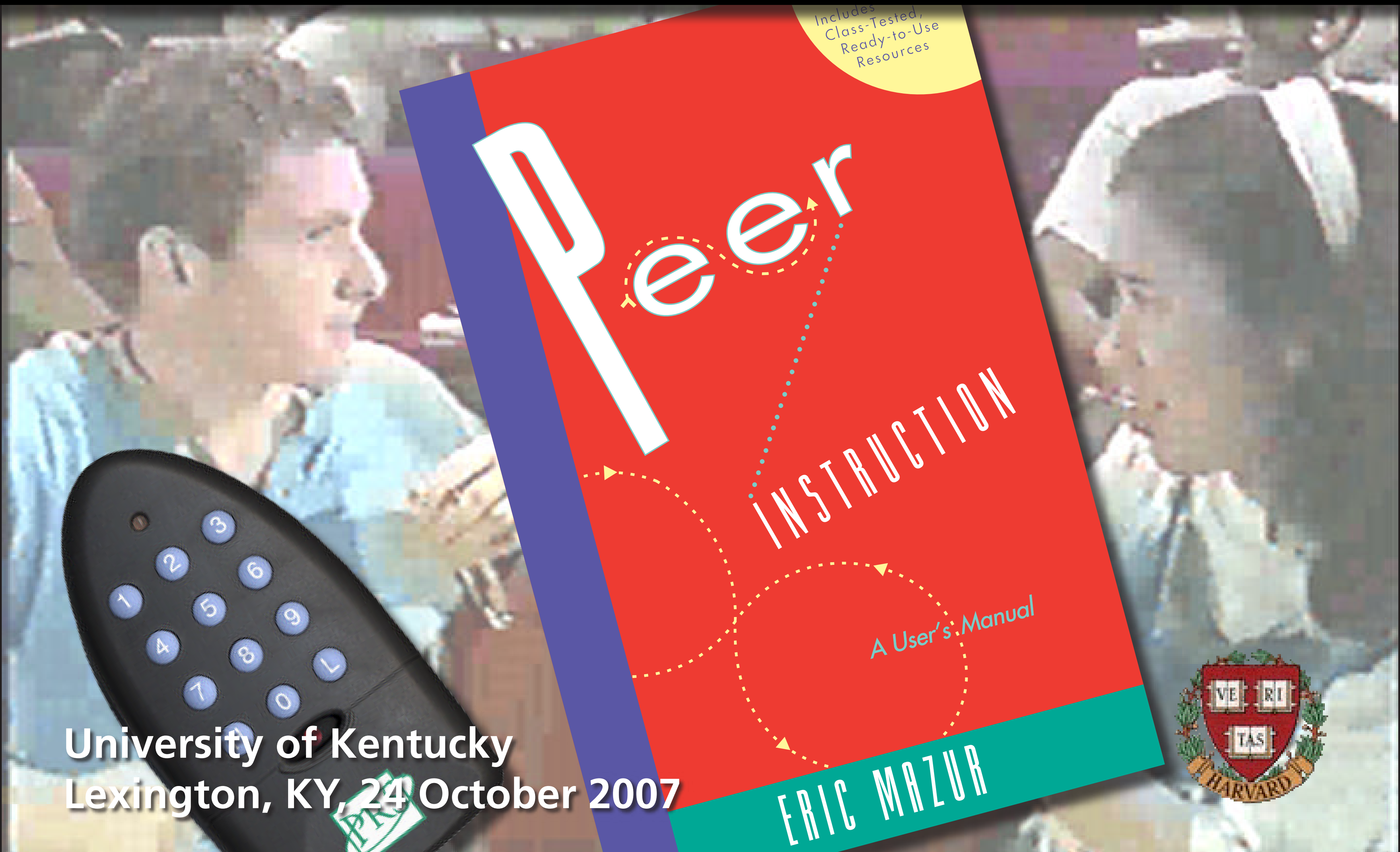
Workshop on Peer Instruction



University of Kentucky
Lexington, KY, 24 October 2007

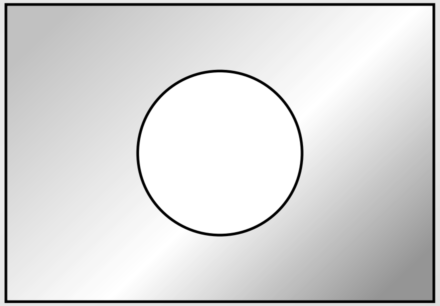
Outline

Some options:

- **Let’s try it!**
- **Feedback methods**
- **Research: providing the basis for change**
- **Problems with problems**
- **Resources**
- **Barriers to reform**

Let's try it!

Consider a rectangular metal plate with a circular hole in it.



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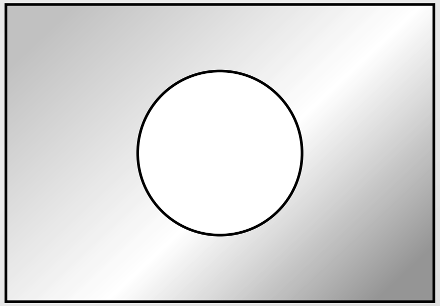


When the plate is uniformly heated, the diameter of the hole

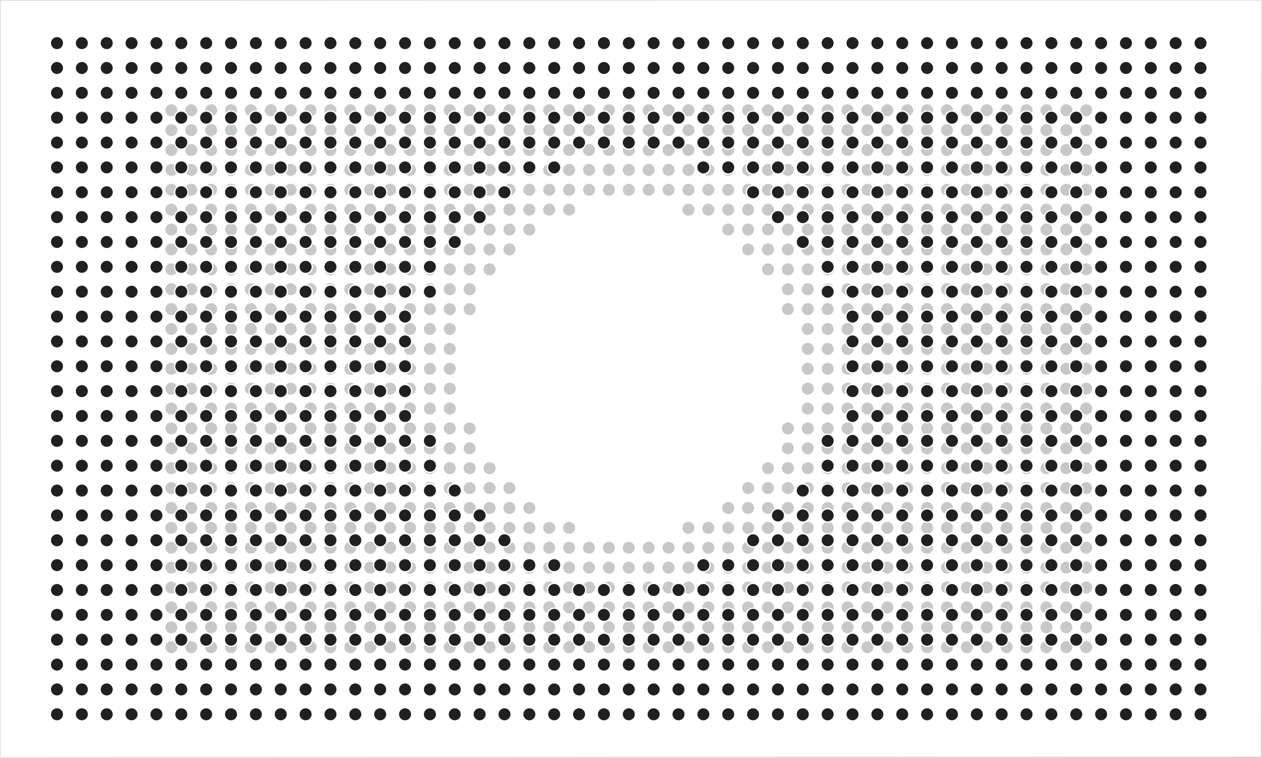
1. increases.
2. stays the same.
3. decreases.

Let’s try it!

It’s easy to fire up the audience!

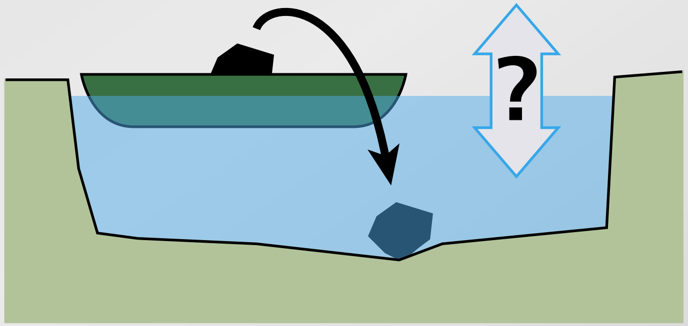
Let's try it!

The distance between the atoms increases uniformly



Let’s try it!

A boat carrying a large boulder is floating on a small pond. The boulder is thrown overboard and sinks to the bottom of the pond.



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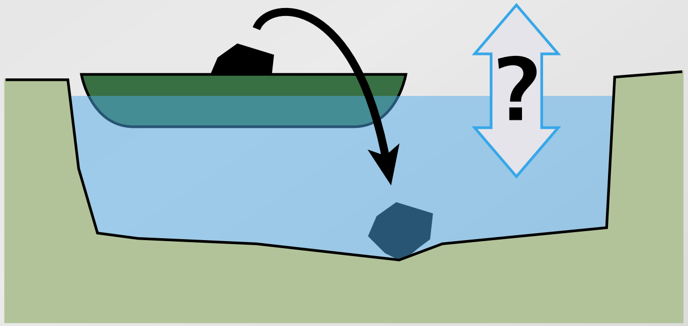


After the boulder sinks to the bottom of the pond, the level of the water in the pond is

1. higher than
2. the same as
3. lower than

it was when the boulder was in the boat.

Let’s try it!

We all make mistakes!

Let’s try it!

When we hold a page of printed text in front of a mirror, the text on the image in the mirror runs from right to left:

The New York Times

Let's try it!

When we hold a page of printed text in front of a mirror, the text on the image in the mirror runs from right to left:

The New York Times

Why is it that right and left are interchanged and not top and bottom? Because:

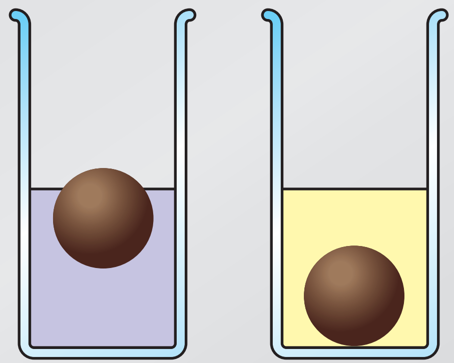
1. the mirror is oriented vertically.
2. we have two eyes in the horizontal plane.
3. the Earth's gravitation is directed downward.
4. a habit we have when looking at images in a mirror.
5. It only *appears* to run from left to right.

Let’s try it!

It’s “simple” only if you know the answer

Let's try it!

Consider an object that floats in water, but sinks in oil. When the object floats in water, most of it is submerged.



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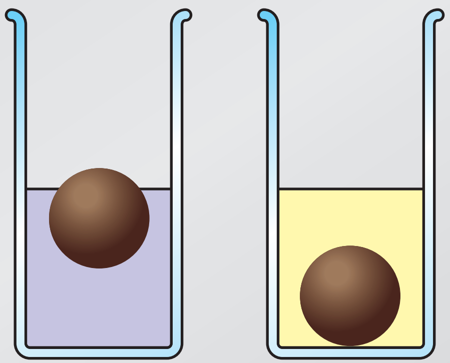
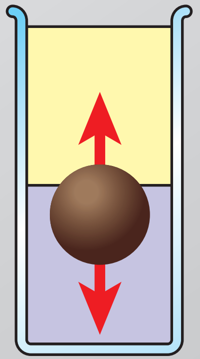


If we slowly pour the oil on top of the water so it completely covers the object, the object



1. moves up.
2. stays in the same place.
3. moves down.

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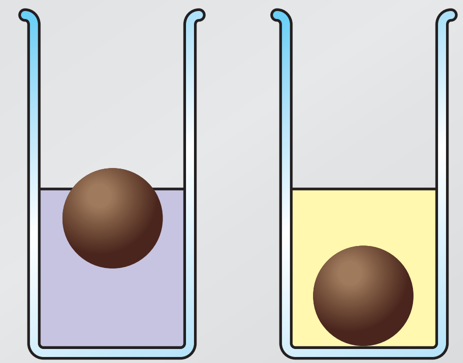

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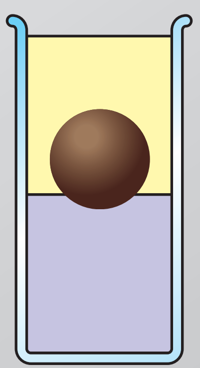


Let’s try it!

It’s easy to make simple demonstrations fascinating!

Developing ConcepTests

Good ConcepTests:

- are based on student difficulties
- focus on single concept
- cannot be solved by “plug and chug”
- are clear and concise
- are of manageable difficulty

Developing ConcepTests

Try writing a ConcepTests on the following topic:

The acceleration due to gravity is constant

Developing ConcepTests

A ball is thrown downward (not dropped) from the top of a tower.

After being released, its downward acceleration is:

1. **greater than *g***
2. **exactly *g***
3. **smaller than *g***

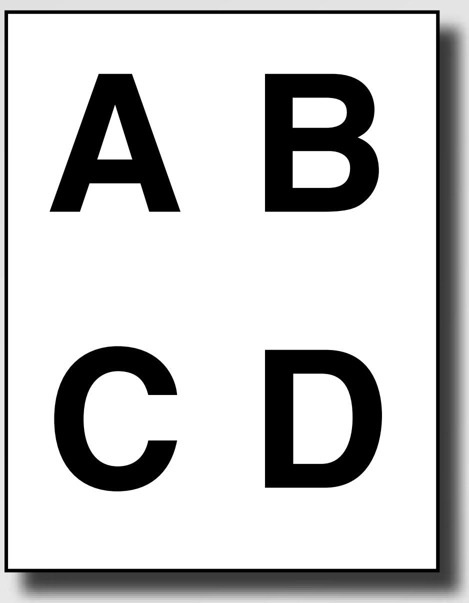
Feedback methods

Show of hands:

easy, but only moderately effective

Feedback methods

Flashcards: simple and effective



Feedback methods

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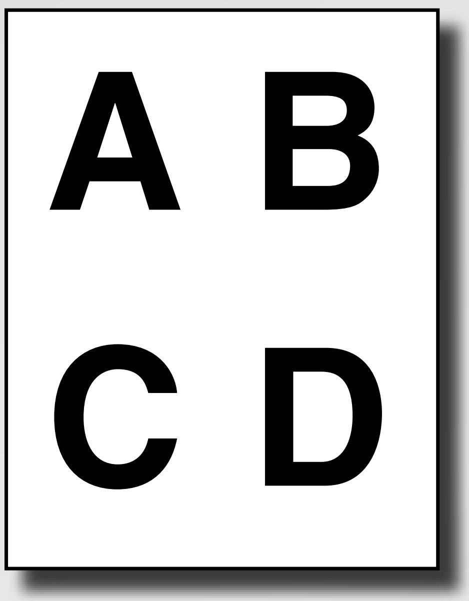
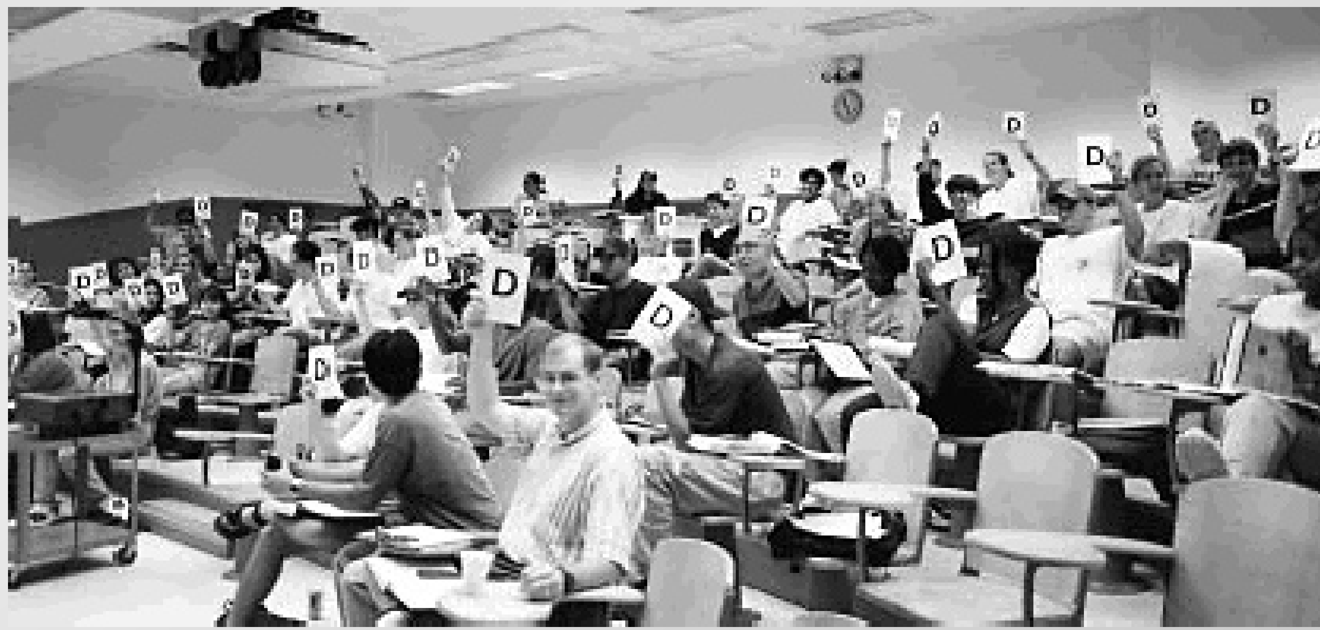




Meltzer and Mannivanan, South Eastern Louisiana University

Feedback methods

Infrared transmitters (PRS): easy collection of data

Feedback methods

Infrared transmitters (PRS): easy collection of data

Kristy Beauvais, Concord Carlisle High School

Feedback methods

near future: wireless classroom

Research: providing the basis for change

Pre/post-testing important for:

- justifying approach
- improving implementation

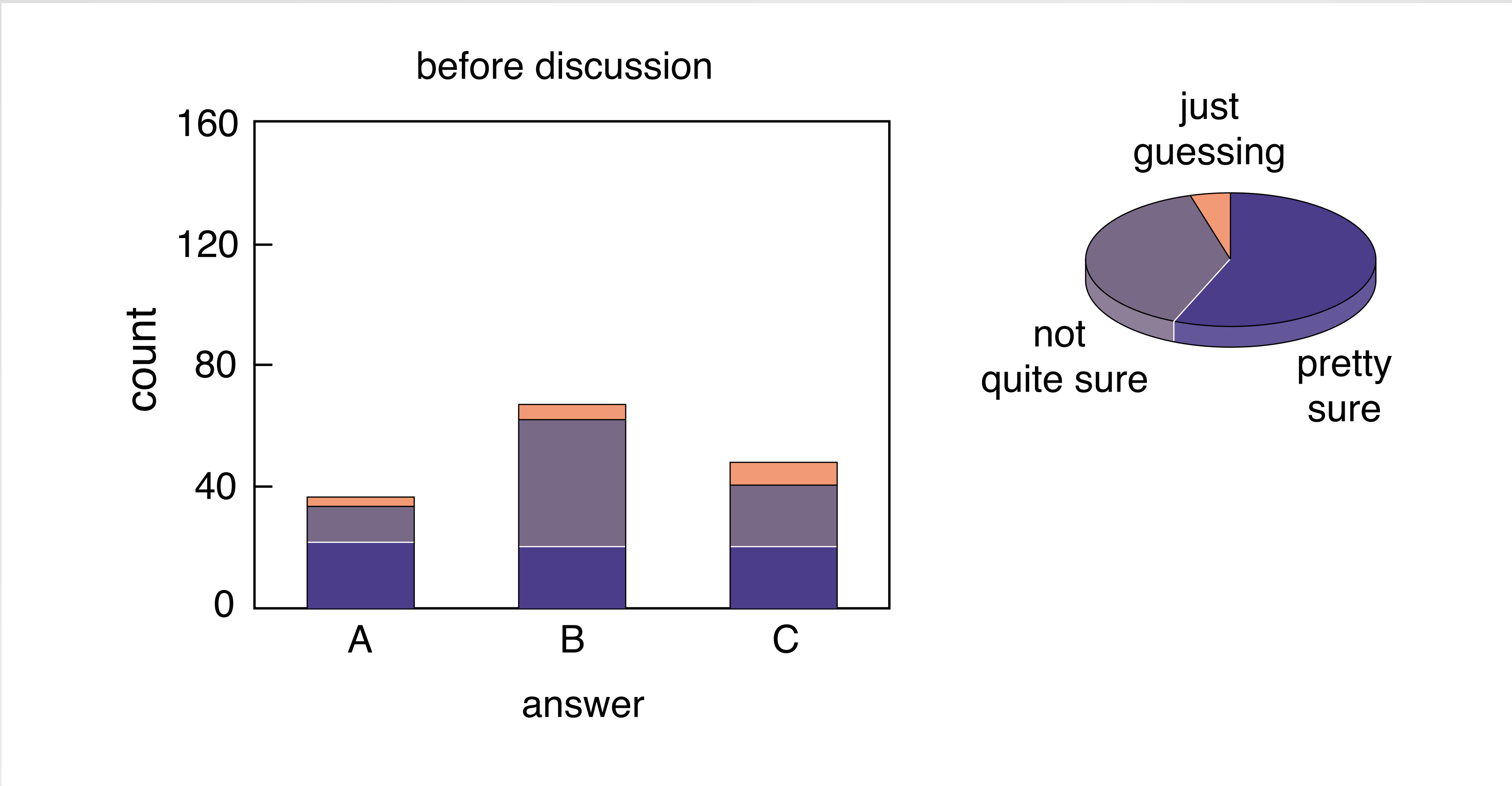
Research: providing the basis for change

Evaluate assessment by comparing

student performance on various kinds of problems

Research: providing the basis for change

ConcepTest data



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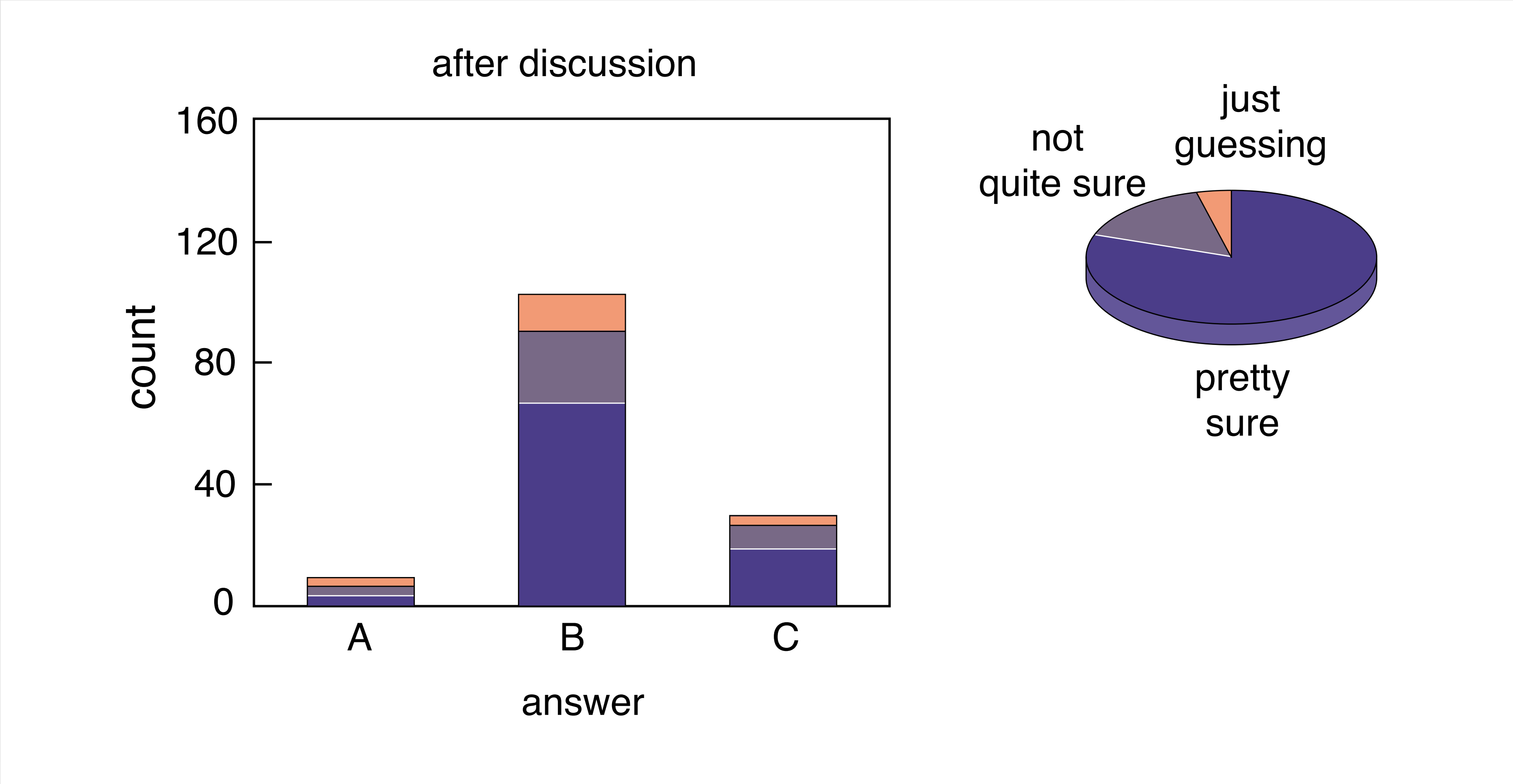

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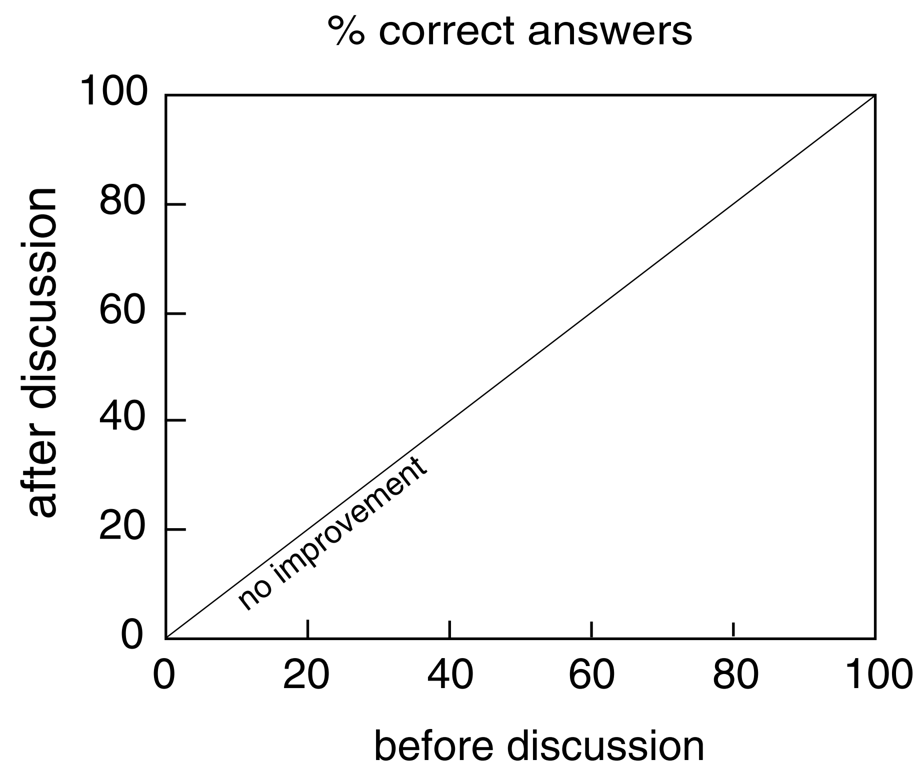

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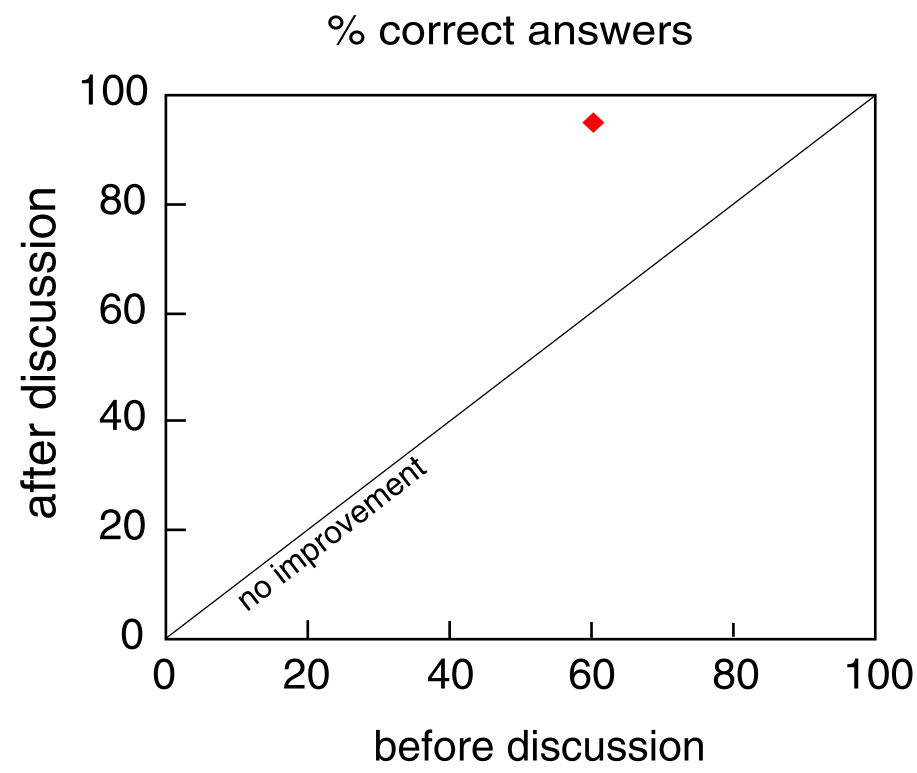

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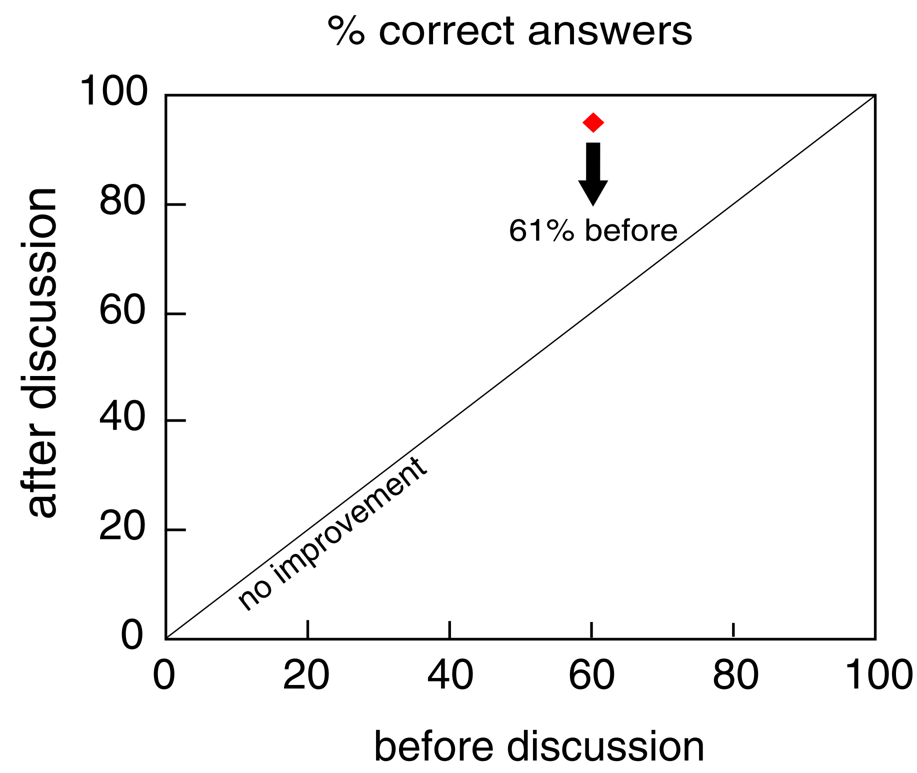

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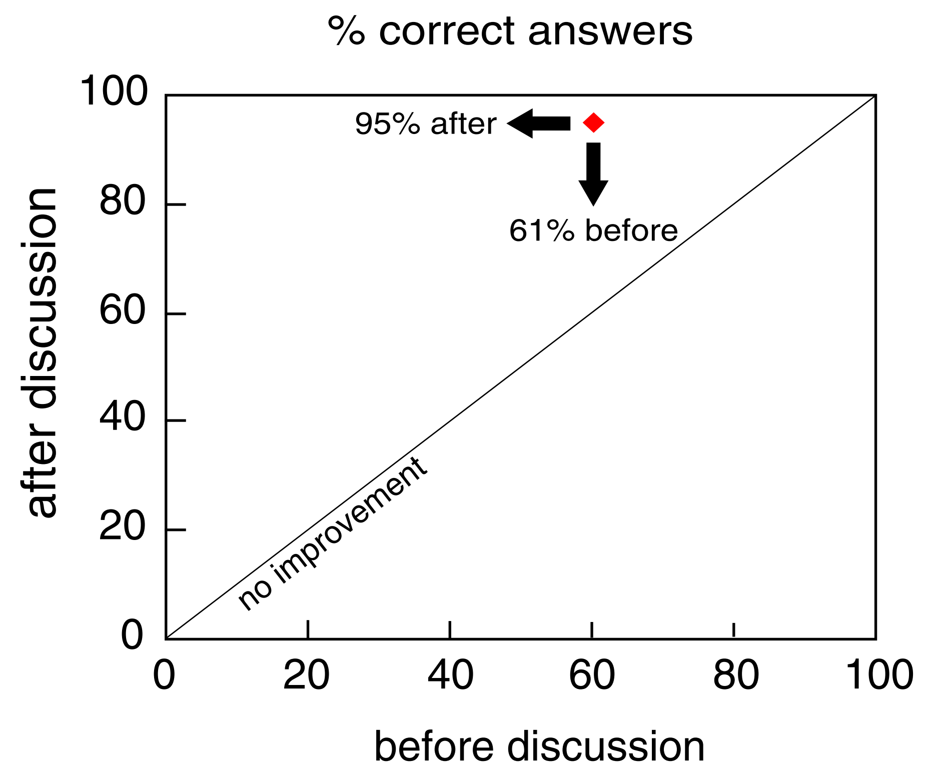

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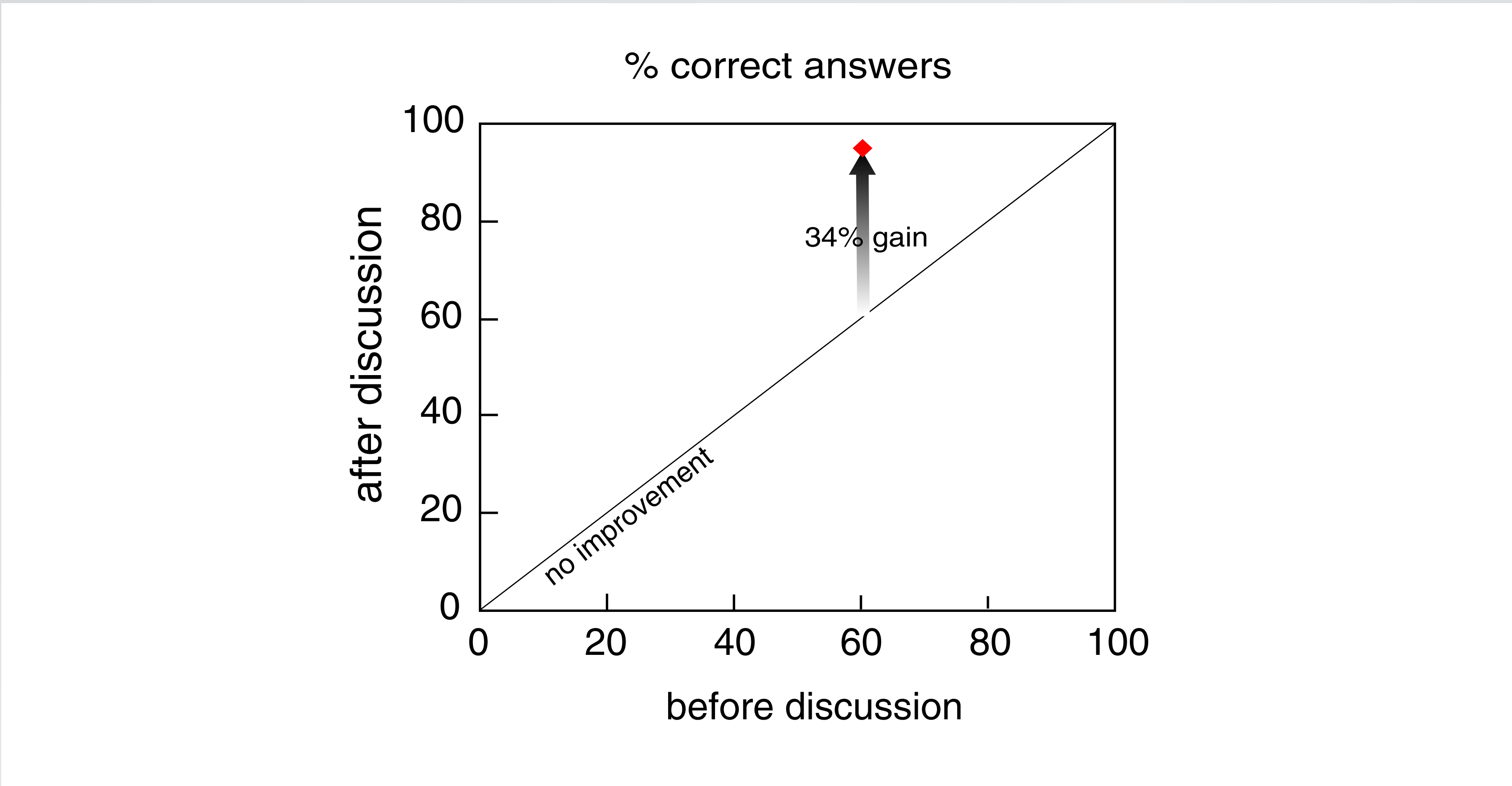

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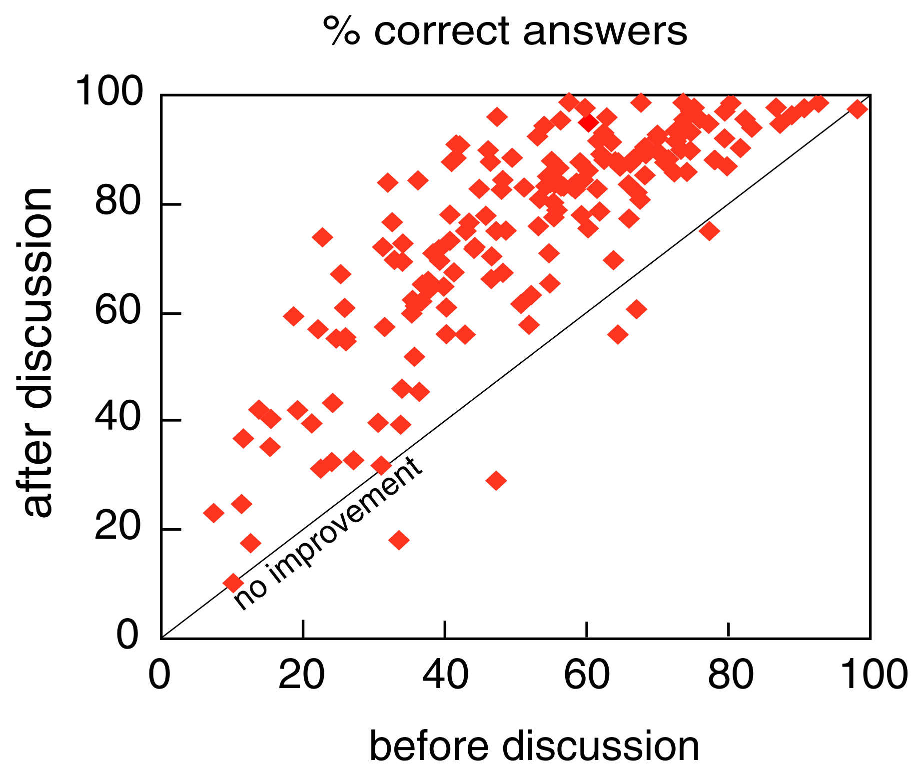

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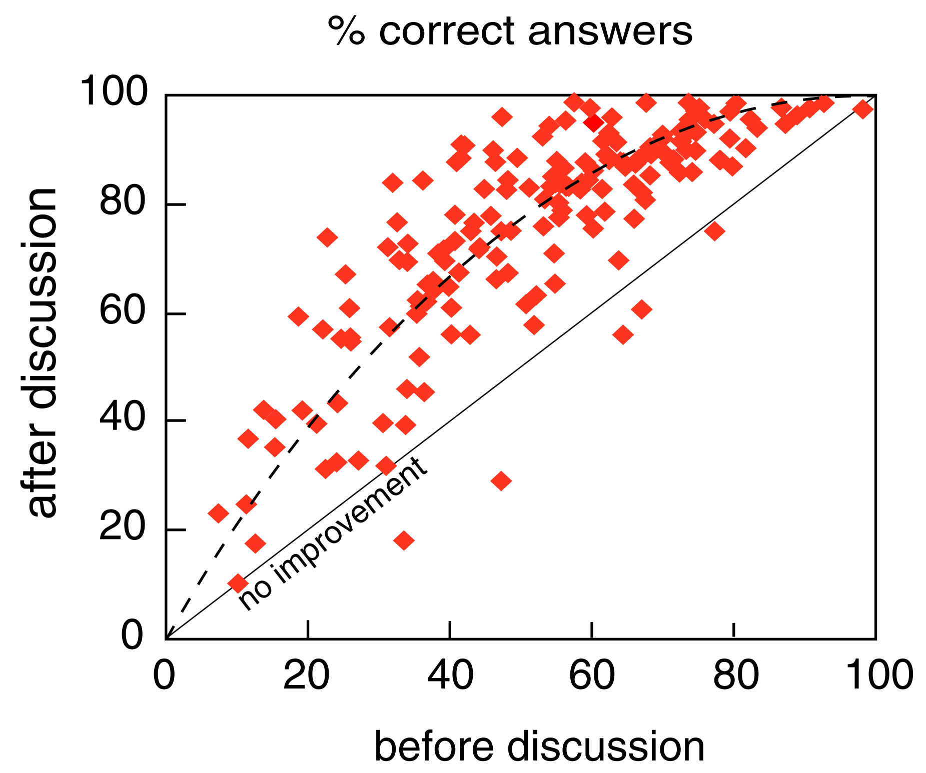

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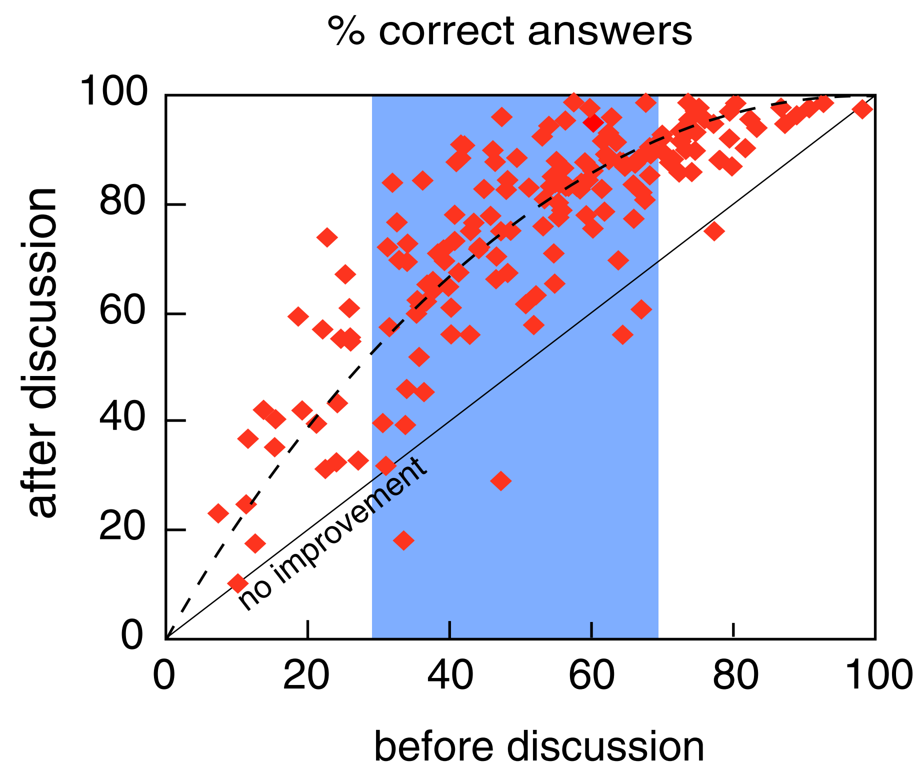
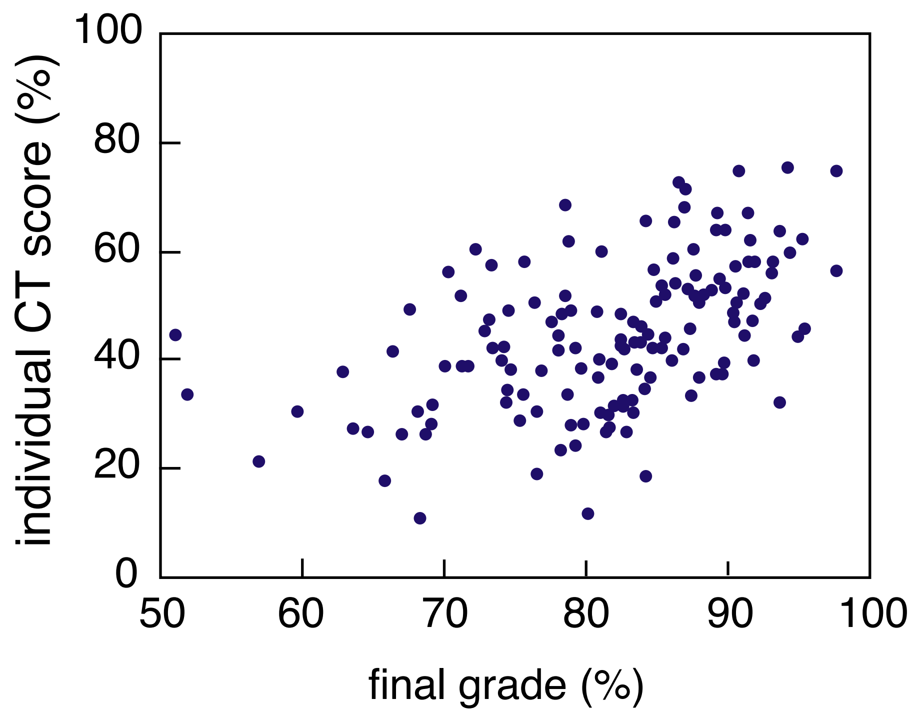


Research: providing the basis for change

who benefits from the ConcepTests?



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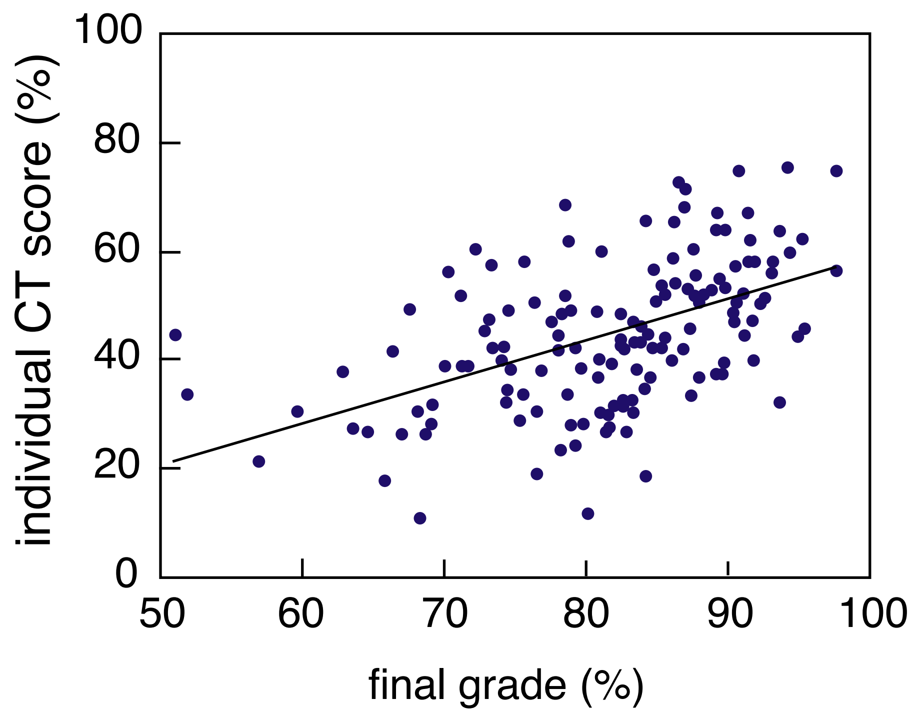
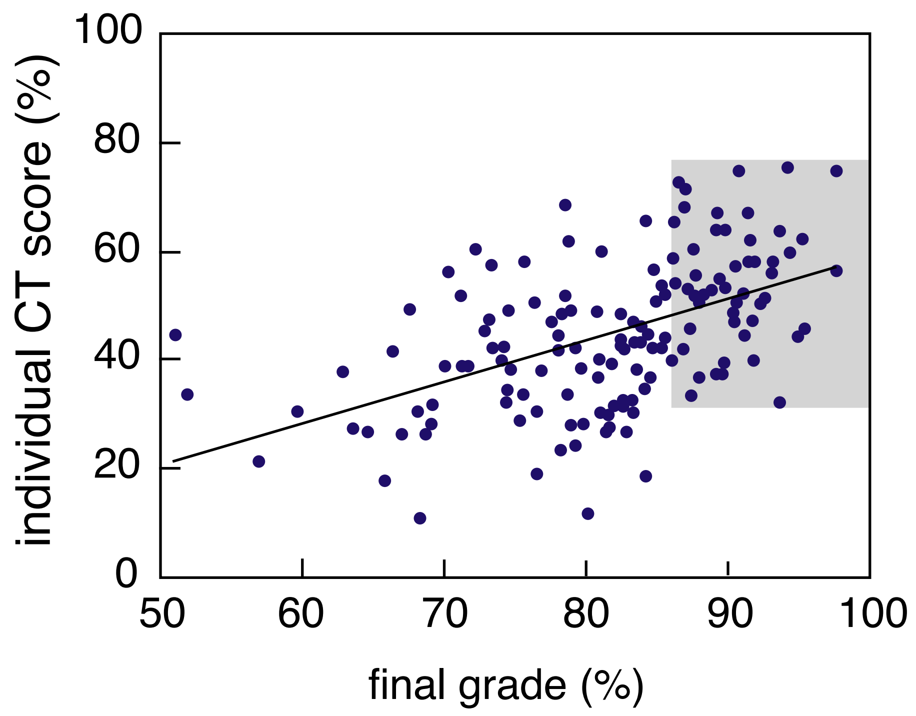


Research: providing the basis for change

even the best students are challenged



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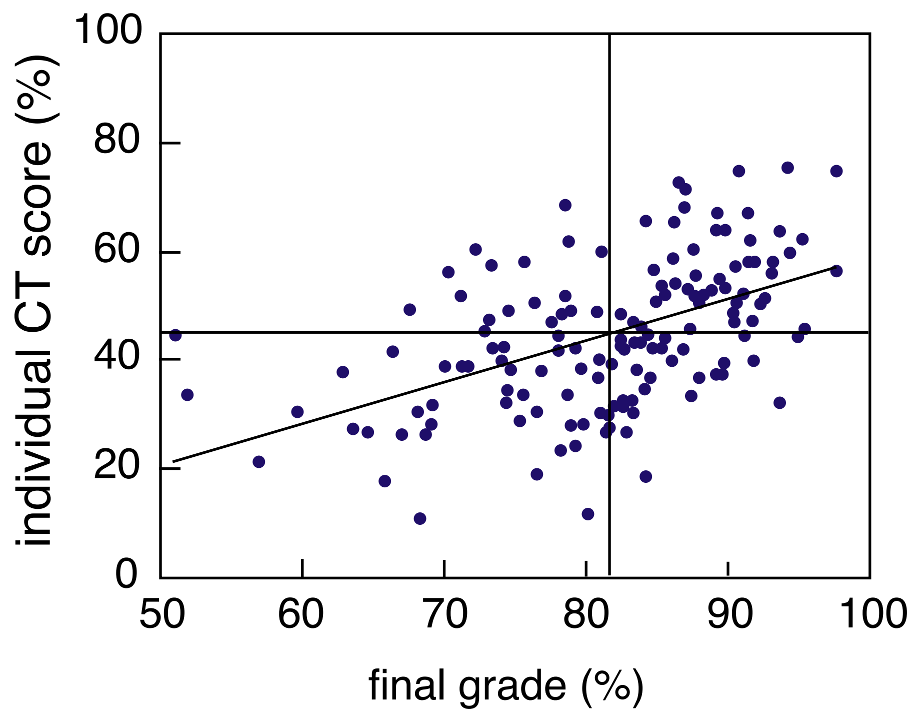

Problems with problems

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Requires:

Assumptions
Developing a model
Applying that model

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Requires:

Applying a (new) model

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Requires:

Using a calculator

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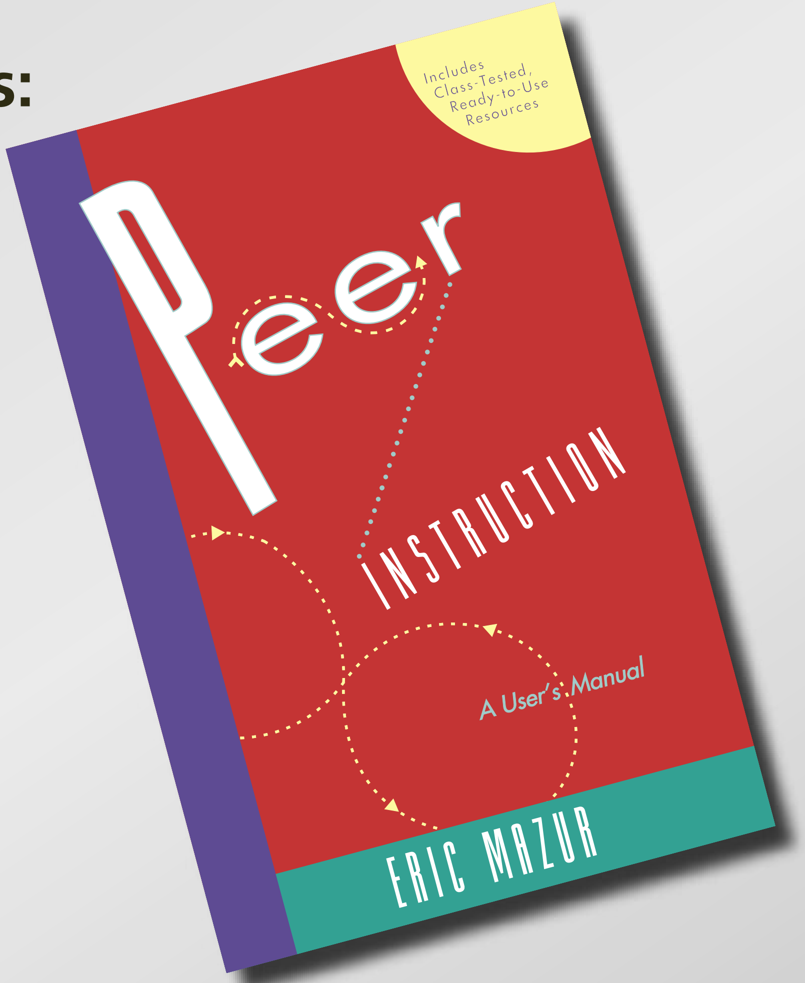
Resources

Books with ConcepTests:

- **Physics (Prentice Hall)**



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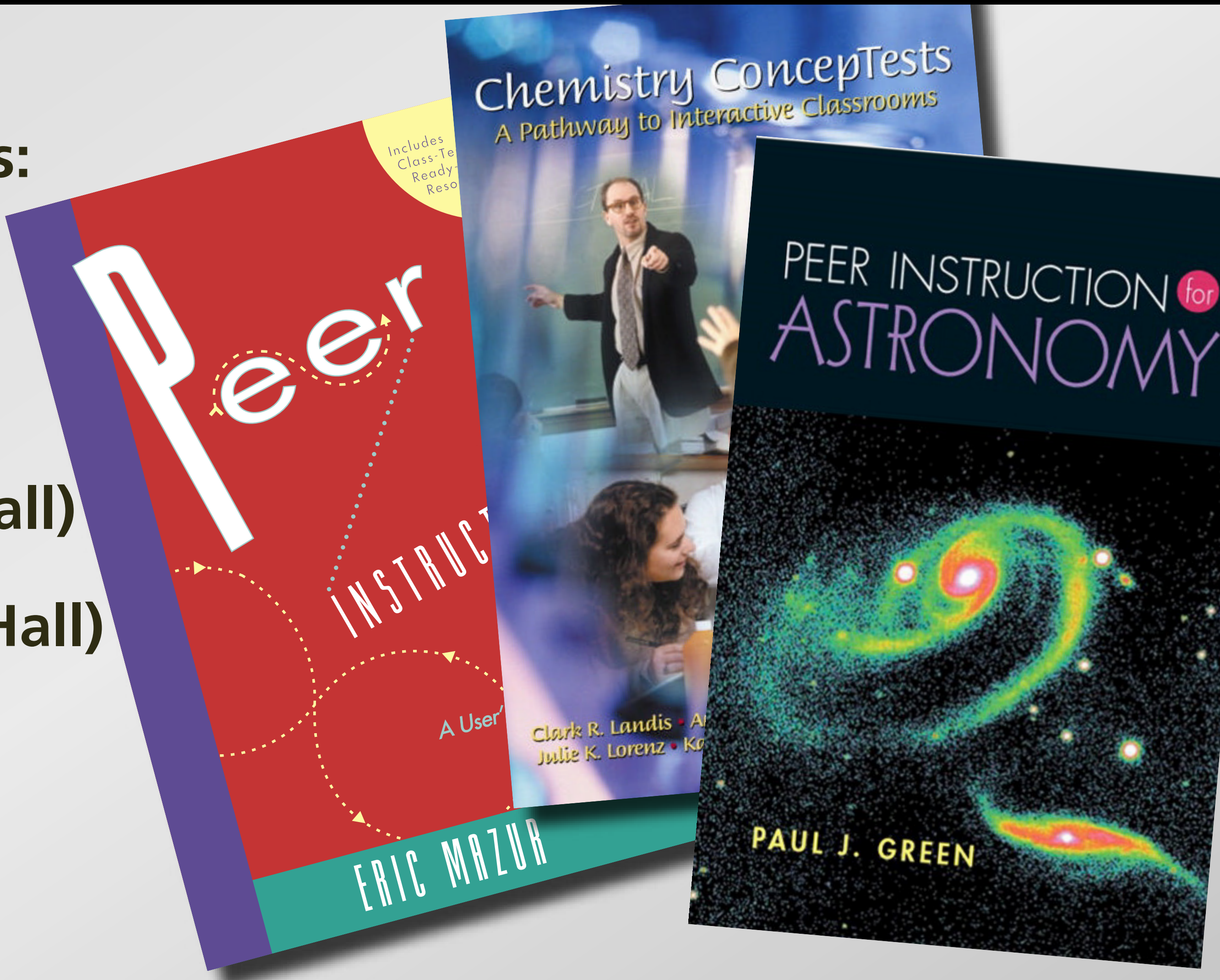
- Astronomy (Prentice Hall)



Resources

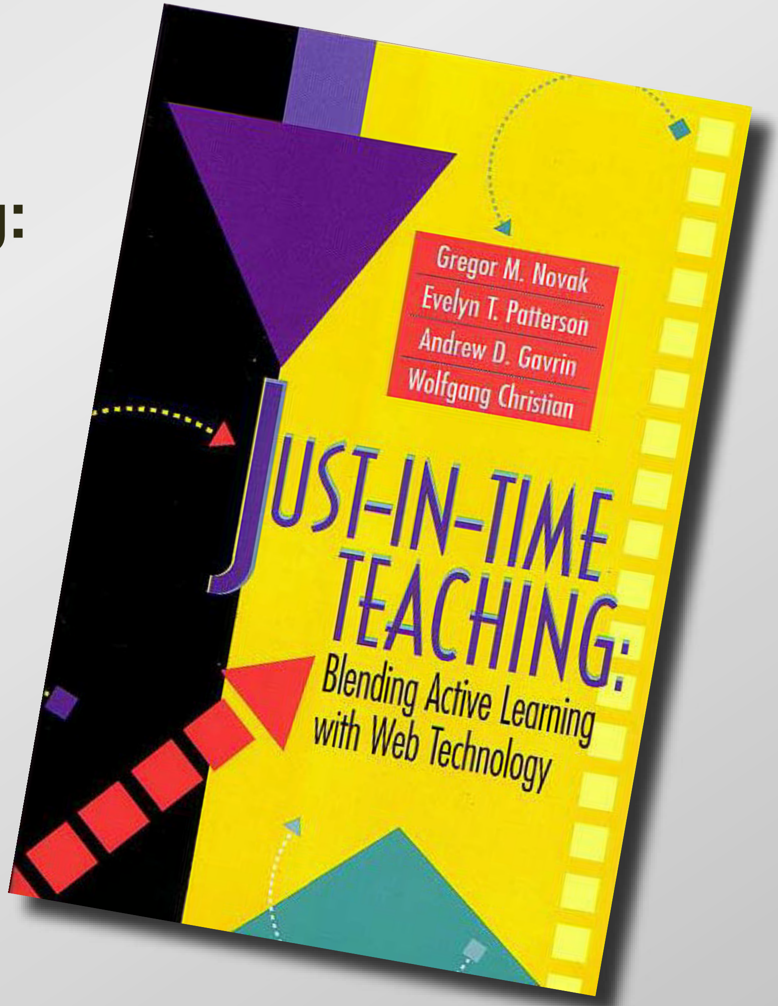
Books with ConcepTests:

- Physics (Prentice Hall)
- Chemistry (Prentice Hall)
- Astronomy (Prentice Hall)
- Calculus (Wiley)

Resources

Information on Just-in-Time-Teaching:

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

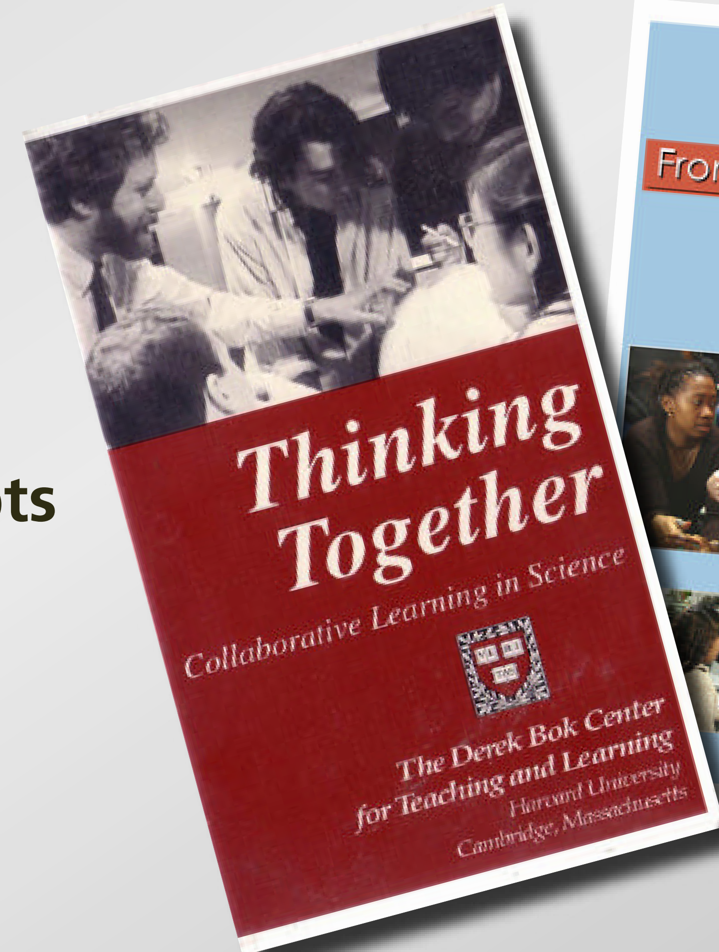


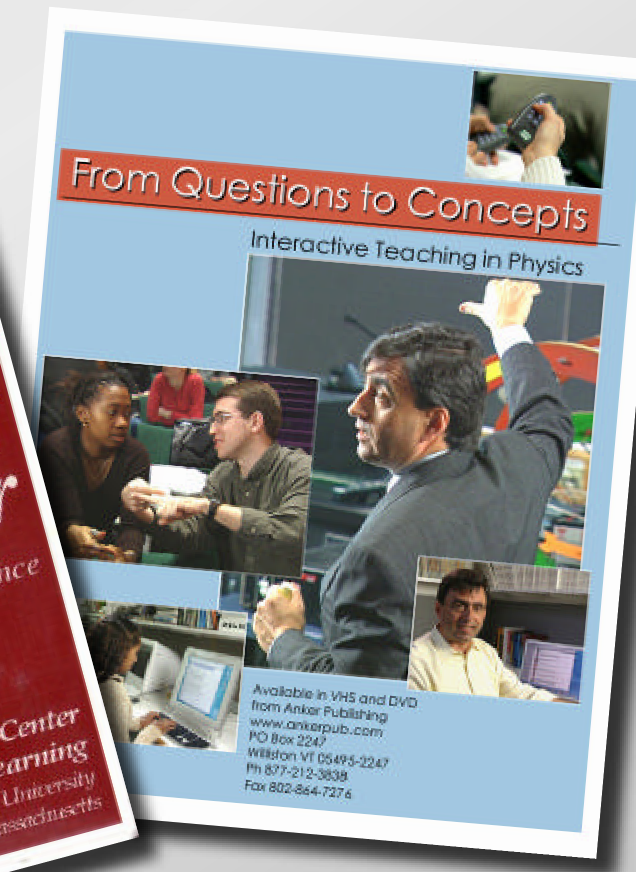
Resources

Videos:

- Thinking together
- From questions to concepts

http://www.ankerpub.com

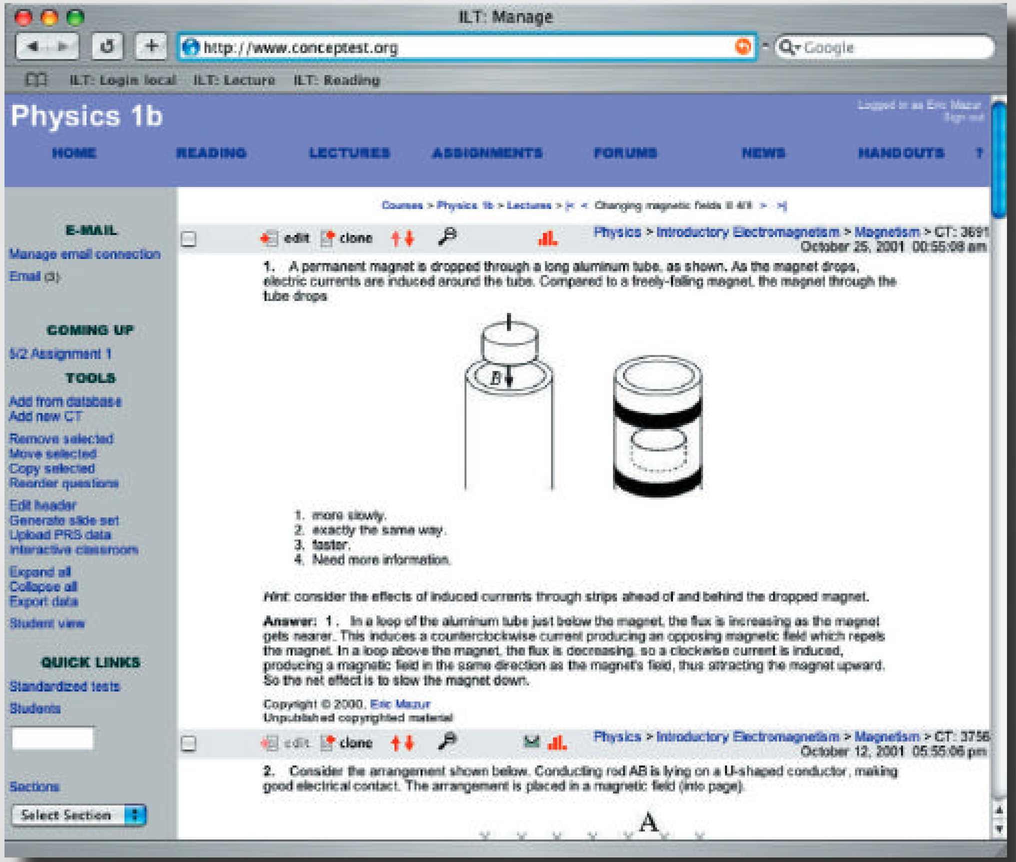




Resources

Course management:

http://deas.harvard.edu/ilt



Barriers to reform

Challenges:

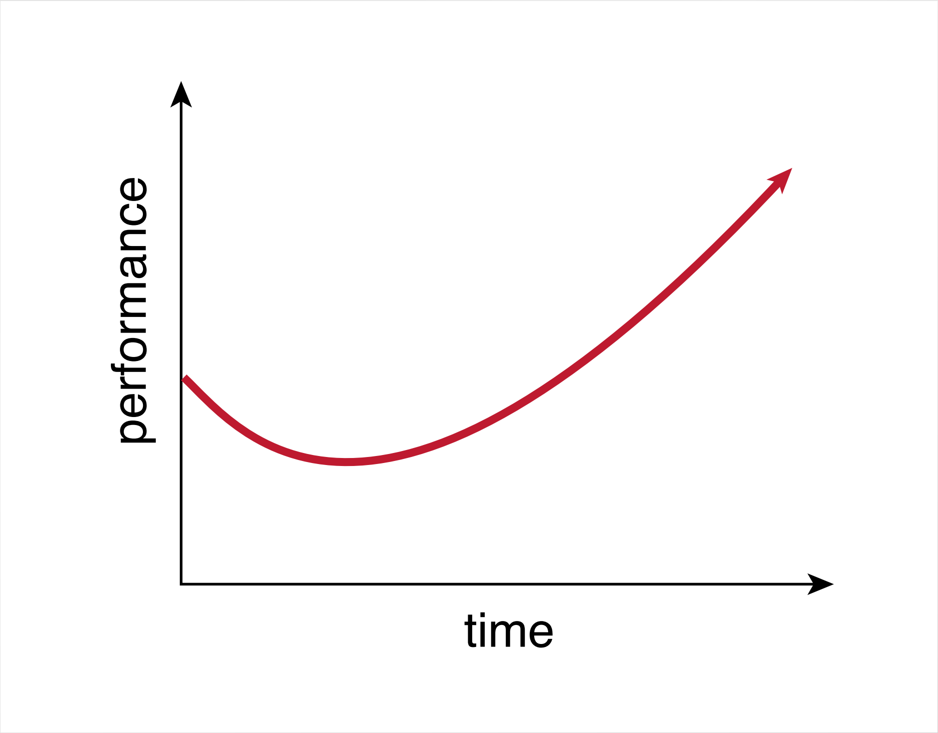
- skepticism
- growing pains
- limited circle of influence

Barriers to reform

Two things to watch out for

Barriers to reform

After changing, things might get *worse* before they get better!



Barriers to reform

Better understanding leads to *more* — not fewer — questions!

(must recognize confusion as step towards understanding)

Barriers to reform

Things to do:

- take data
- motivate students
- be prepared for initial adjustments

Barriers to reform

	"lectures"	PI
coverage	complete	partial
preclass reading	none	cover everything
confusion	little none	substantial
evaluations	known	unknown

Barriers to reform

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evaluations	known	unknown	important
learning	little	better	not measured
retention	little	better	not part of grade

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National Science Foundation

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