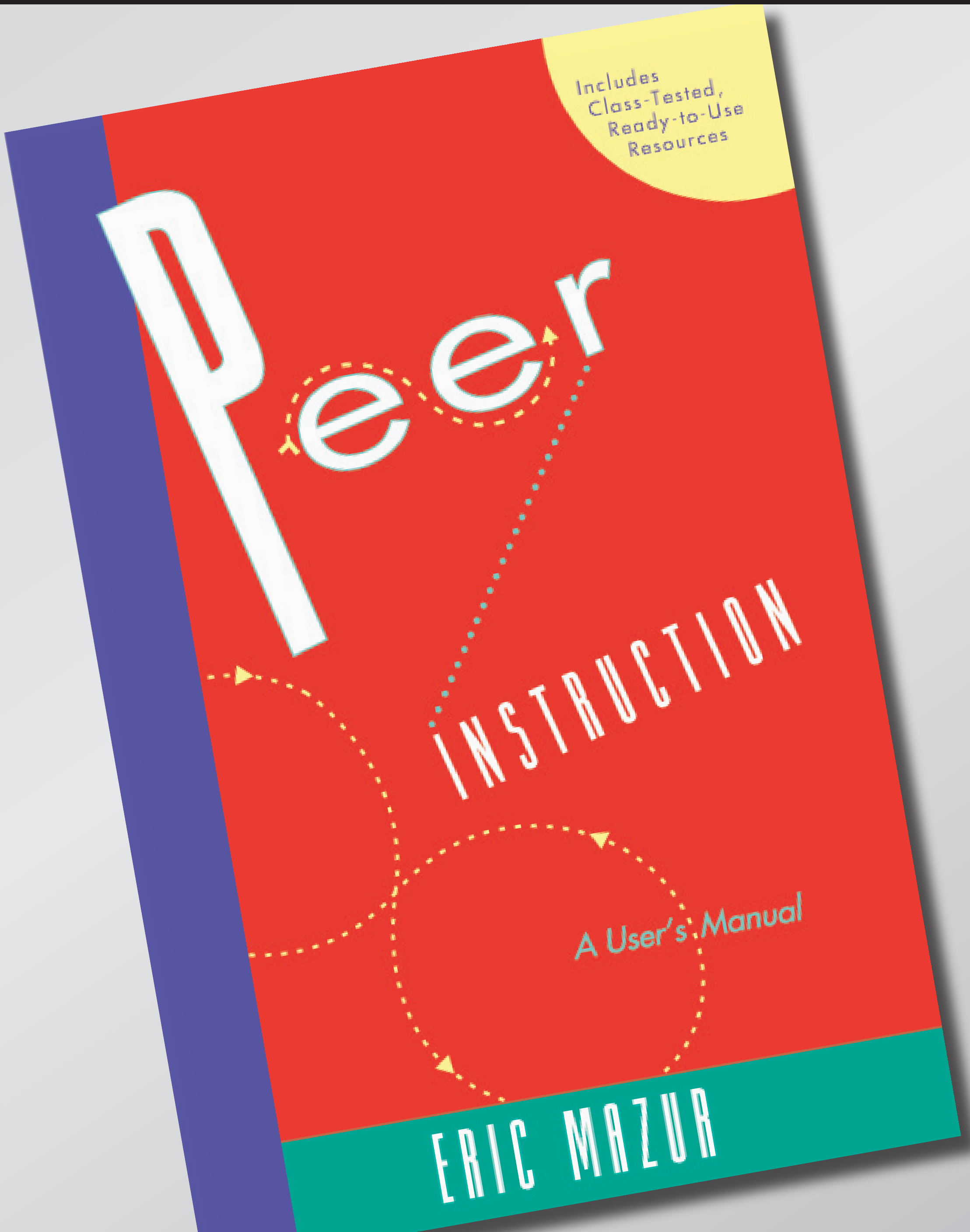


- preparing for class
- **provoking thought**
- additional tools

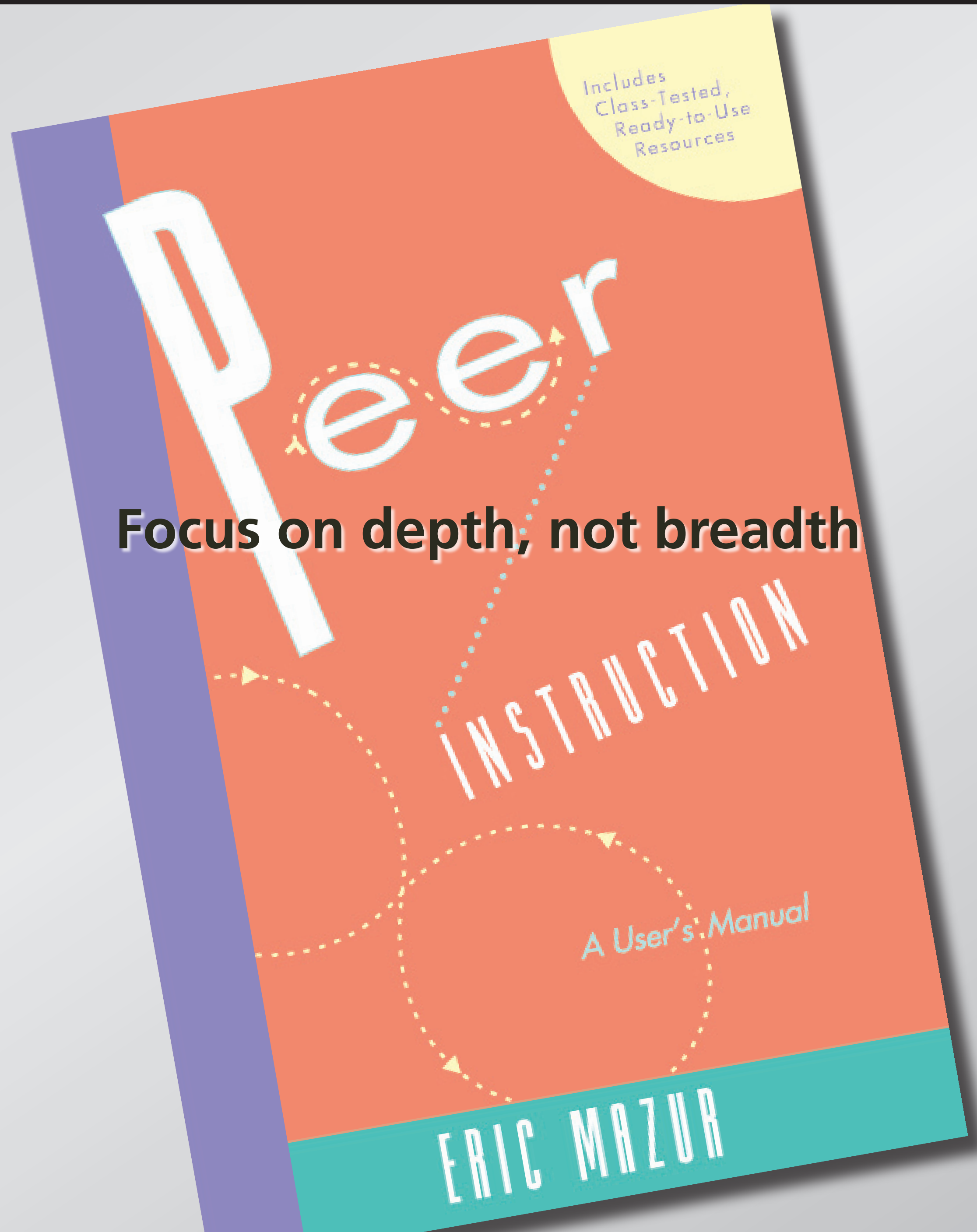
Provoking thought

What to do in class?

Provoking thought



Provoking thought



Focus on depth, not breadth

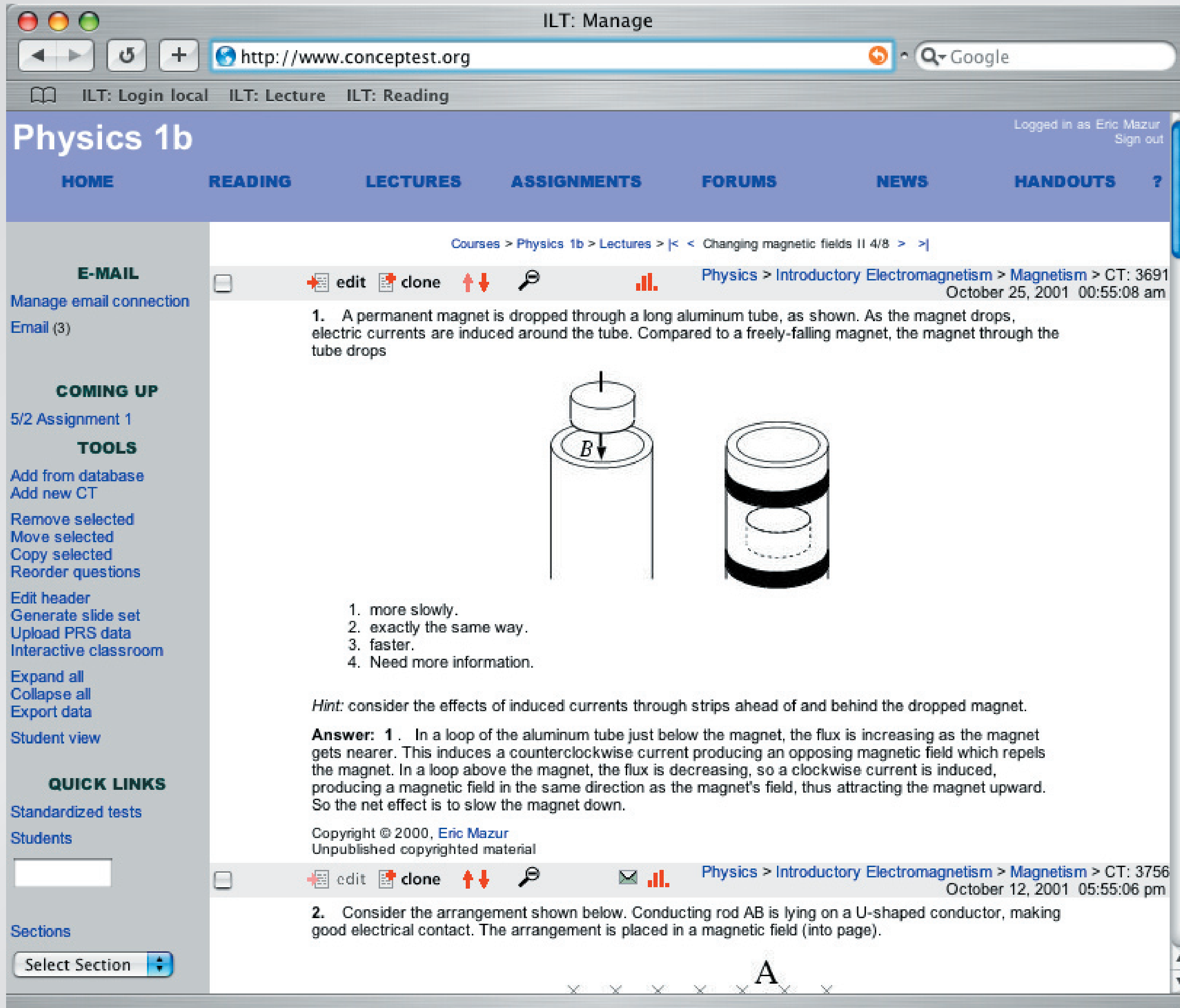
Provoking thought

Provoking thought

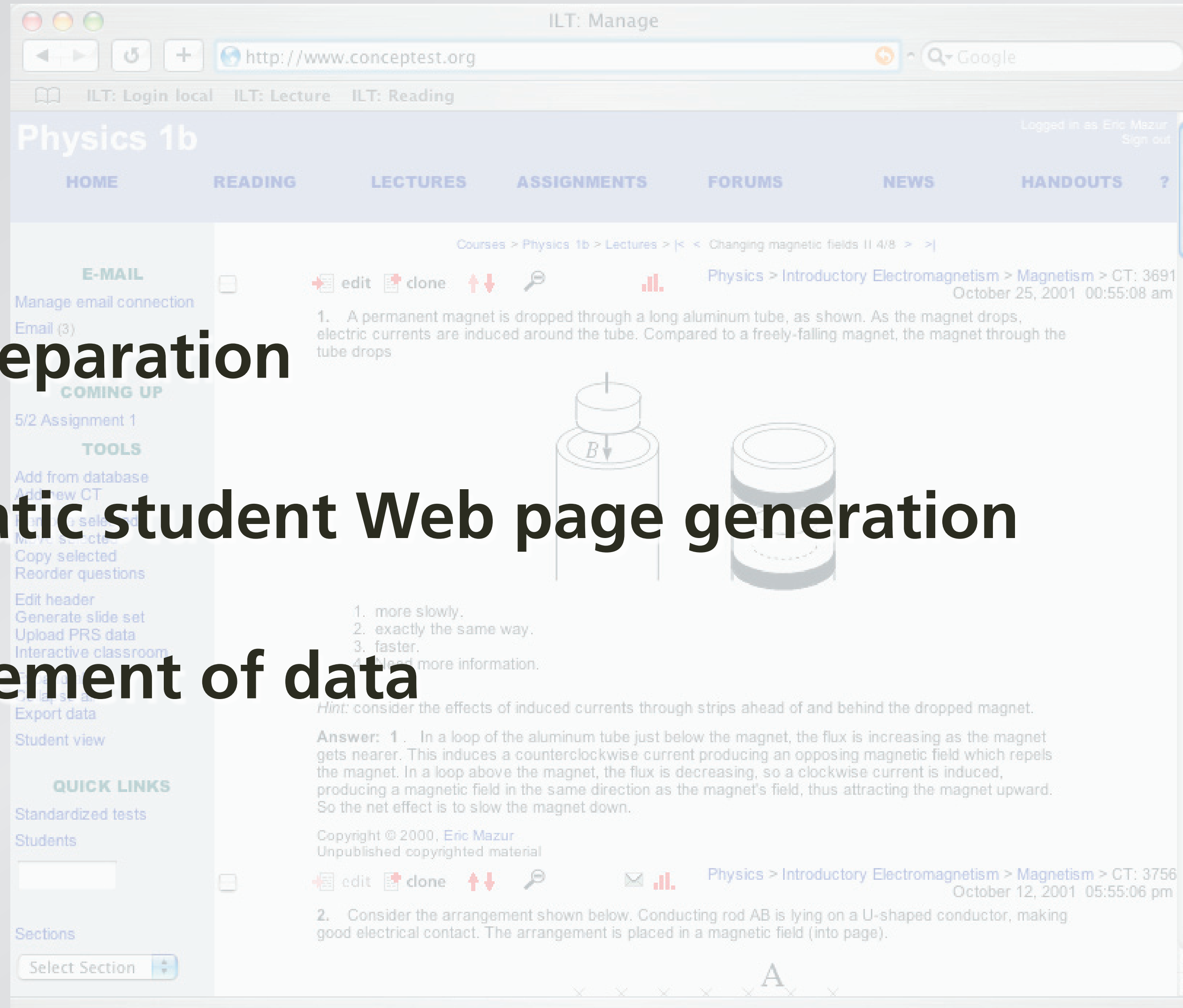
Some hurdles:

- finding materials
- collecting and managing feedback
- providing materials to students

Provoking thought



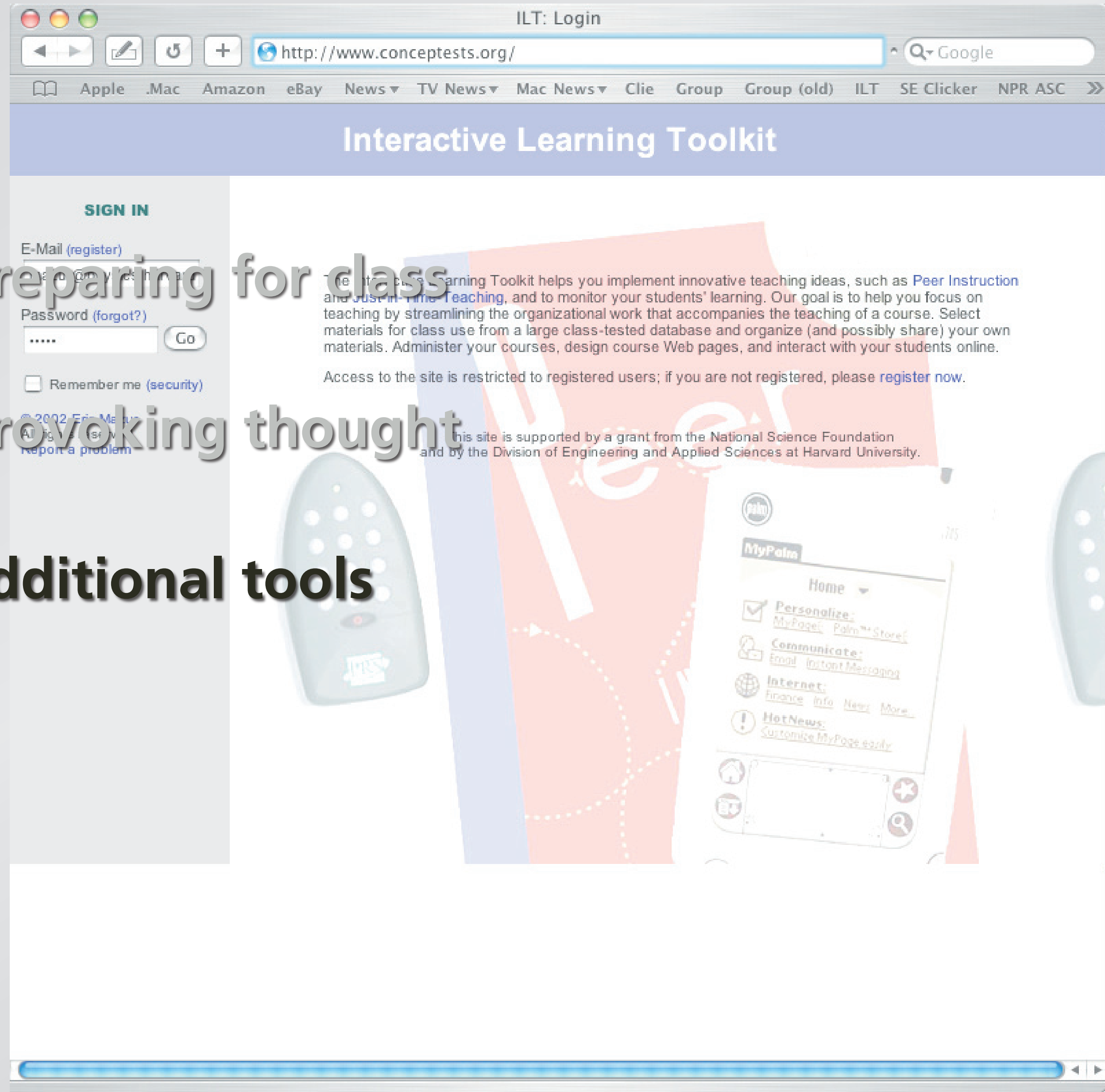
Provoking thought



Benefits:

- easy preparation
- automatic student Web page generation
- management of data

Outline

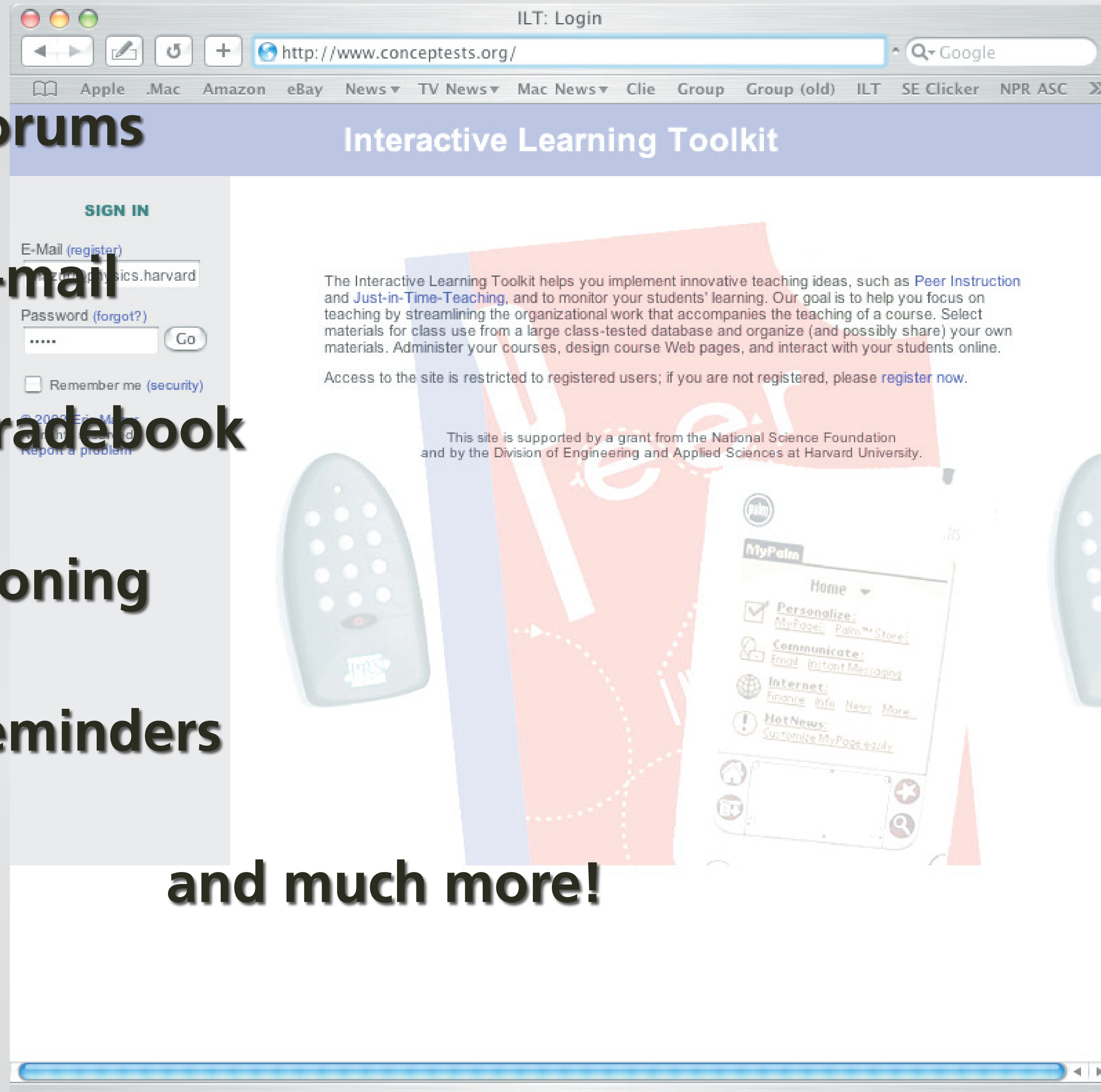


- preparing for class
- provoking thought
- additional tools

Additional tools

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

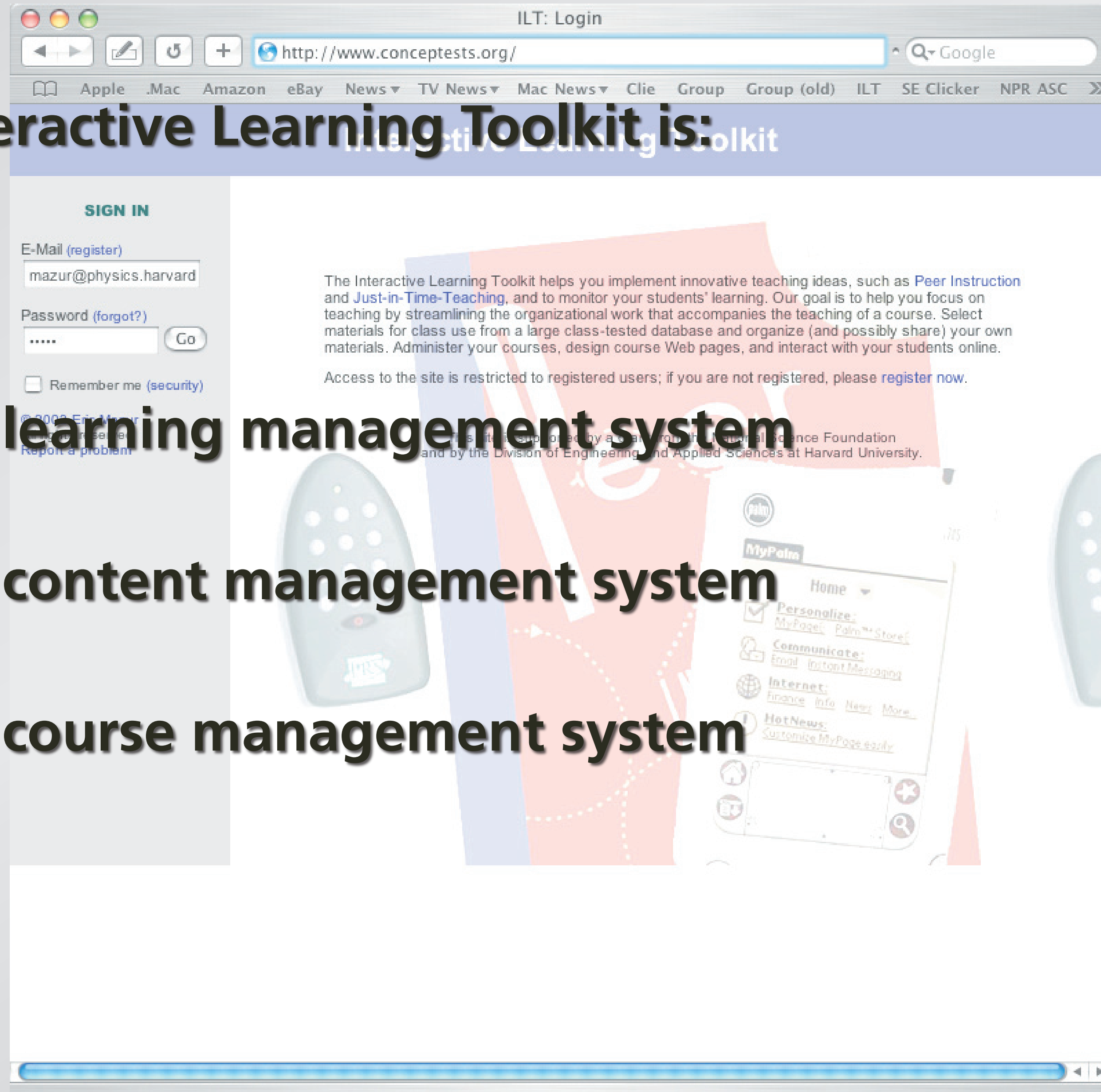
and much more!



Additional tools

Interactive Learning Toolkit is:

- a learning management system
- a content management system
- a course management system

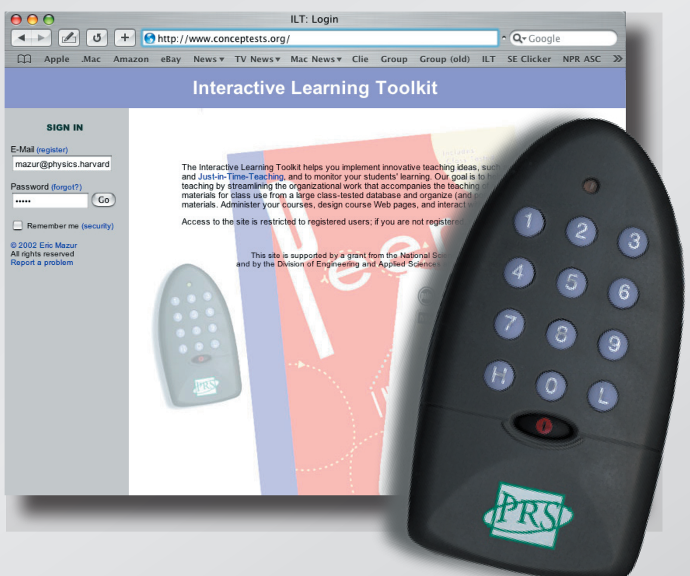


Additional tools

Resources:

ILT video (www.ankerpub.com)

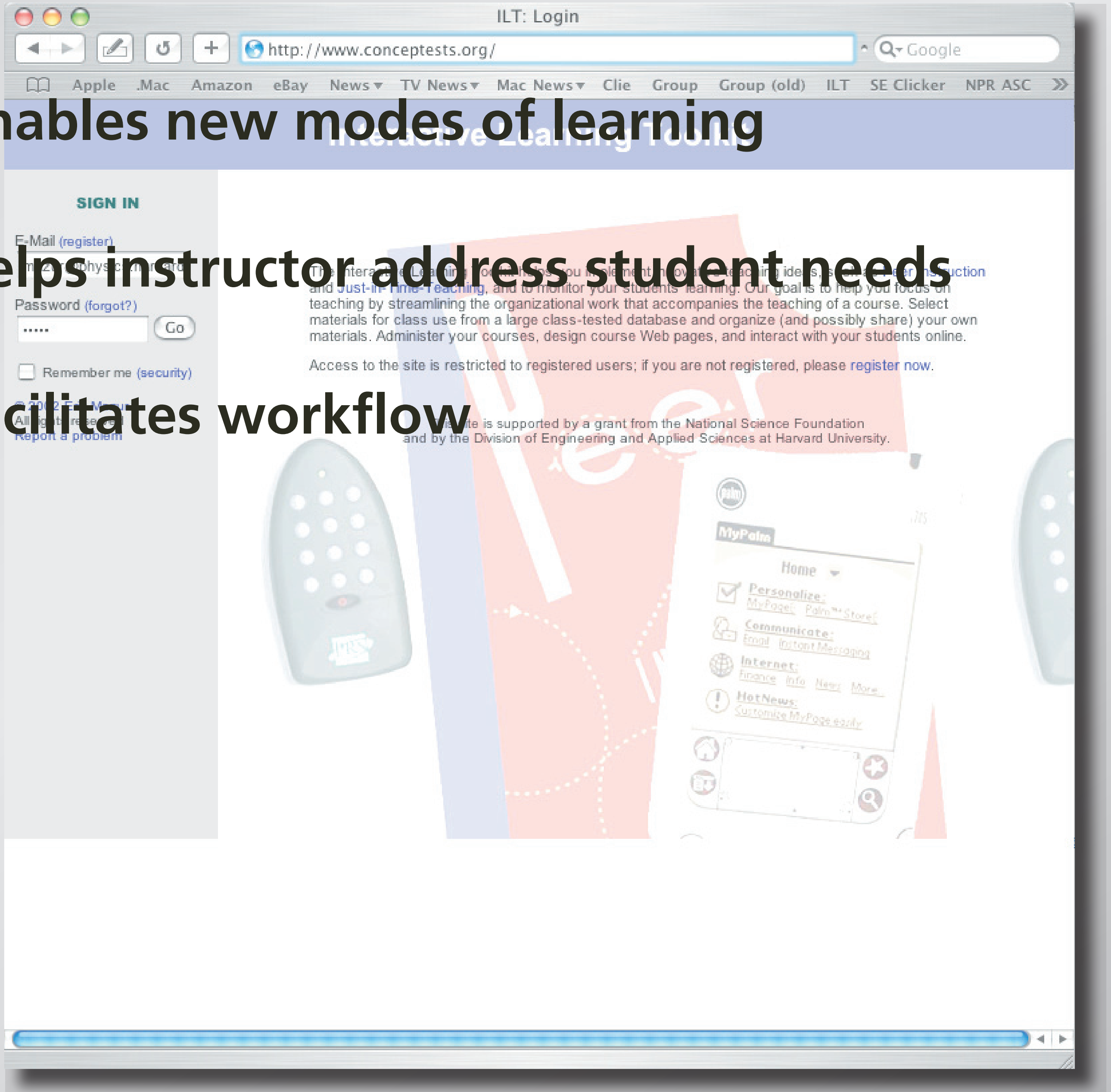
Books on PI and JiTT (Prentice Hall)



ILT site:

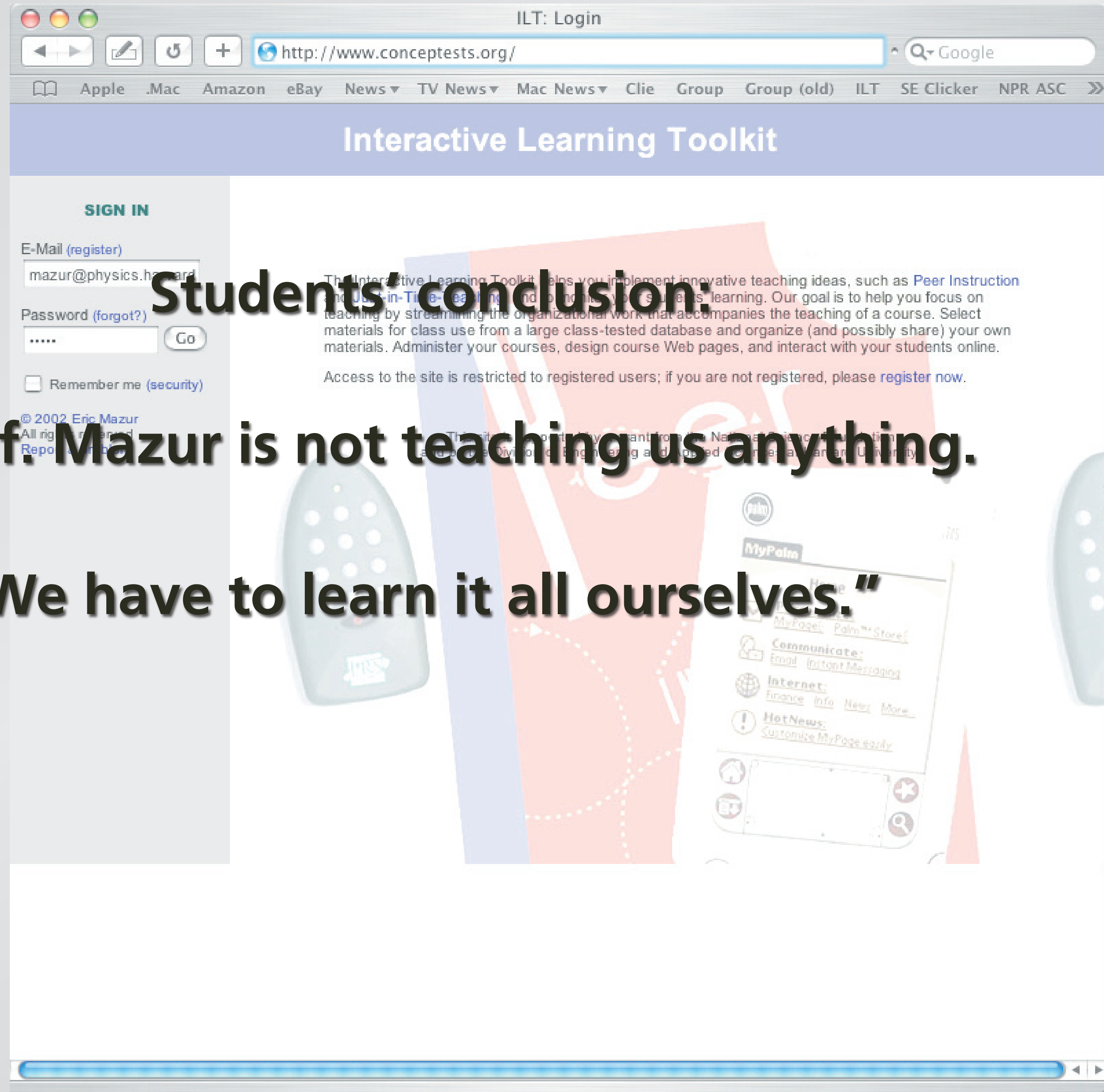
deas.harvard.edu/ilt

Summary



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

Summary



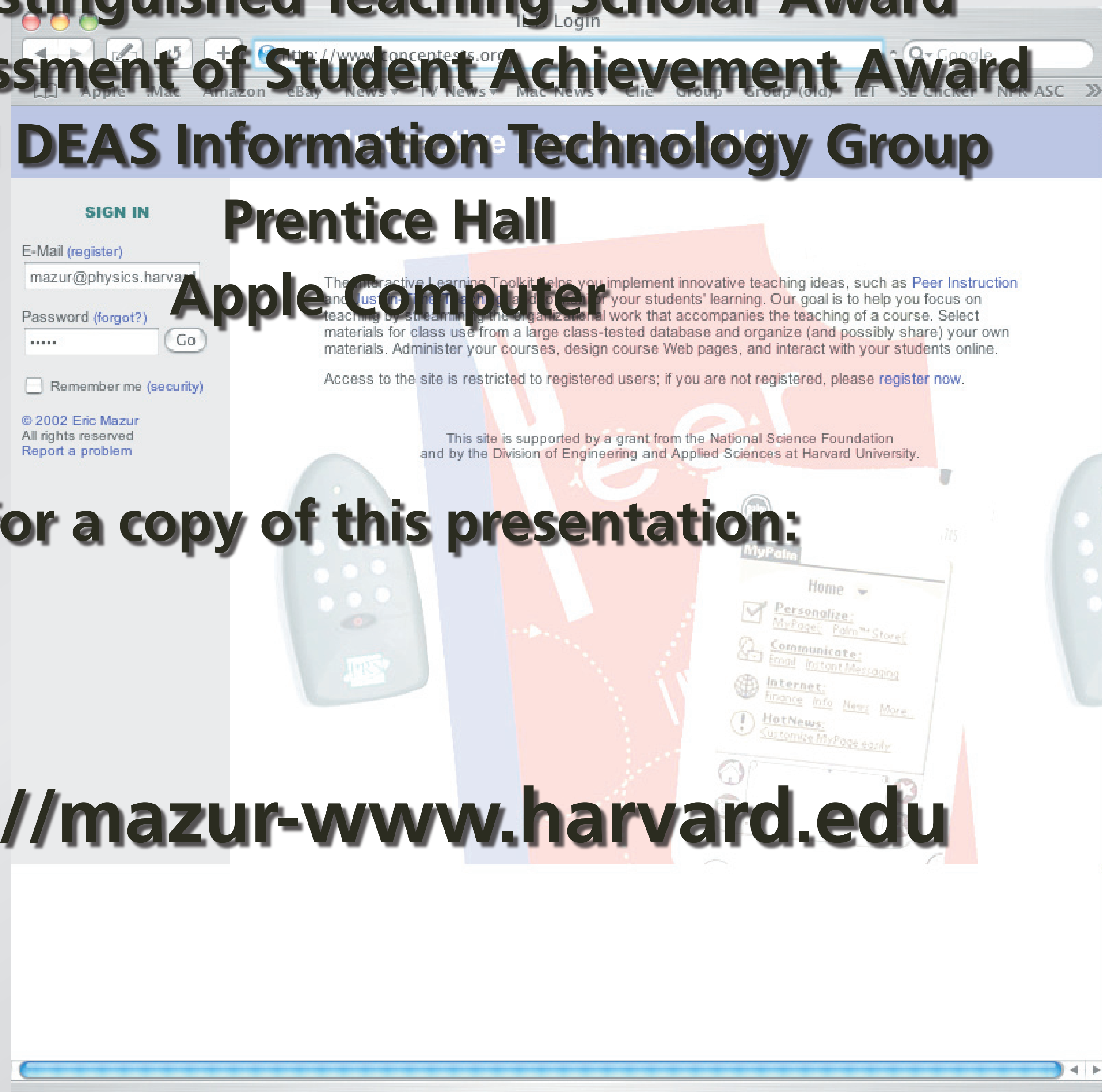
Students' conclusion:

"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