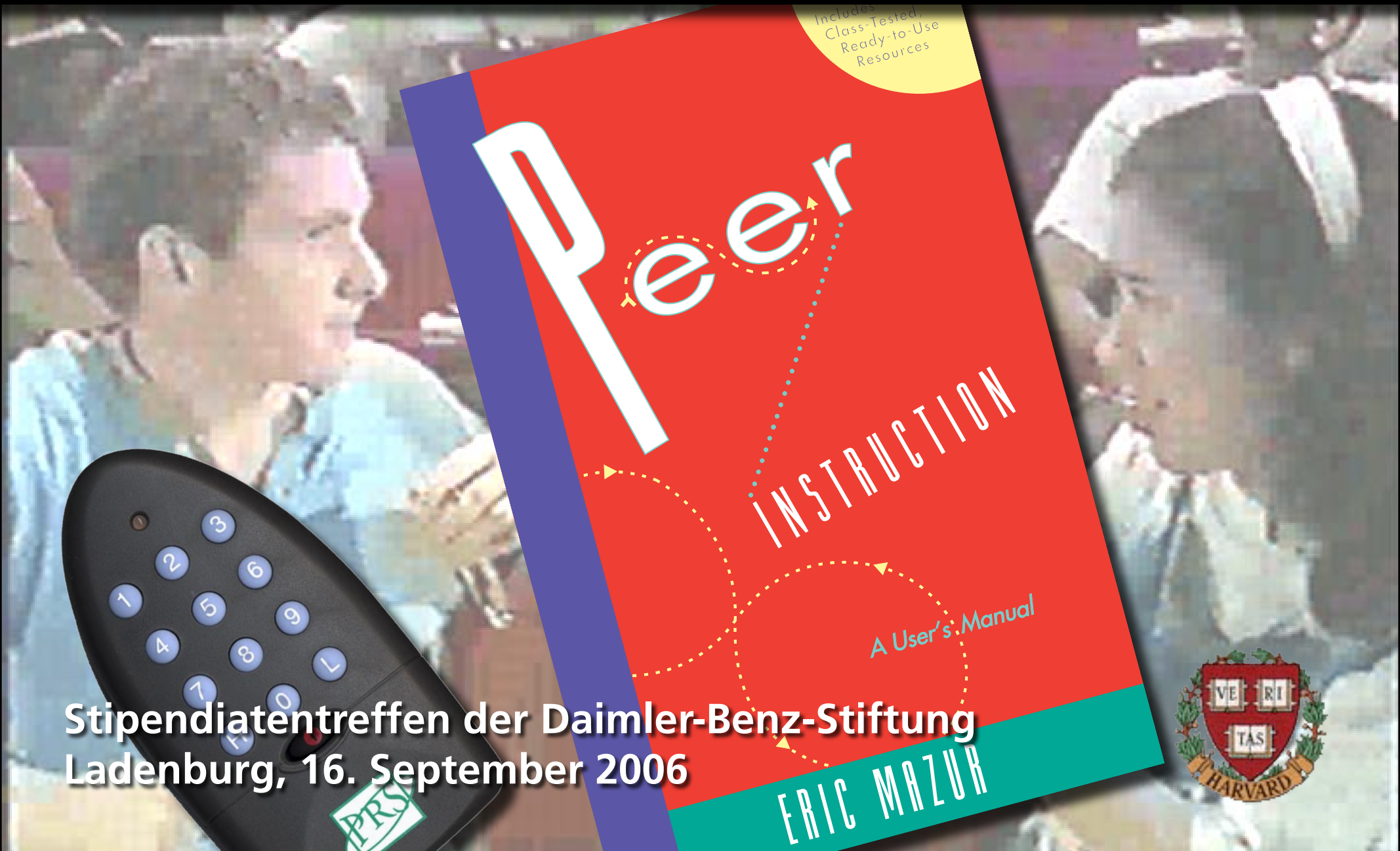
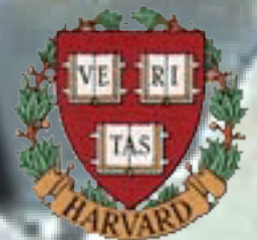


Interactive teaching: Turning a large lecture into a seminar

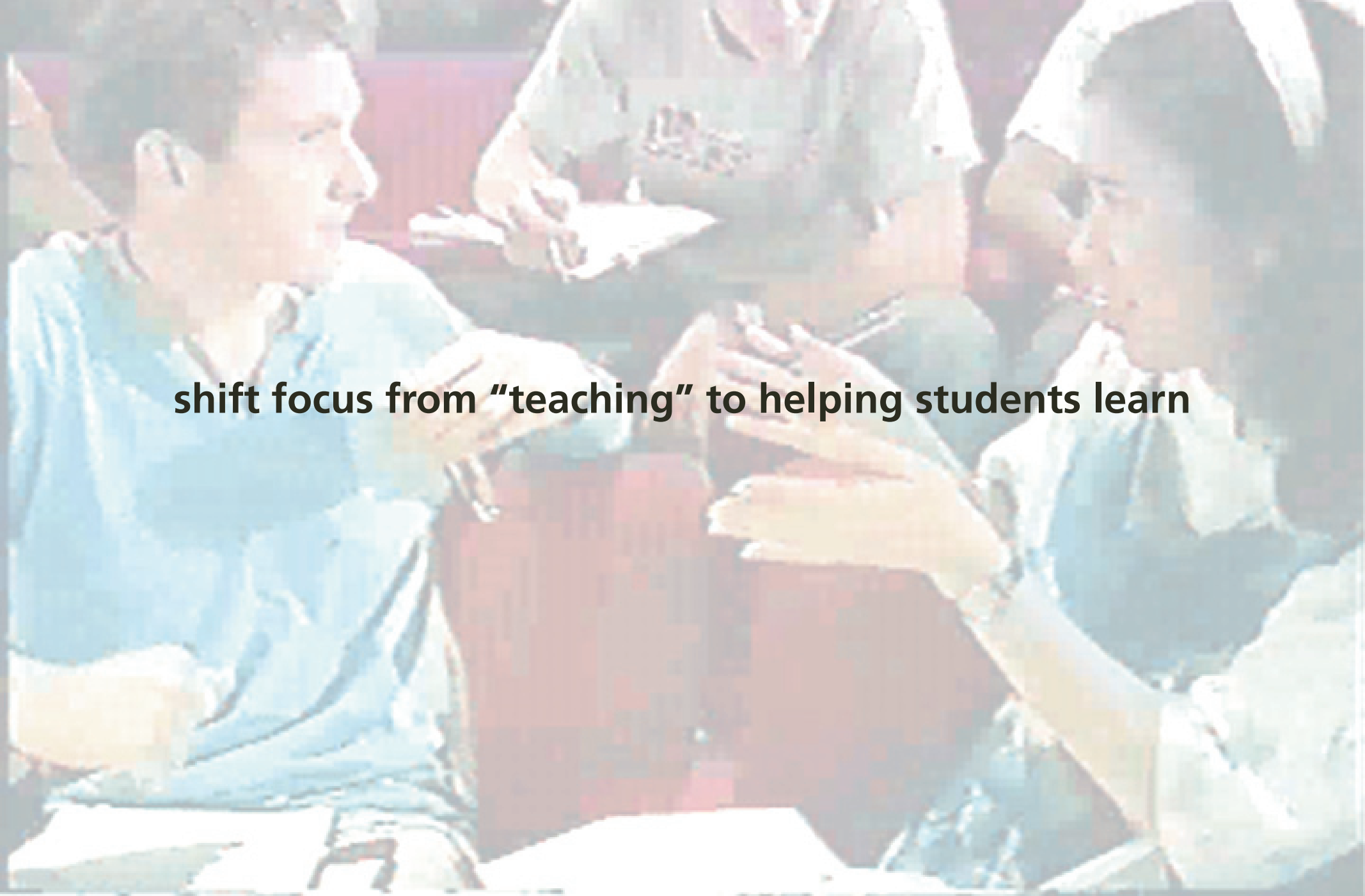


Stipendiatentreffen der Daimler-Benz-Stiftung
Ladenburg, 16. September 2006



My message

shift focus from “teaching” to helping students learn



Outline

- Education



Outline

- Education
- Peer Instruction



Outline

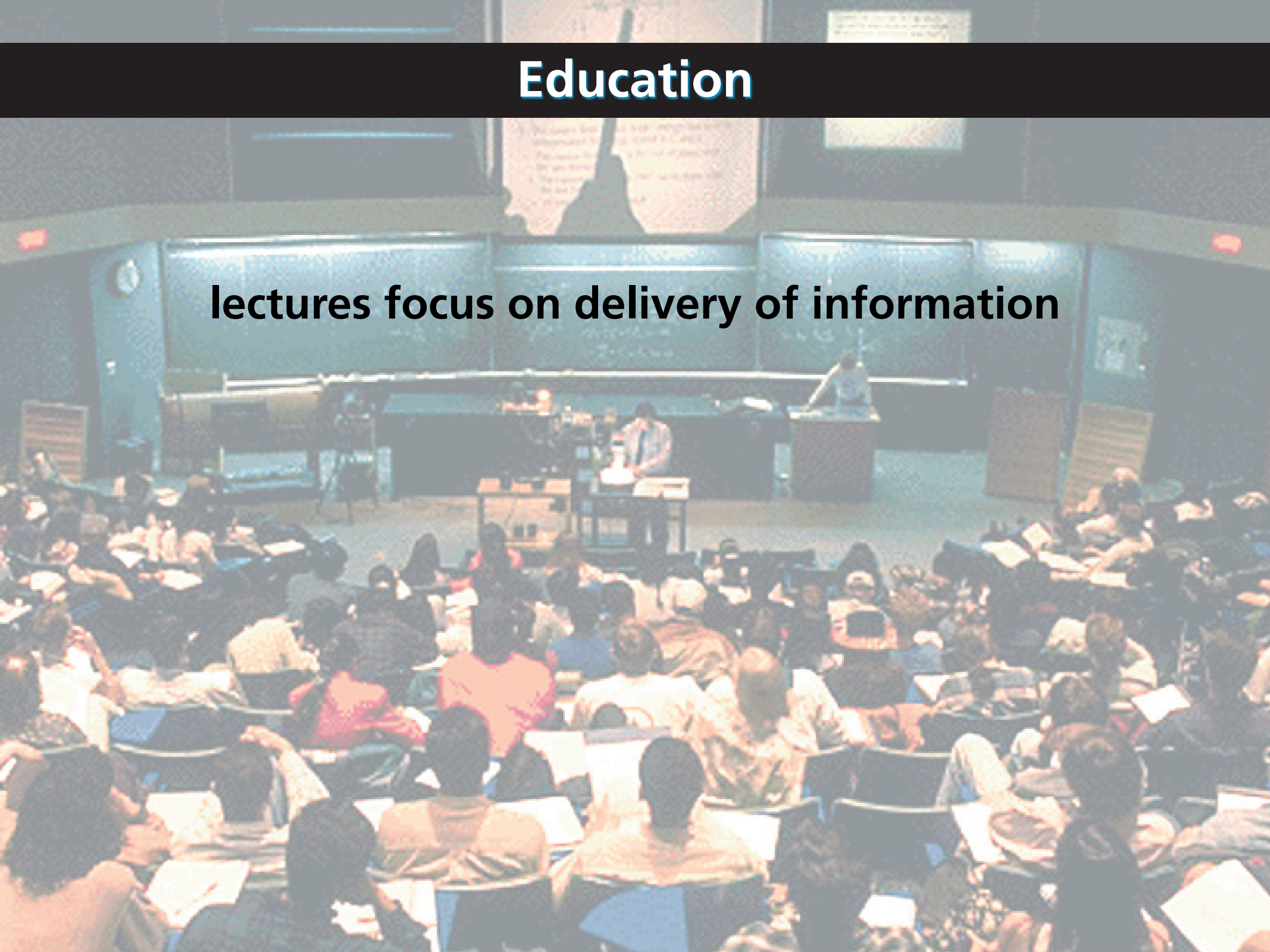
- Education
- Peer Instruction
- Results

Education



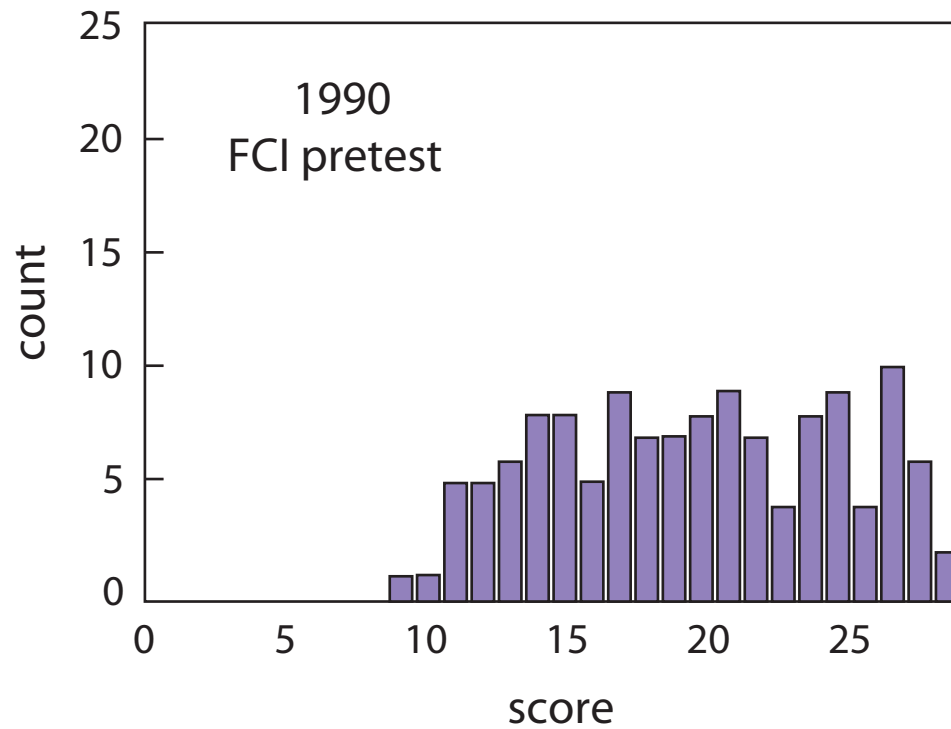
Education

lectures focus on delivery of information



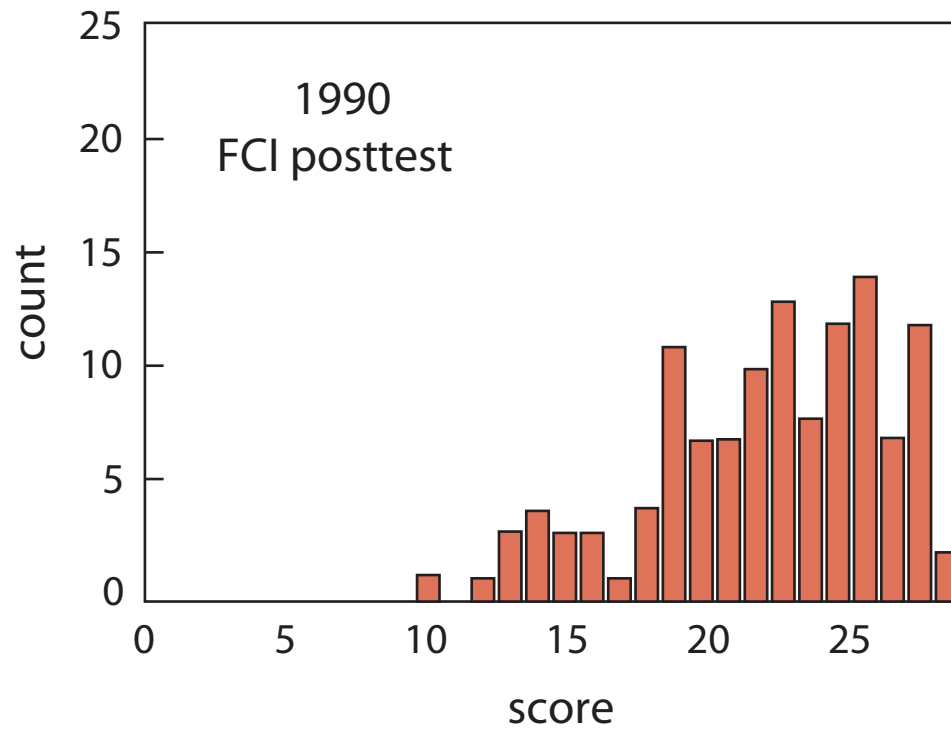
Education

education is not just information transfer



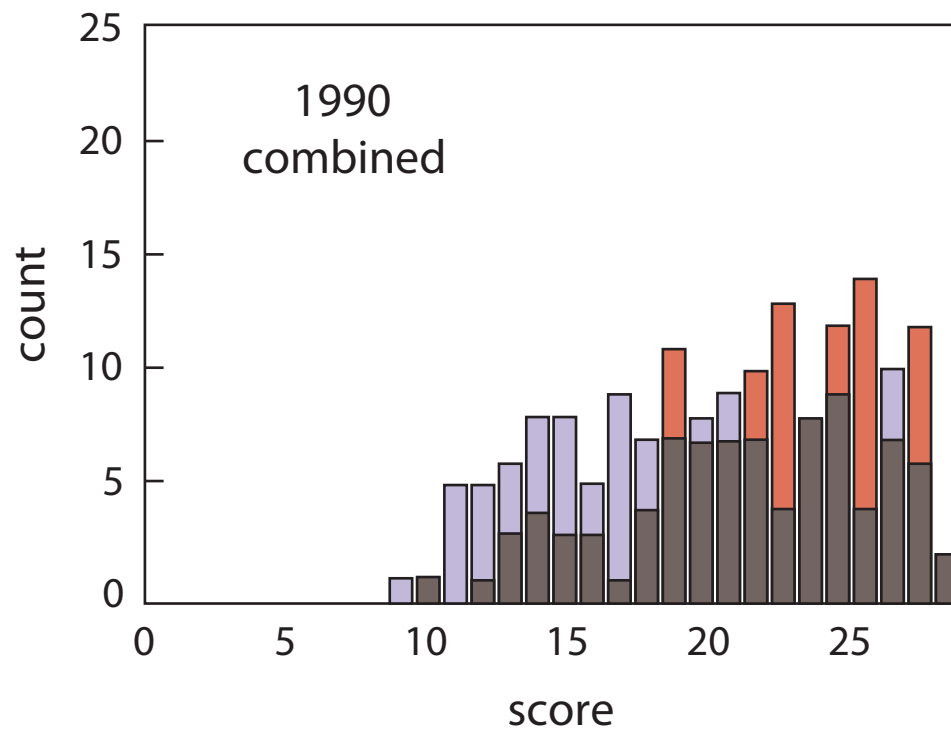
Education

education is not just information transfer

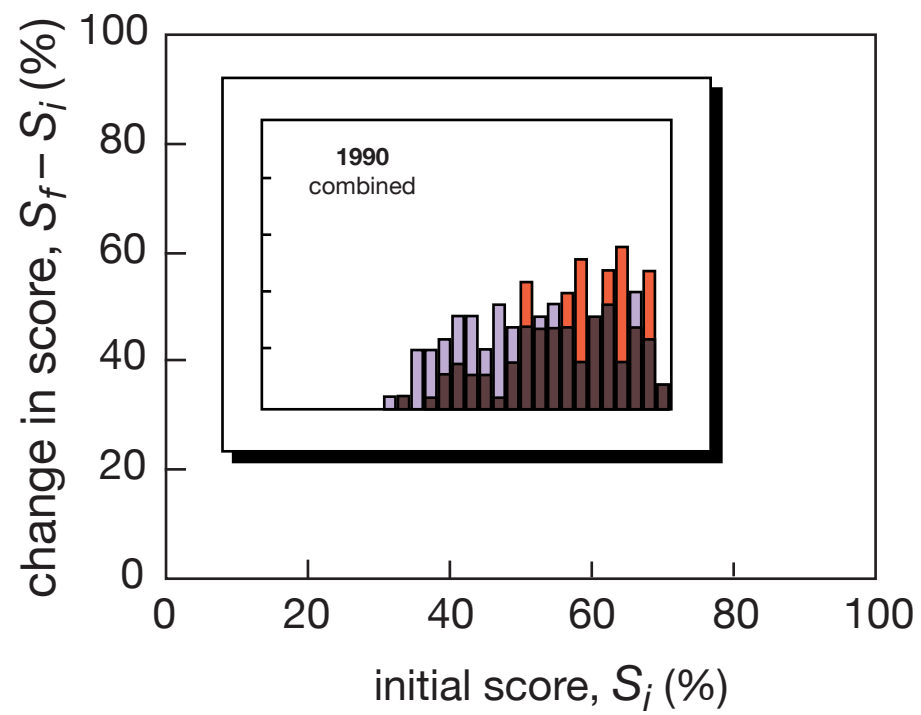


Education

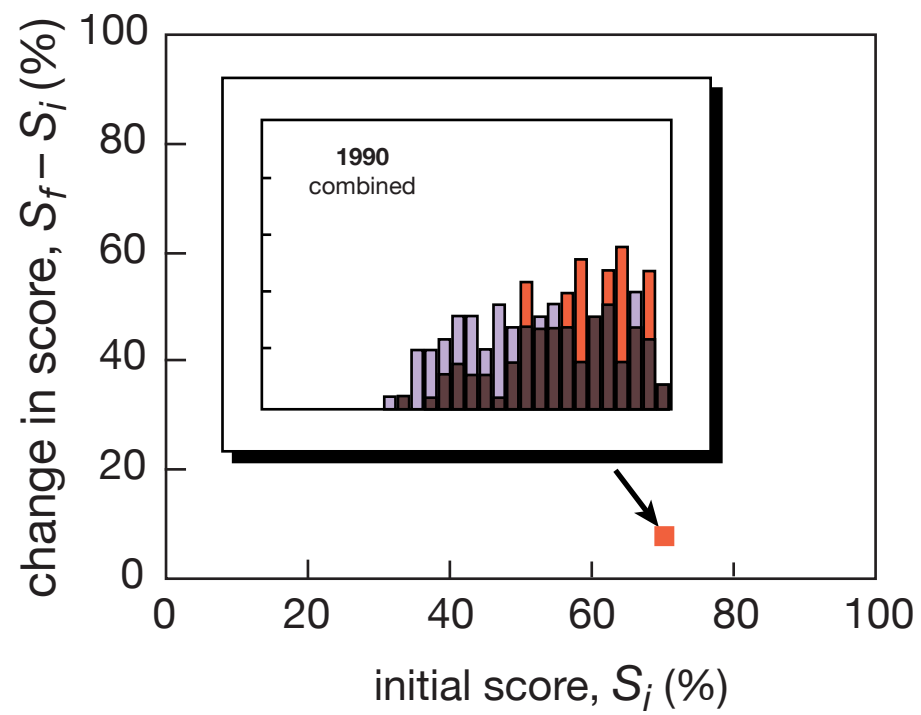
education is not just information transfer



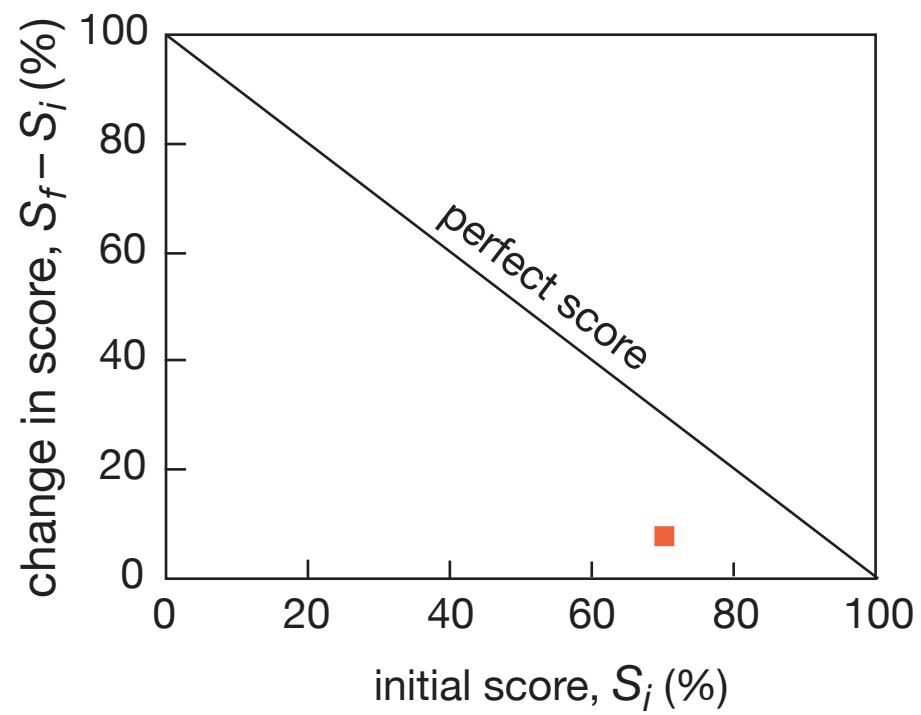
Education



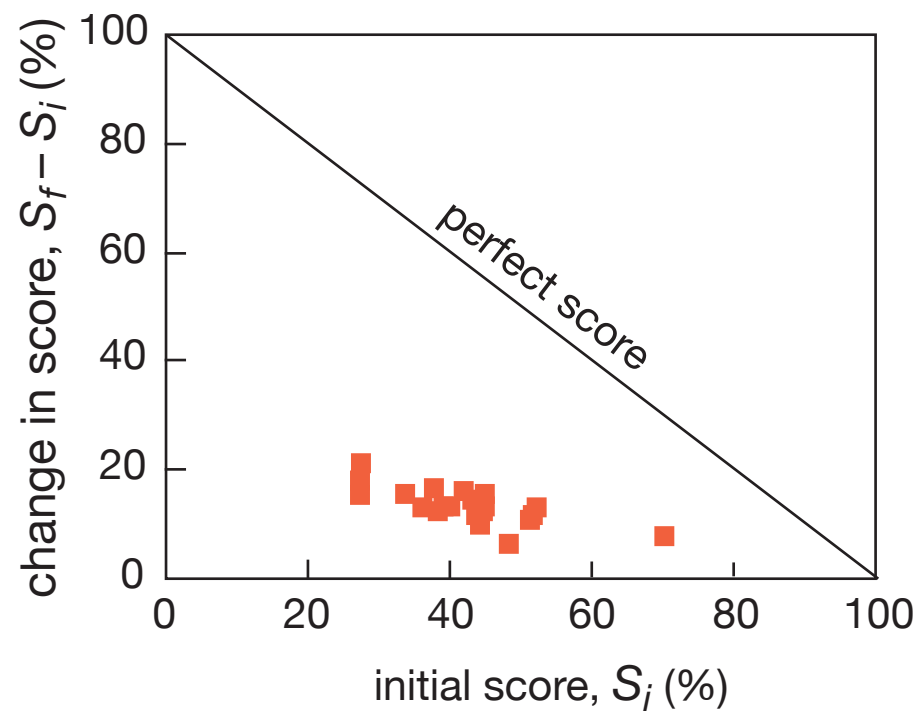
Education



Education

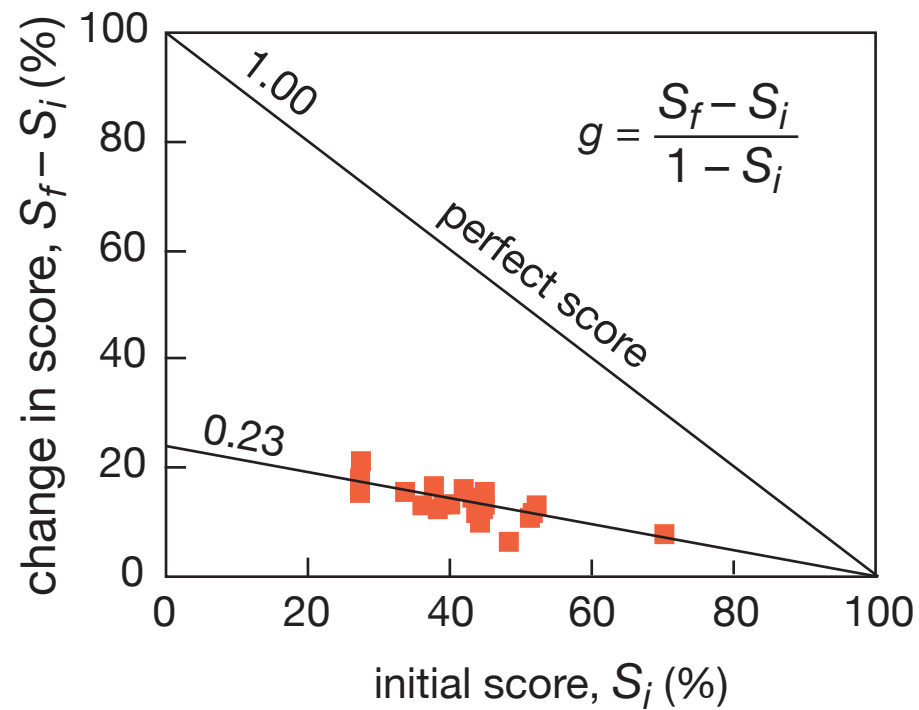


Education



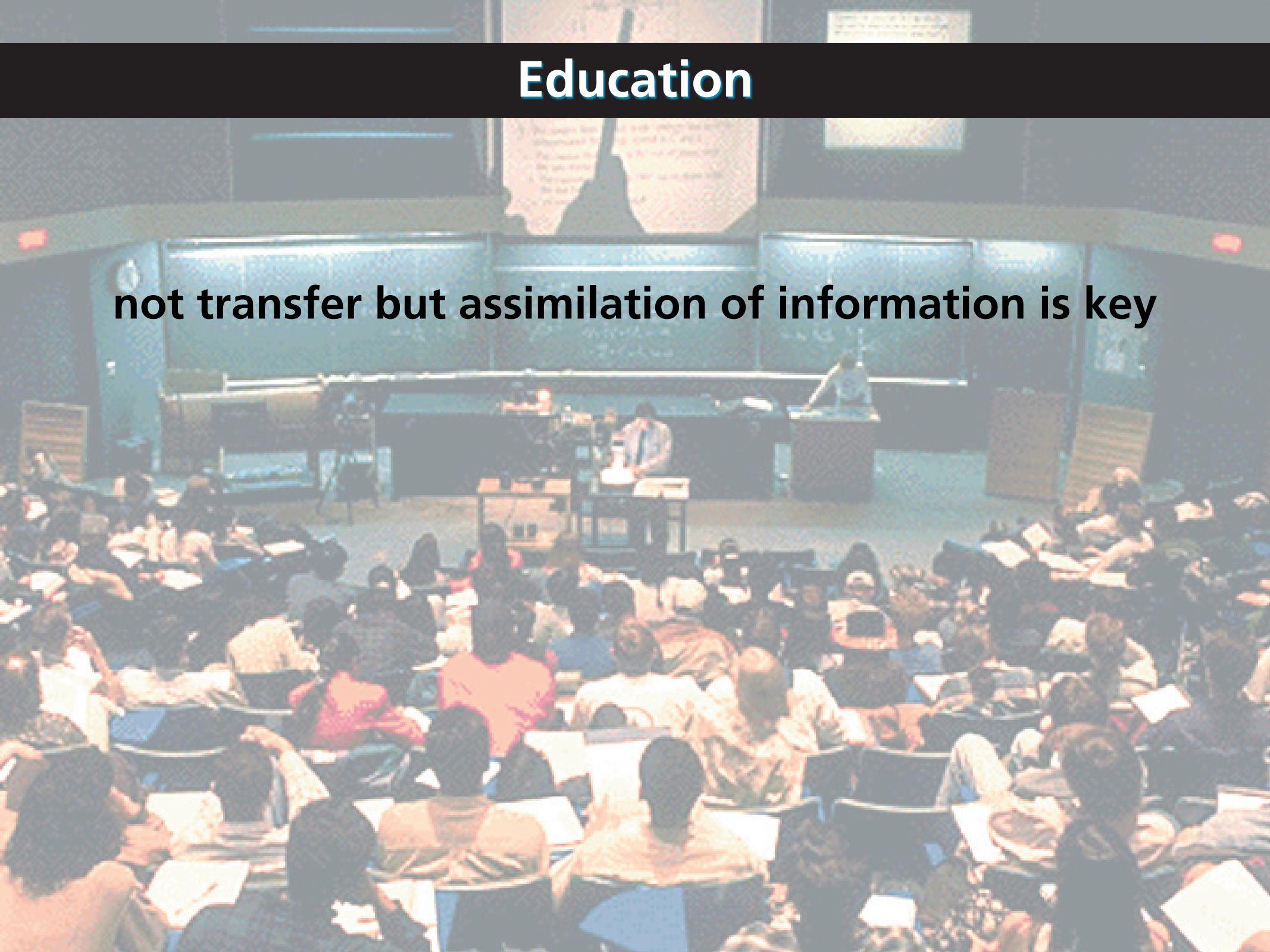
Education

only one quarter of maximum gain realized



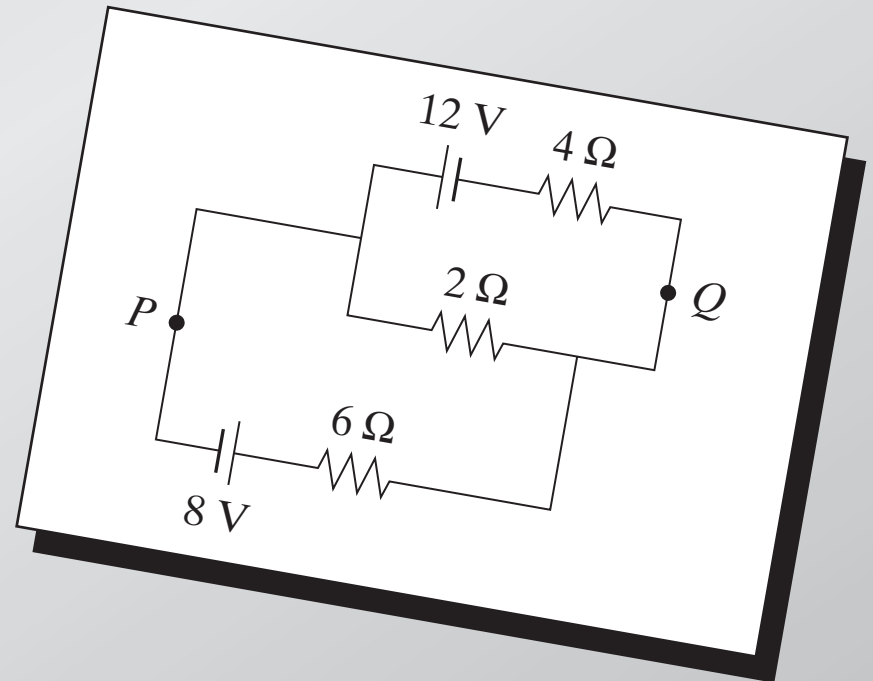
Education

not transfer but assimilation of information is key



Education

conventional problems misleading



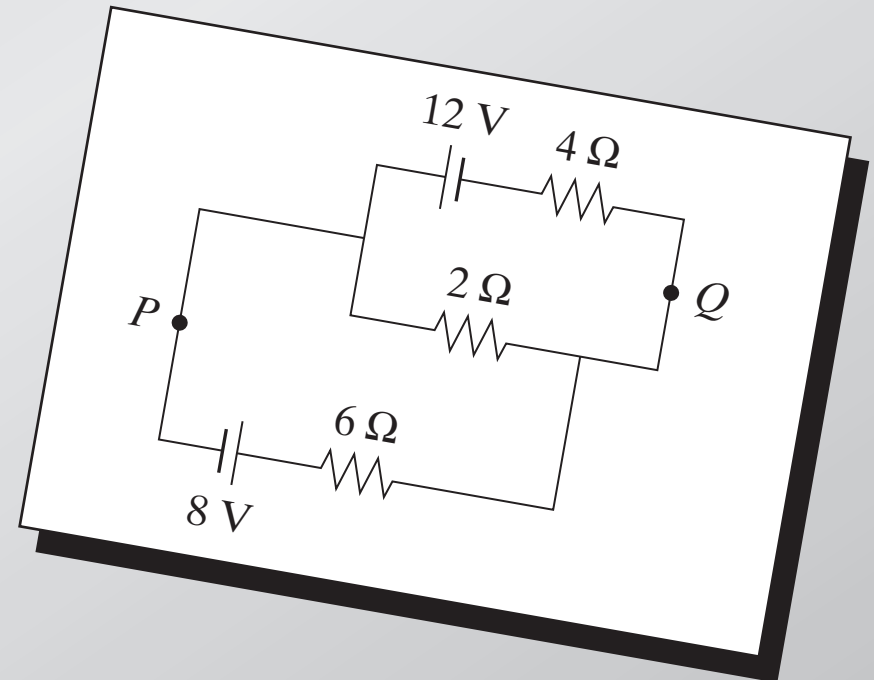
Education

conventional problems misleading

Calculate:

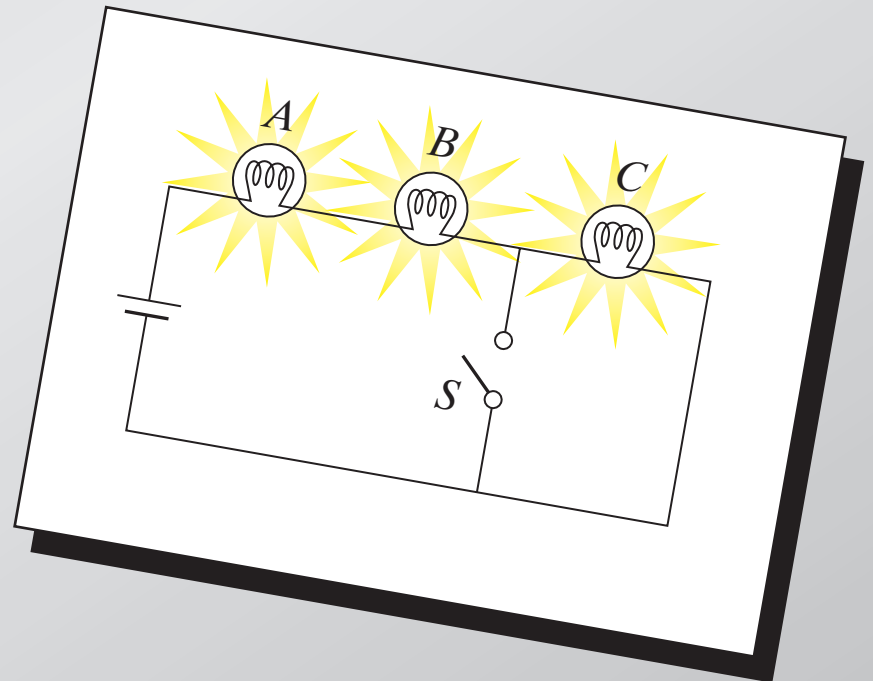
(a) current in 2- Ω resistor

(b) potential difference
between P and Q



Education

are the basic principles understood?

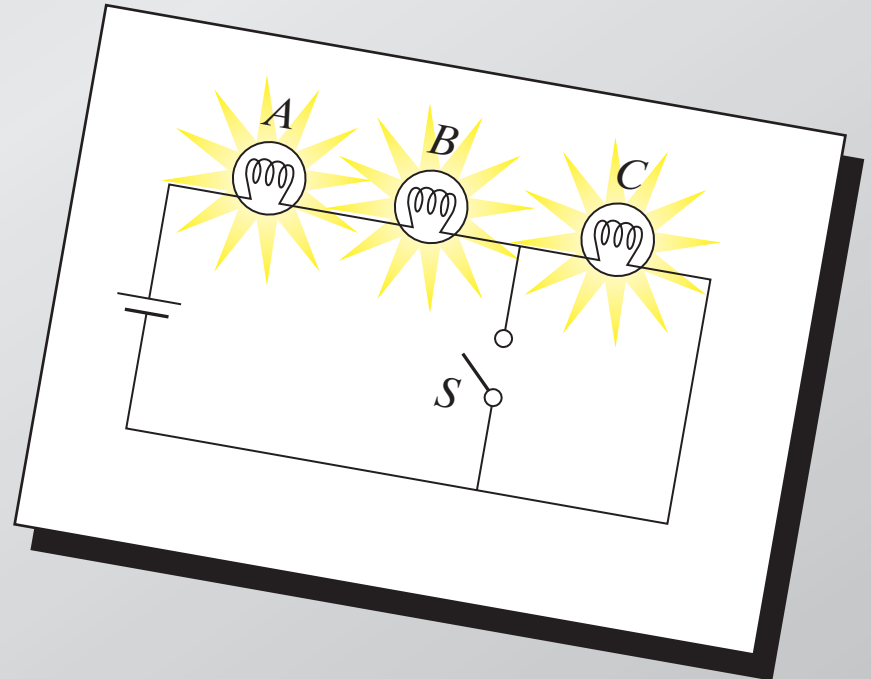


Education

are the basic principles understood?

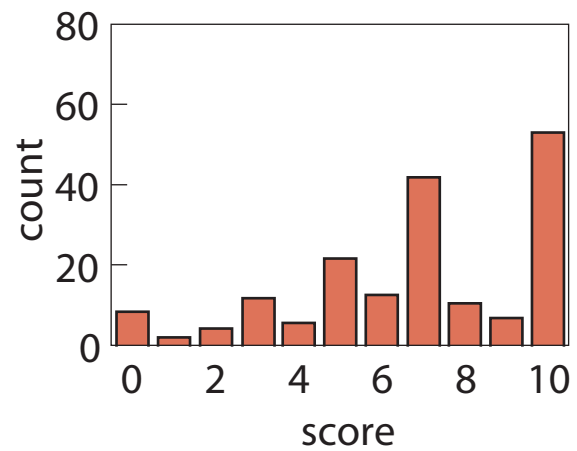
When S is closed, what happens to:

- (a) intensities of A and B ?
- (b) intensity of C ?
- (c) current through battery?
- (d) potential difference across
 A , B , and C ?
- (e) the total power dissipated?

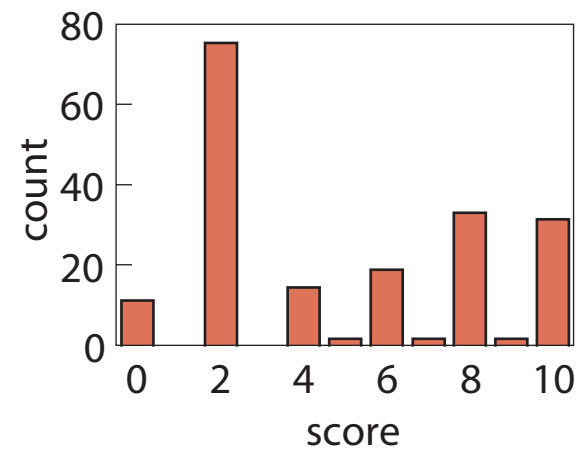


Education

conventional

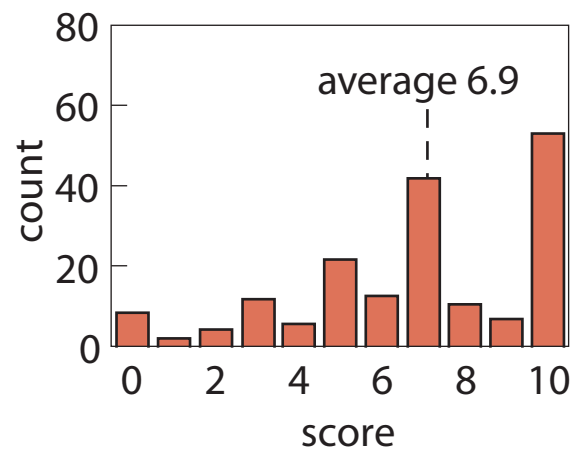


conceptual

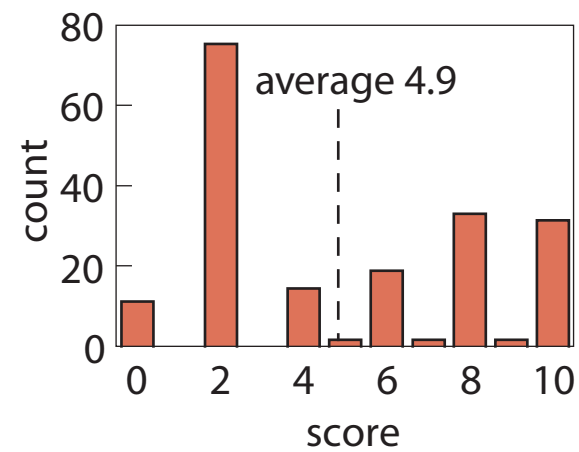


Education

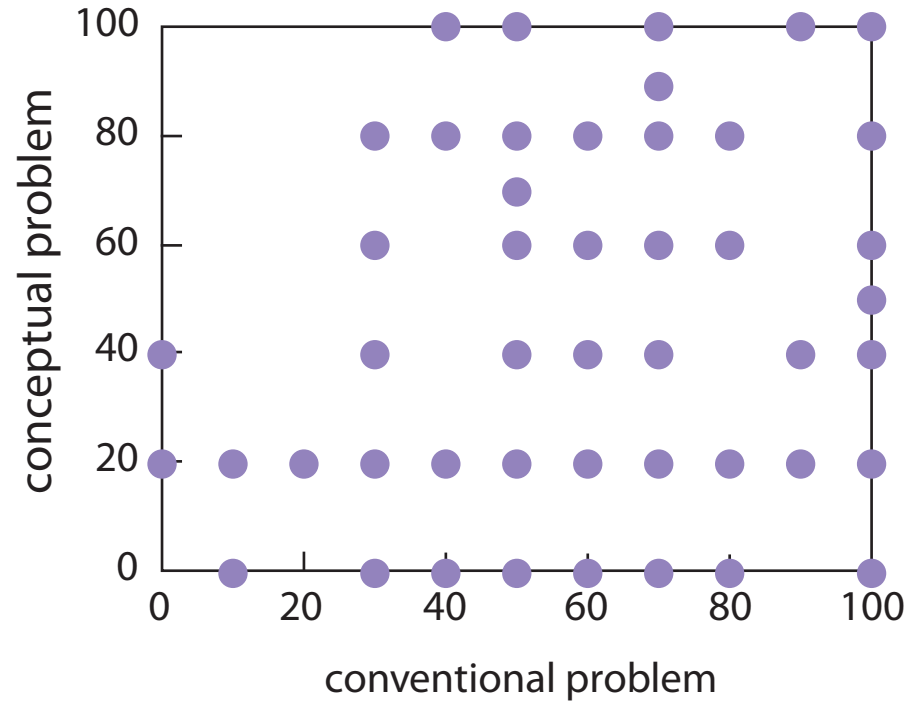
conventional



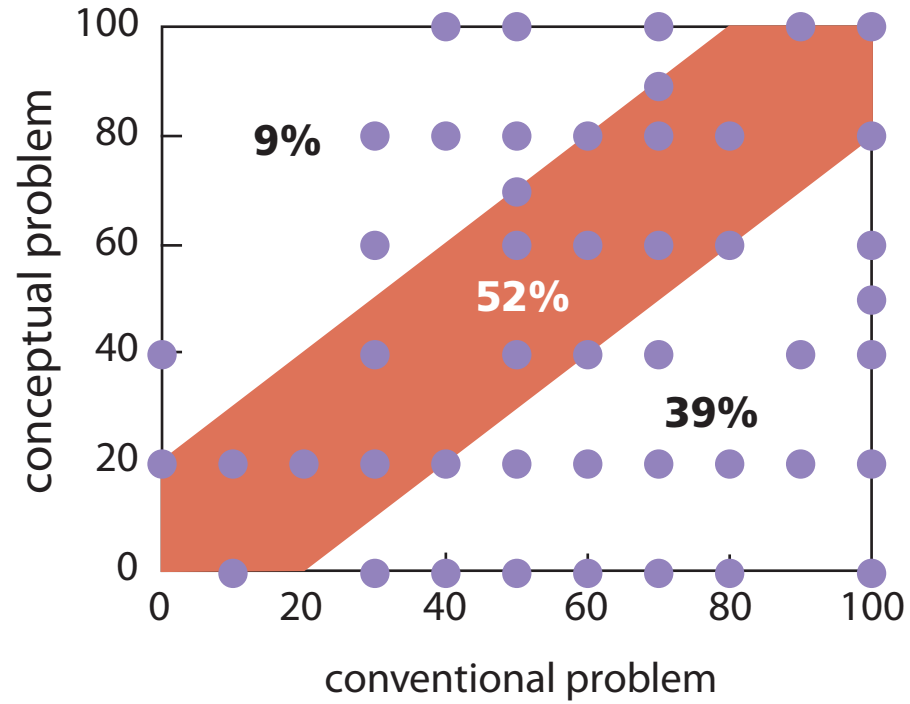
conceptual



Education



Education





The image shows a large lecture hall from the perspective of the back of the room. Students are seated at long desks, facing a stage. On the stage, a lecturer is standing near a podium. Behind the lecturer is a large screen displaying a presentation slide. The slide has a title and a list of bullet points. The room is dimly lit, with the stage area being brighter. The text "So what should we do?" is overlaid on the image in a large, white, sans-serif font.

So what should we do?

Peer Instruction

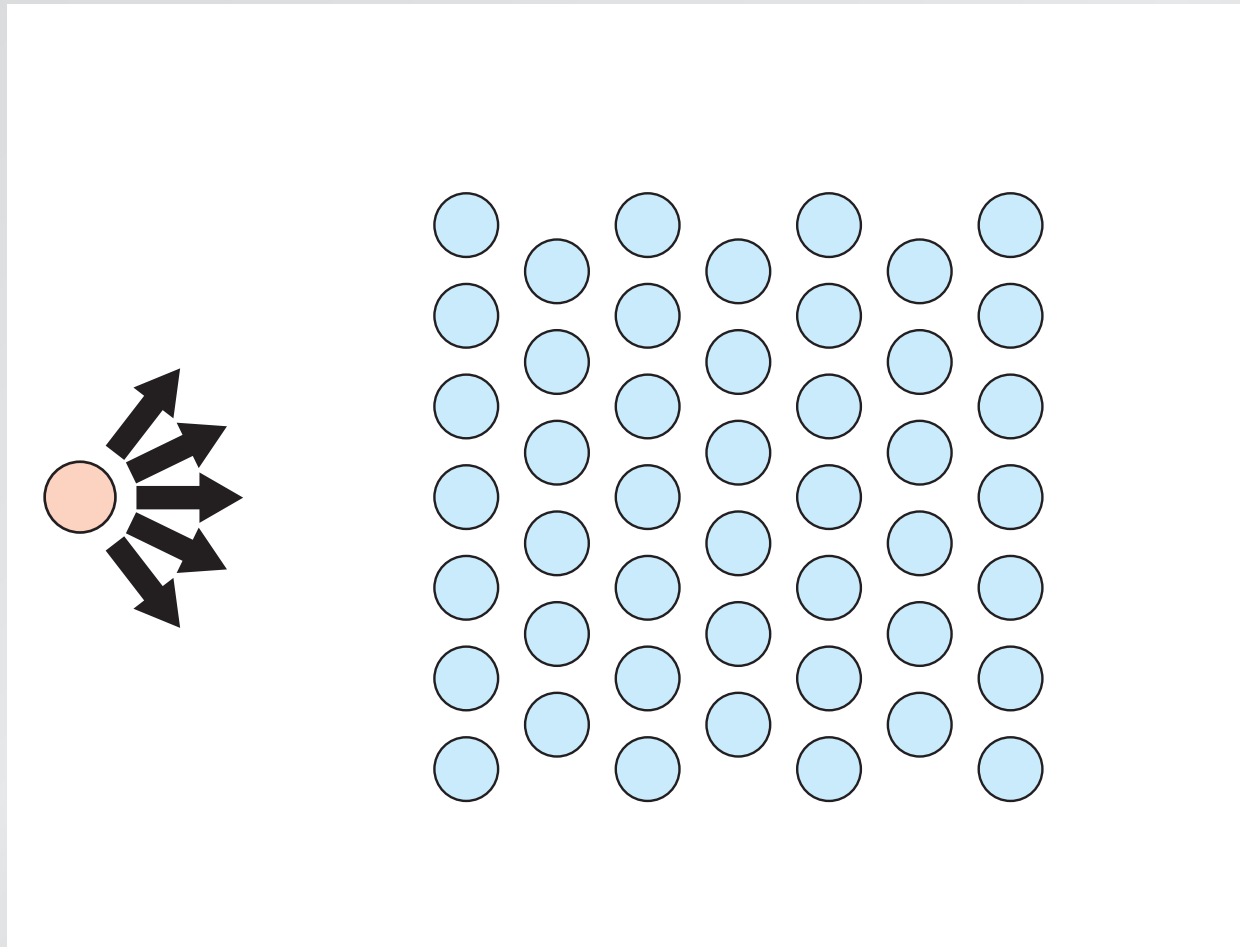
Give students more responsibility for gathering information...

Peer Instruction

**Give students more responsibility for gathering information...
so we can better help them assimilate it.**

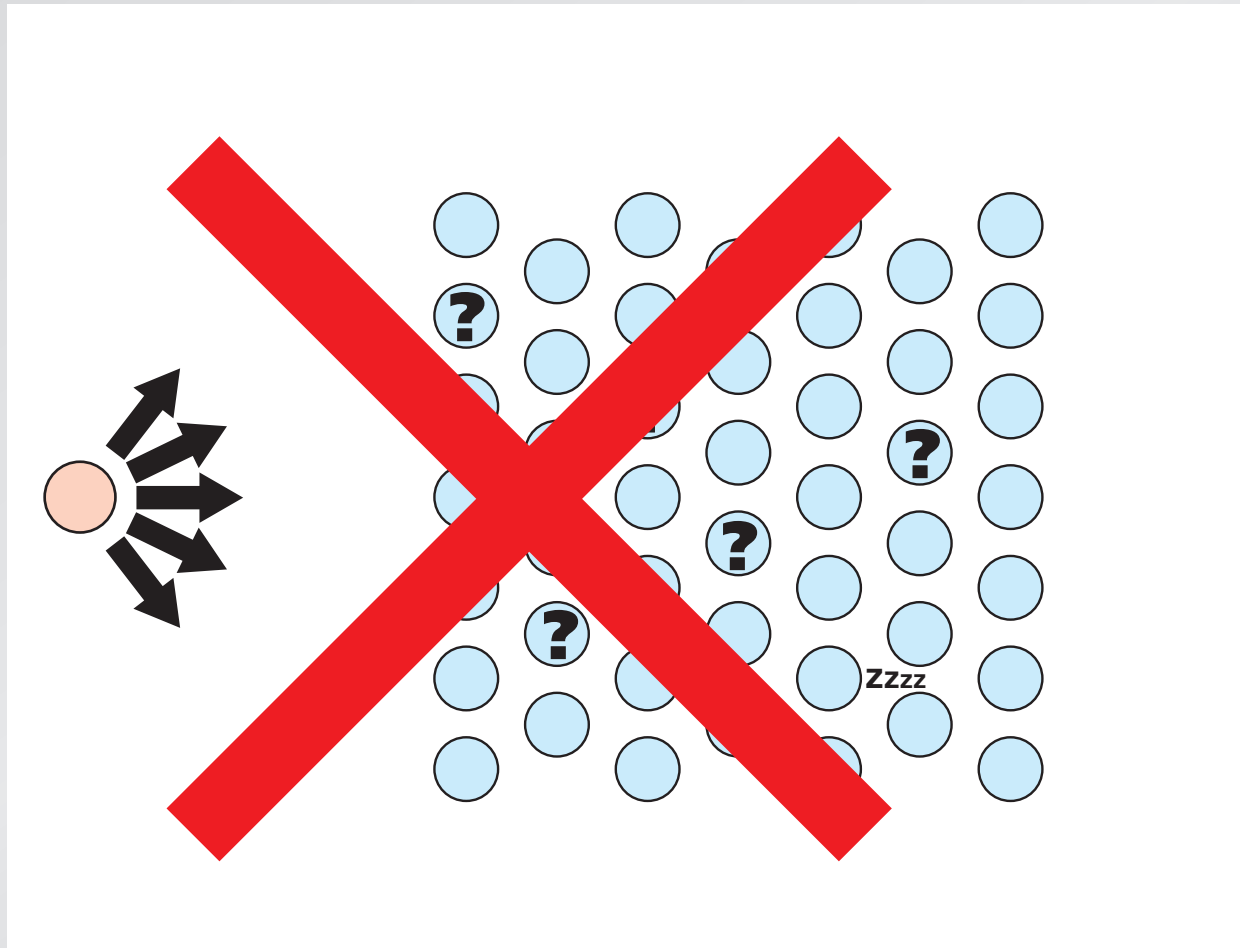
Peer Instruction

1. Recognize the inefficacy of the lecture method



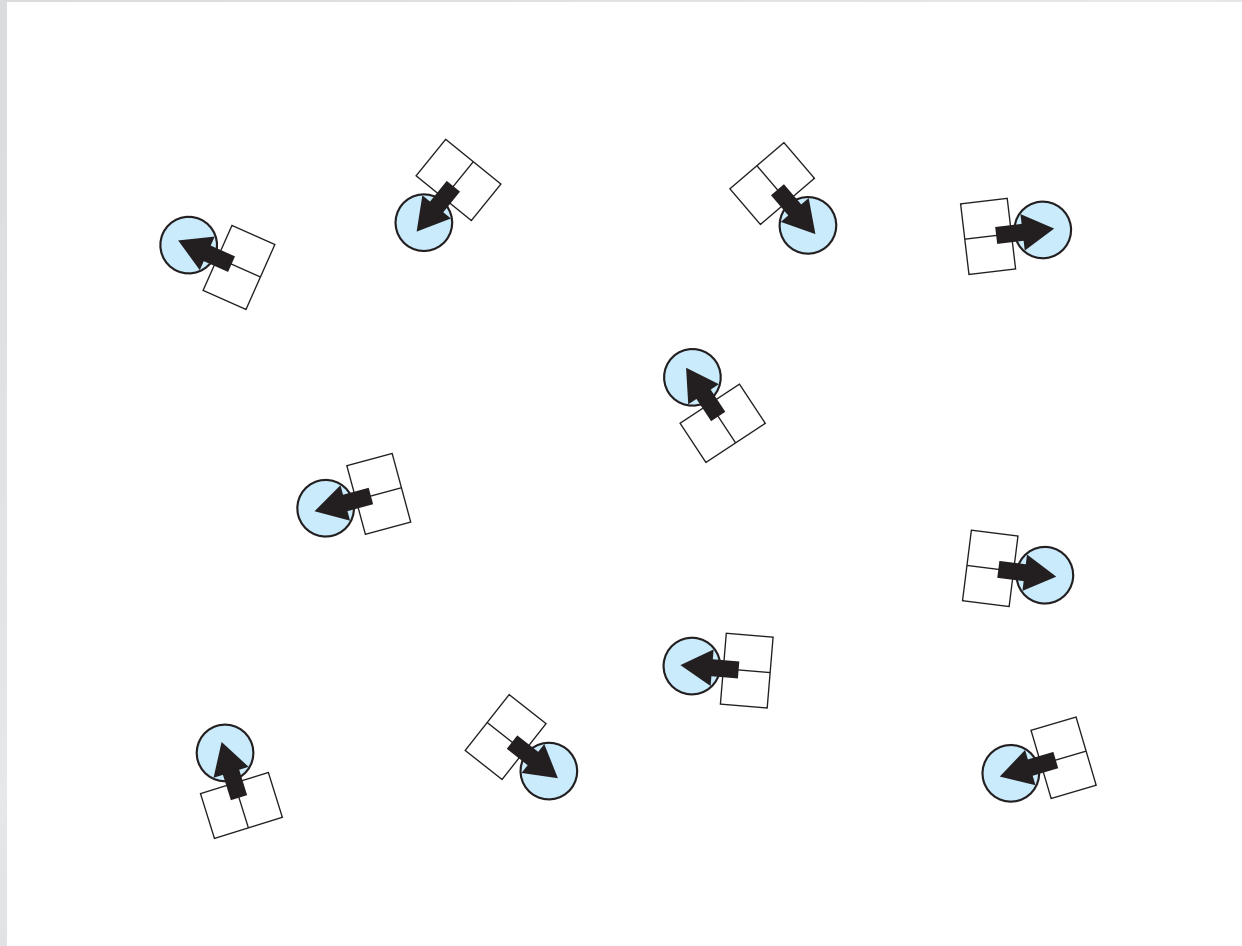
Peer Instruction

1. Recognize the inefficacy of the lecture method



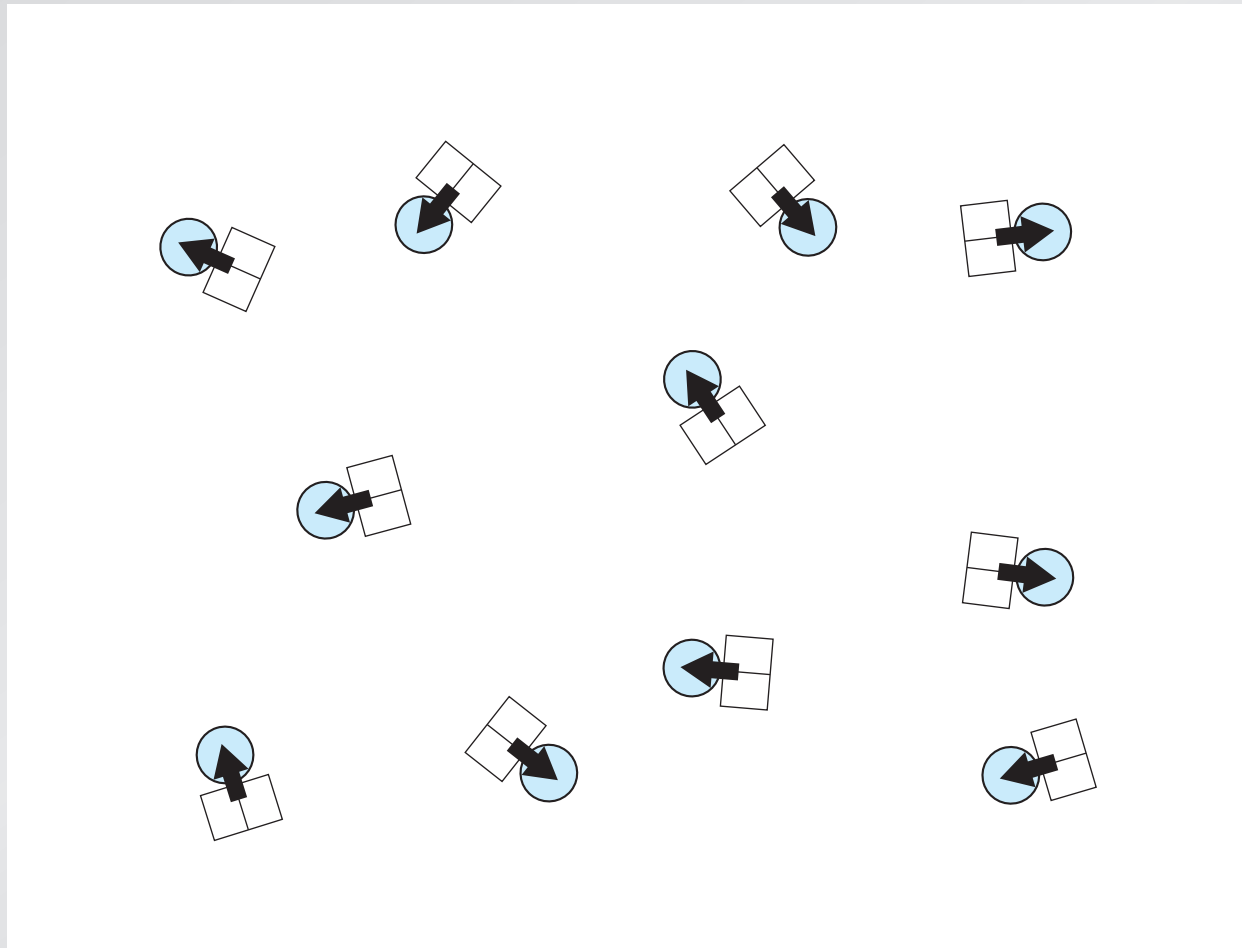
Peer Instruction

2. Move first exposure to material out of classroom



Peer Instruction

2. Move first exposure to material out of classroom



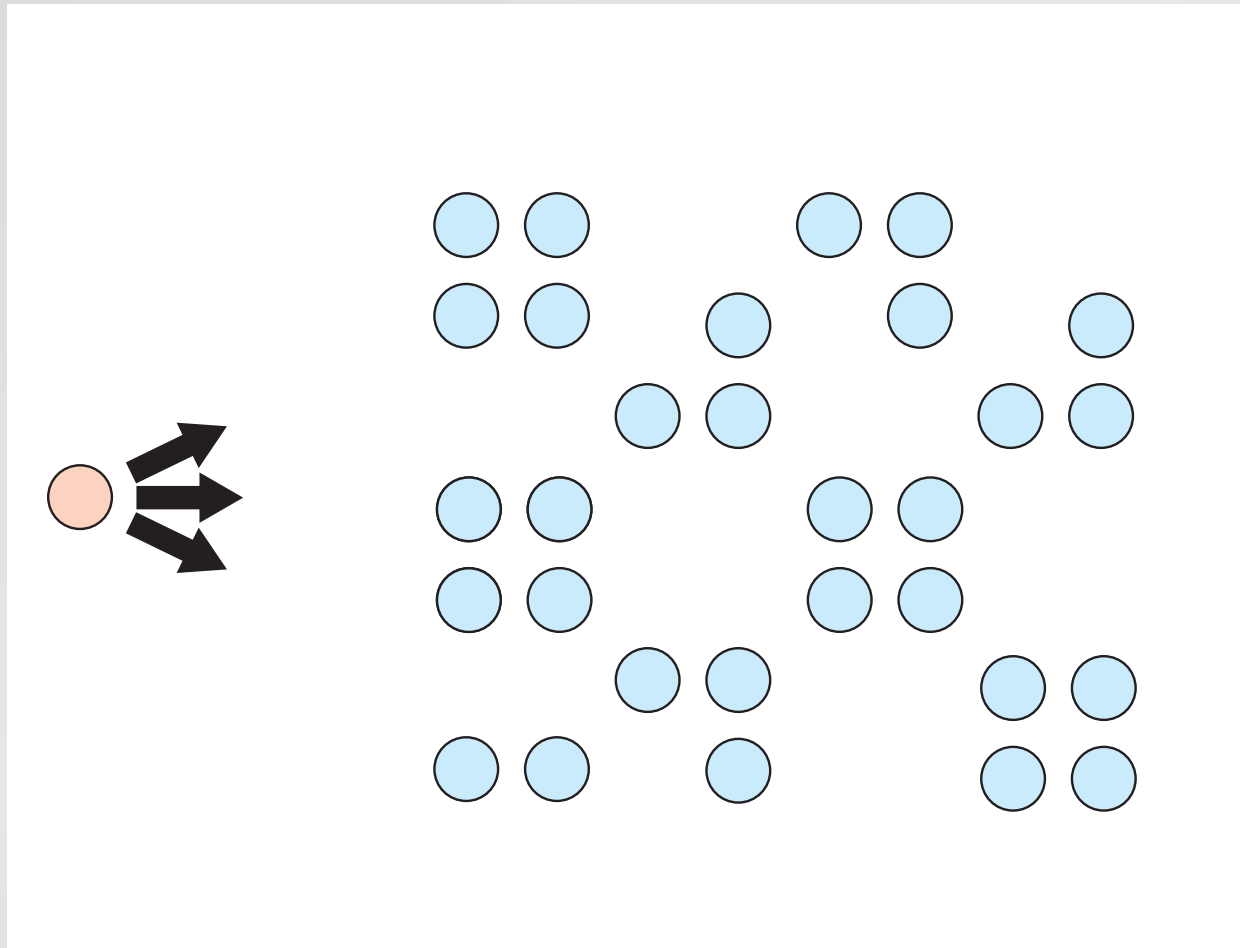
...assign reading!

Peer Instruction

3. Use class period to deepen and broaden understanding

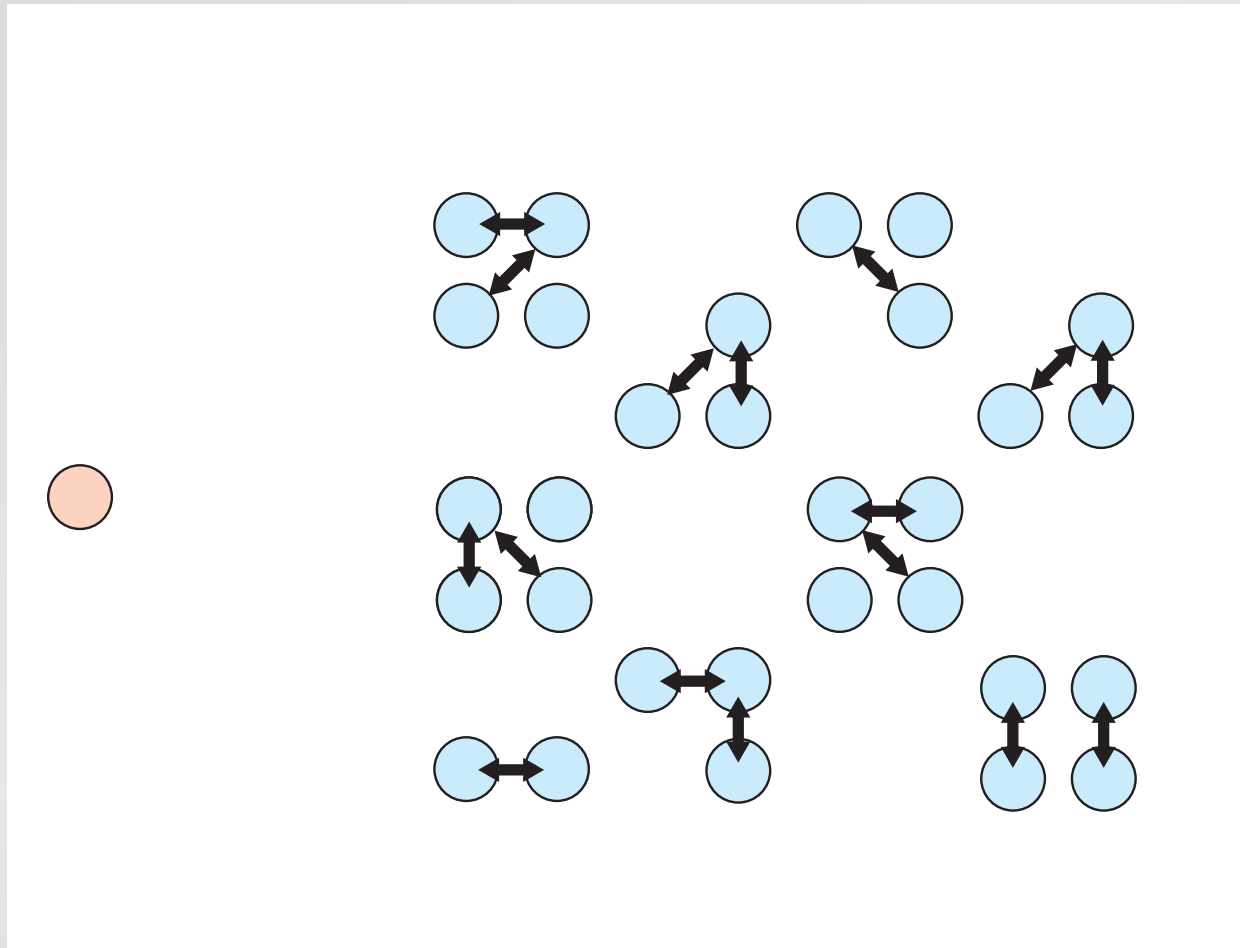
Peer Instruction

...by painting the big picture...



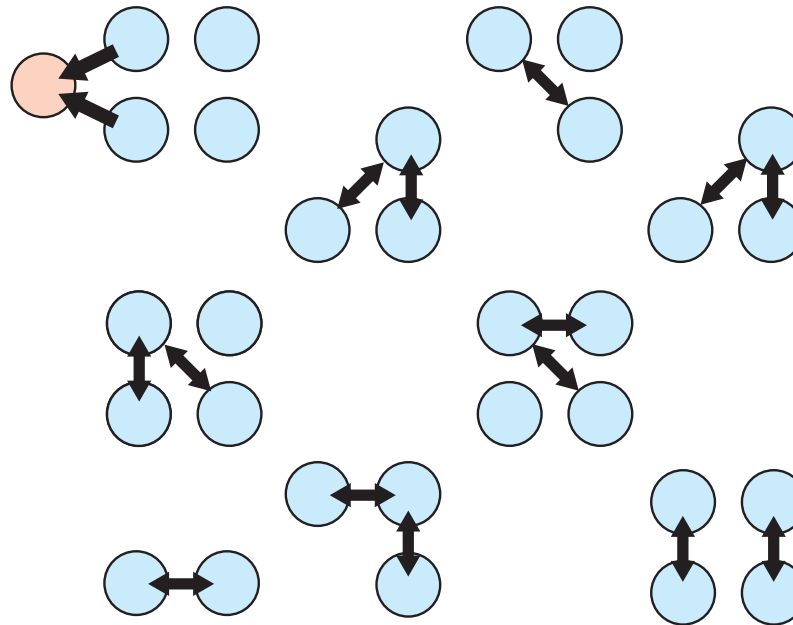
Peer Instruction

...and giving your students time to think and discuss



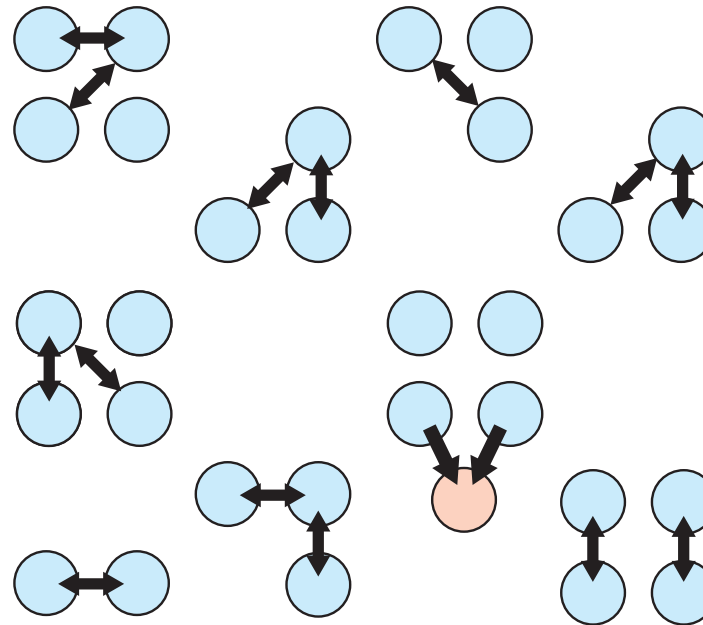
Peer Instruction

Better yet: Learn from your students...



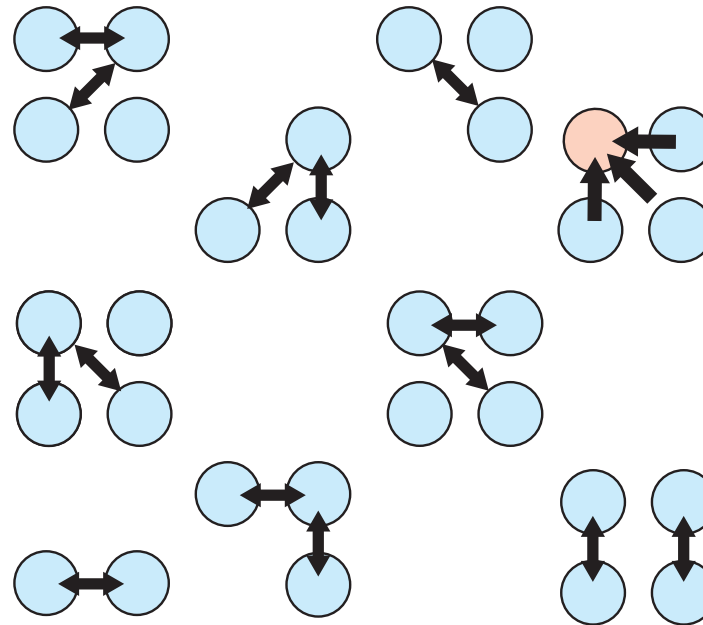
Peer Instruction

Better yet: Learn from your students...



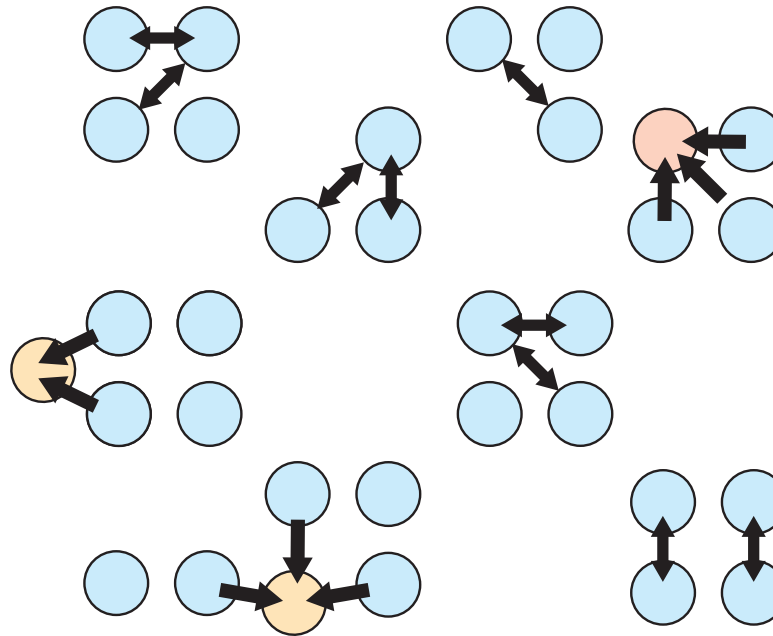
Peer Instruction

Better yet: Learn from your students...



Peer Instruction

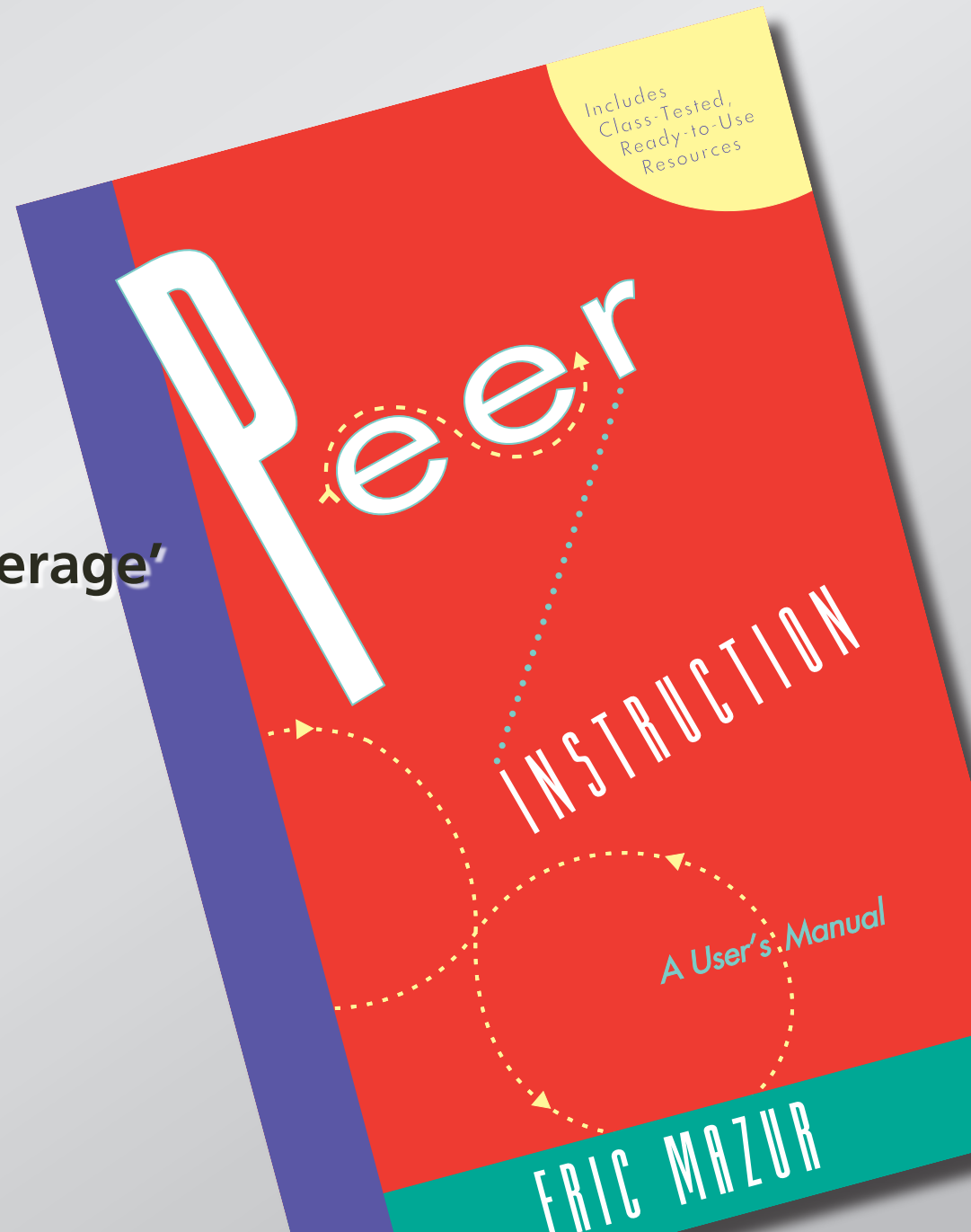
...bring in your Teaching Assistants too!



Peer Instruction

Main features:

- pre-class reading
- in-class: depth, not 'coverage'
- ConcepTests



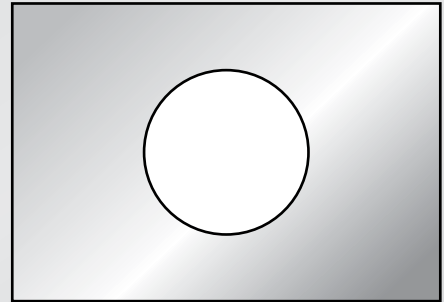
Peer Instruction

ConcepTest:

- 1. Question**
- 2. Thinking**
- 3. Individual answer**
- 4. Peer discussion**
- 5. Revised/Group answer**
- 6. Explanation**

Let's try it!

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

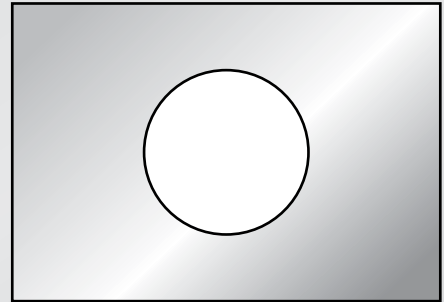


Let's try it!

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

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

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

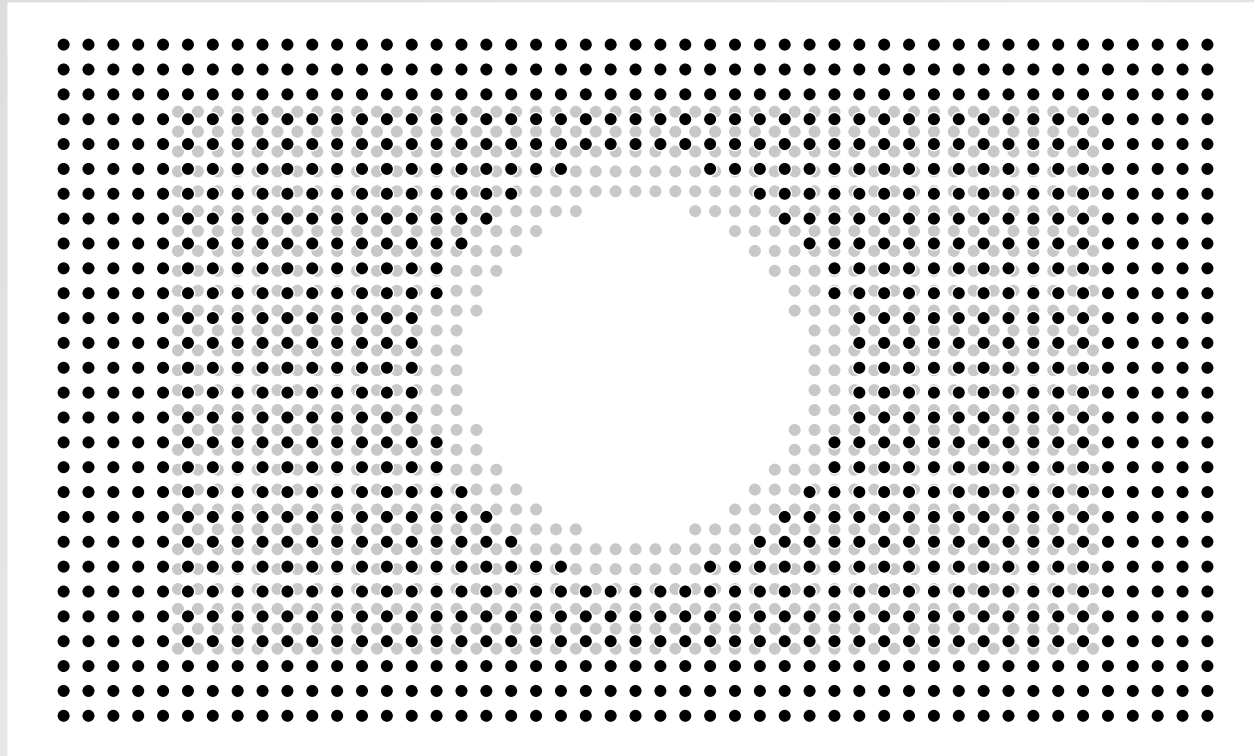


Let's try it!

It's easy to fire up the audience!

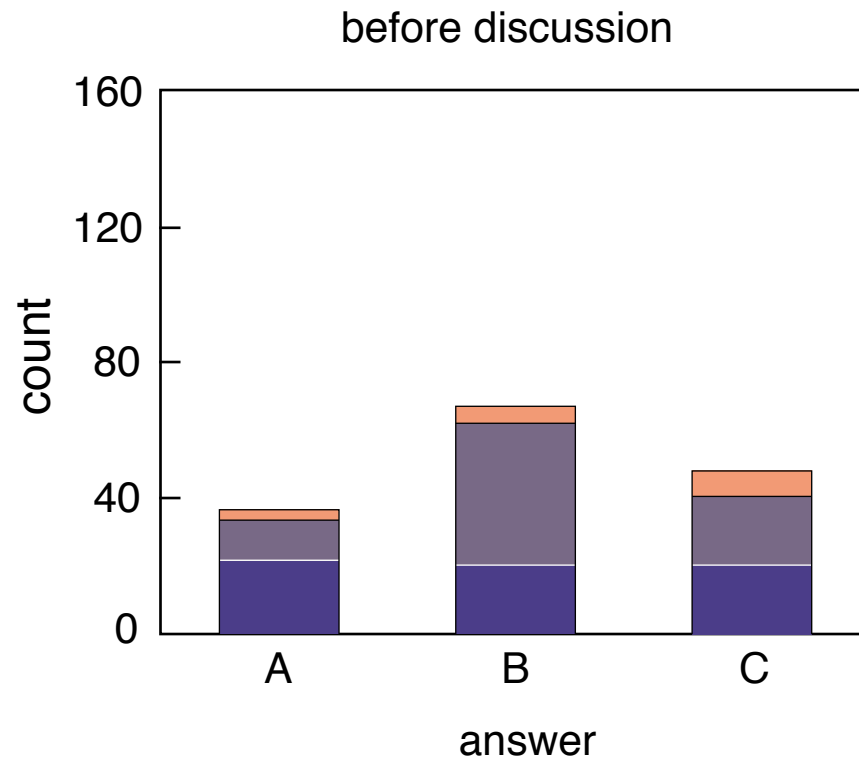
Let's try it!

The distance between the atoms increases uniformly



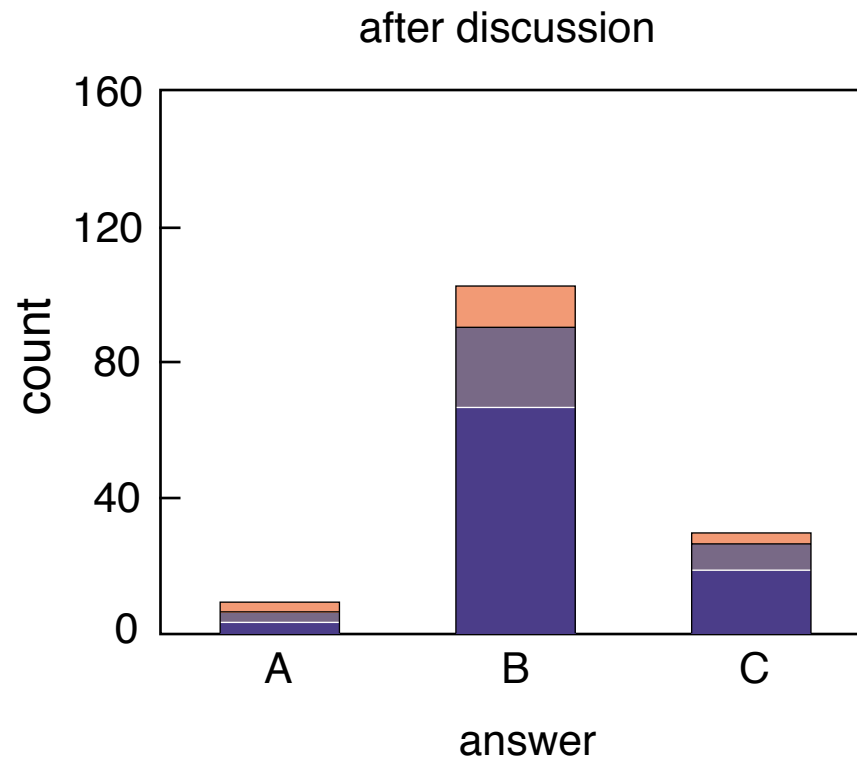
Research: providing the basis for change

ConcepTest data



Research: providing the basis for change

ConceptTest data



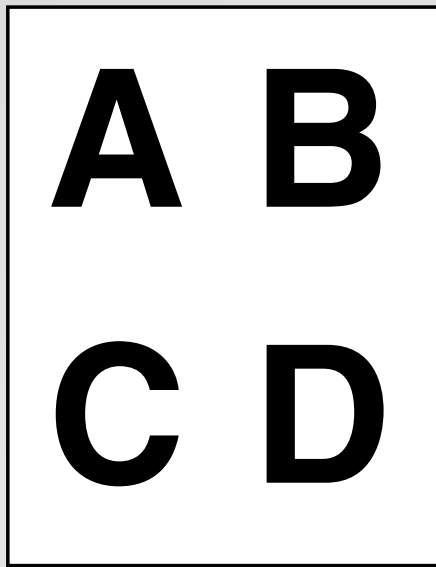
Feedback methods

Show of hands:

easy, but only moderately effective

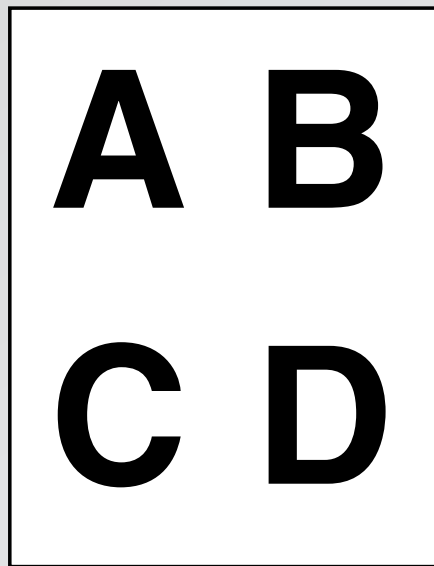
Feedback methods

Flashcards: simple and effective



Feedback methods

Flashcards: simple and effective



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

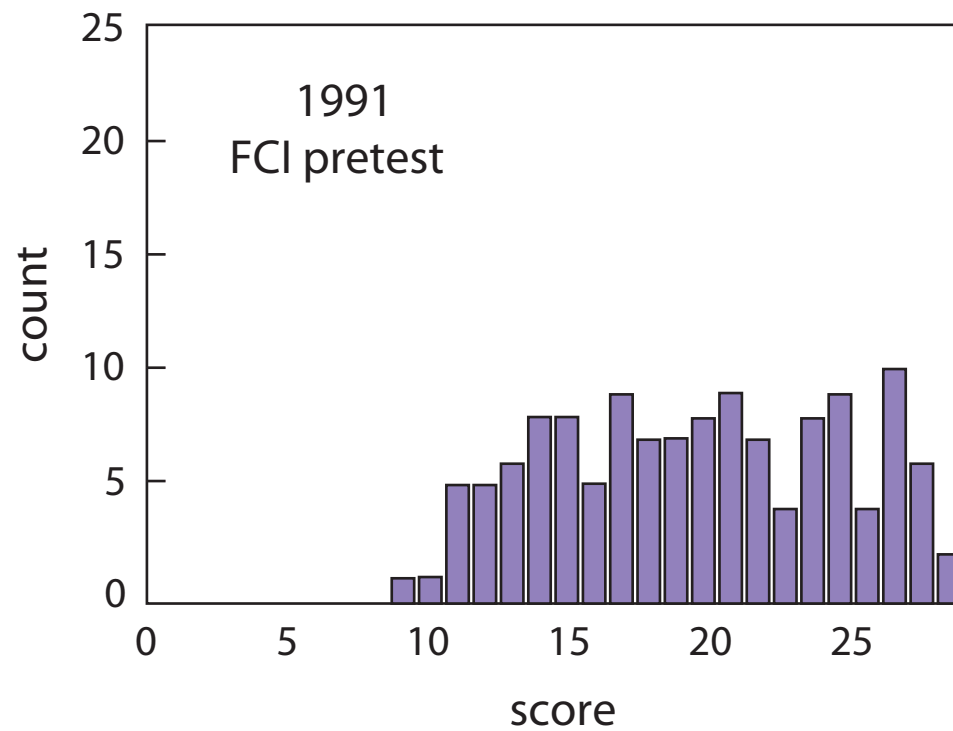


Results

is it any good?

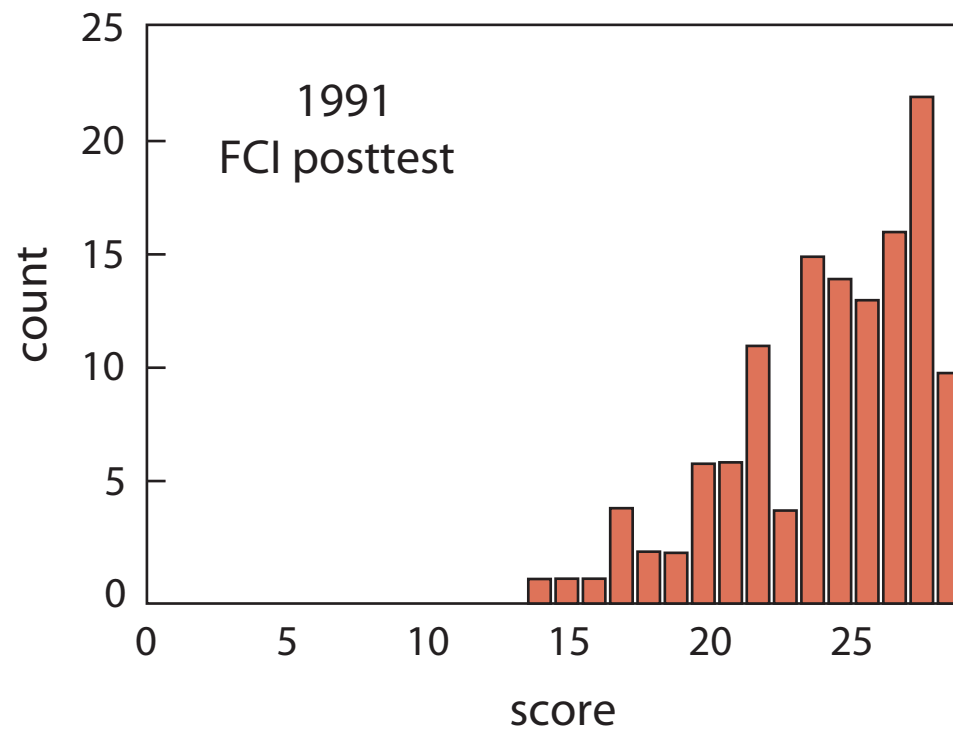
Results

first year of implementing PI



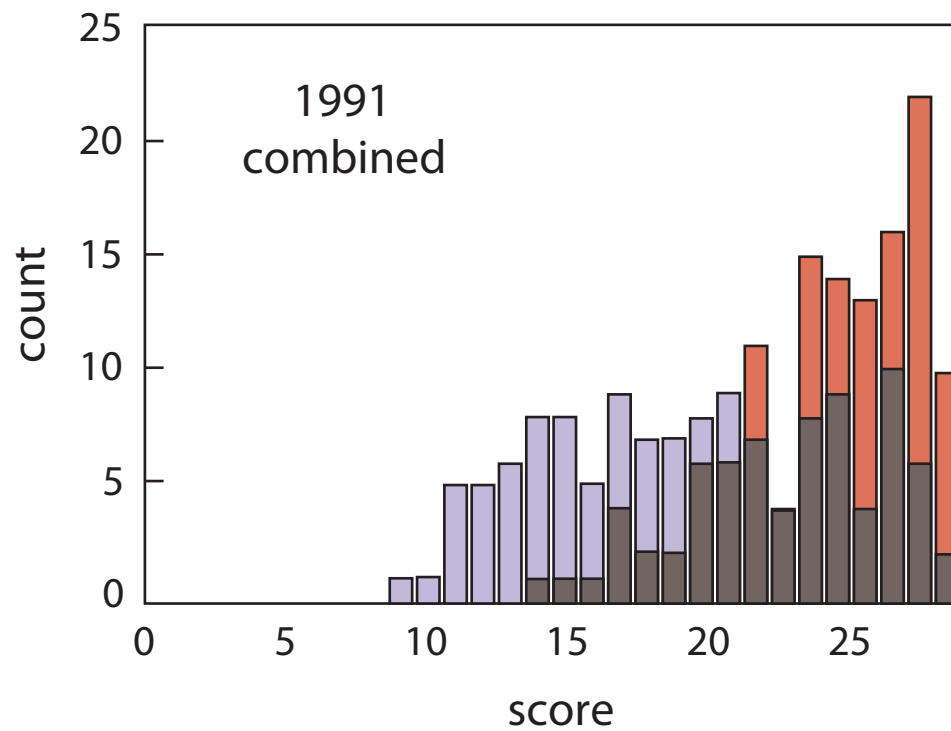
Results

first year of implementing PI

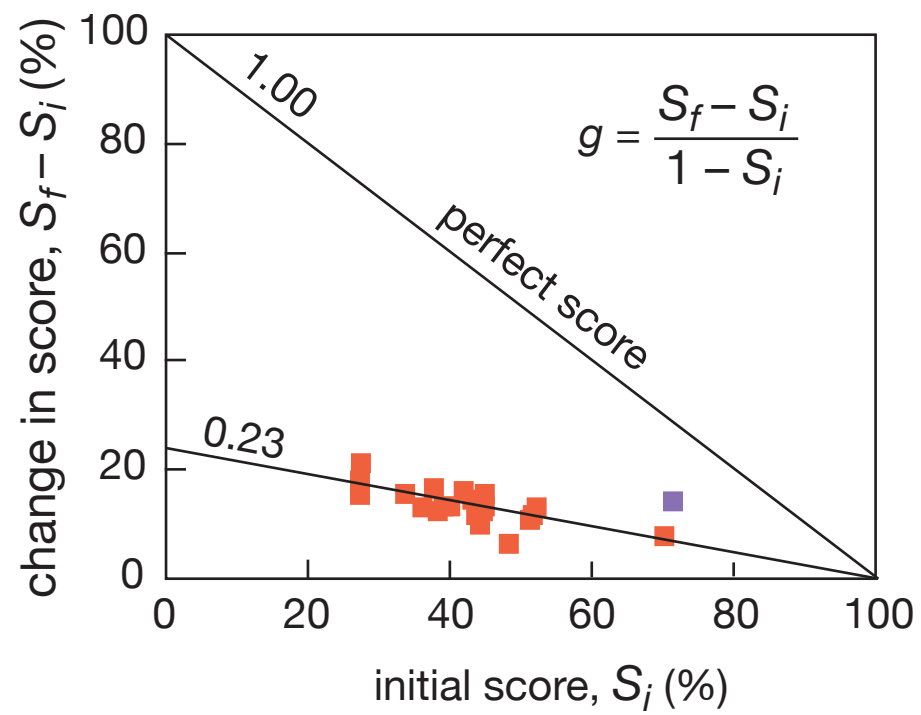


Results

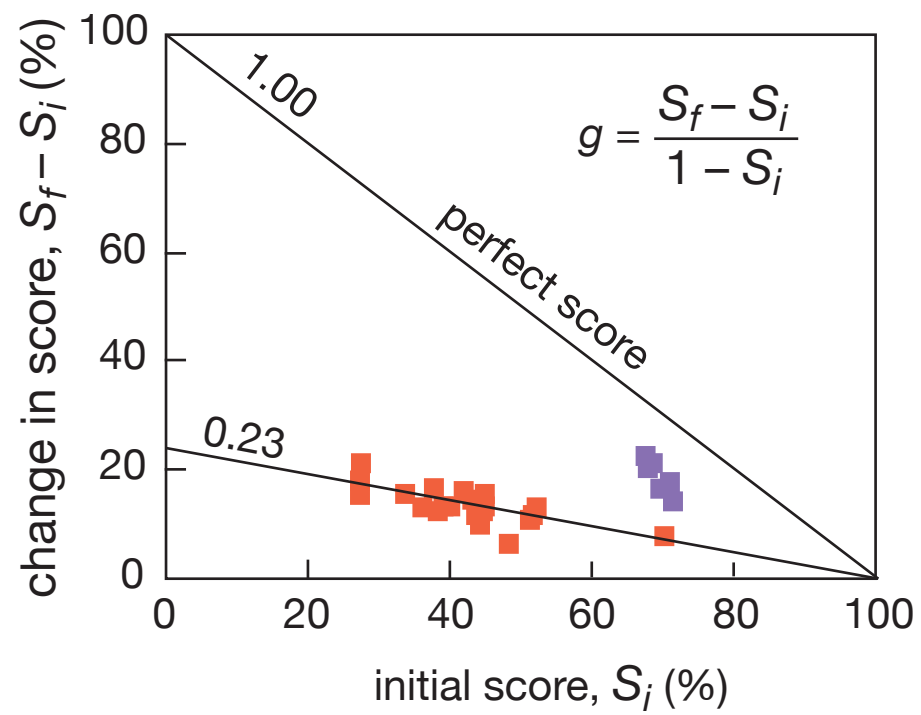
first year of implementing PI



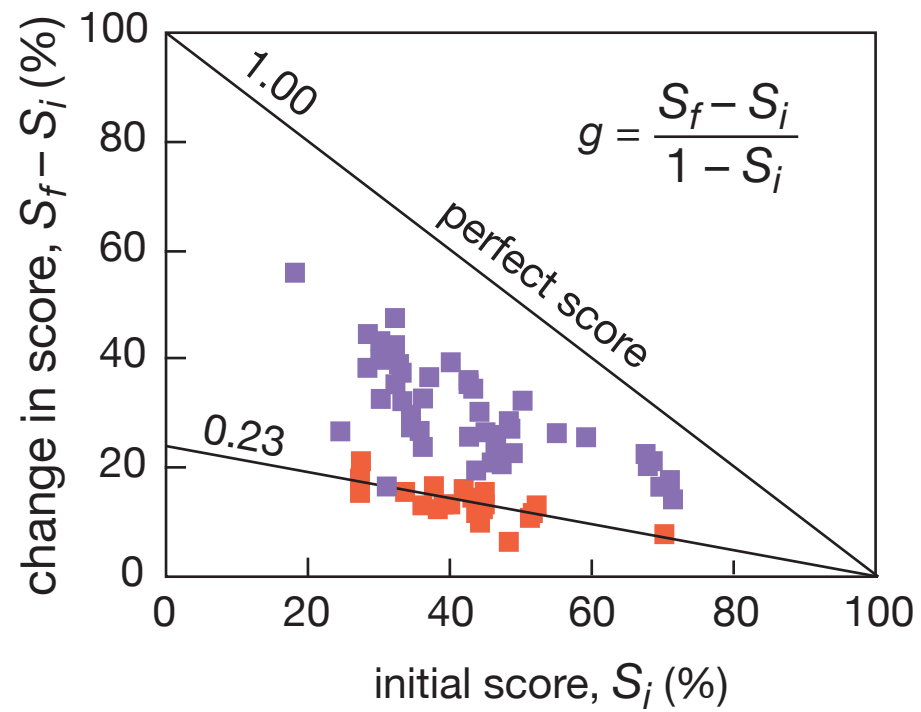
Results



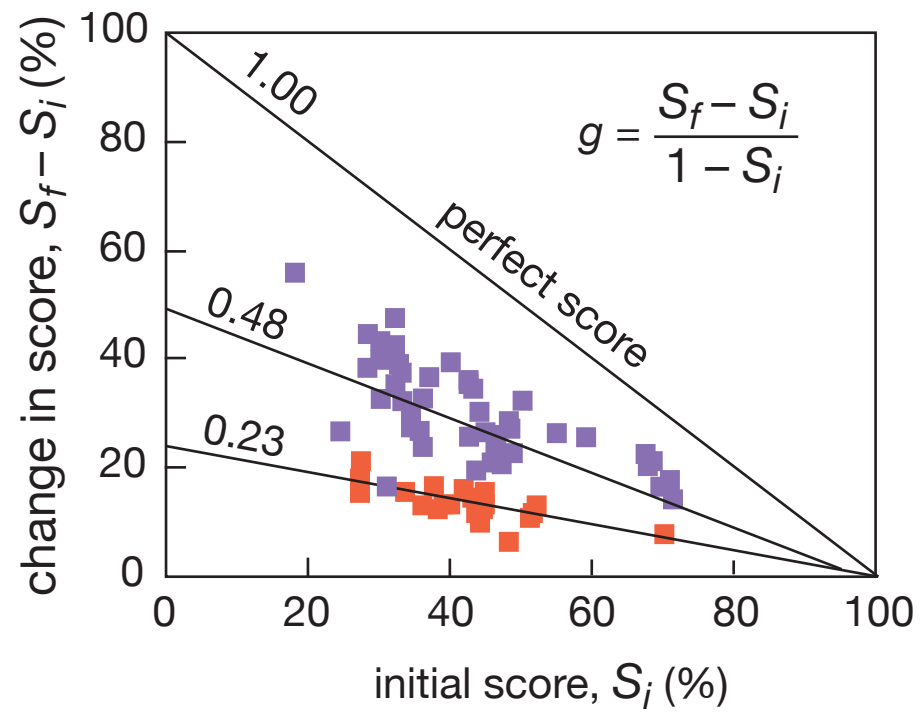
Results



Results



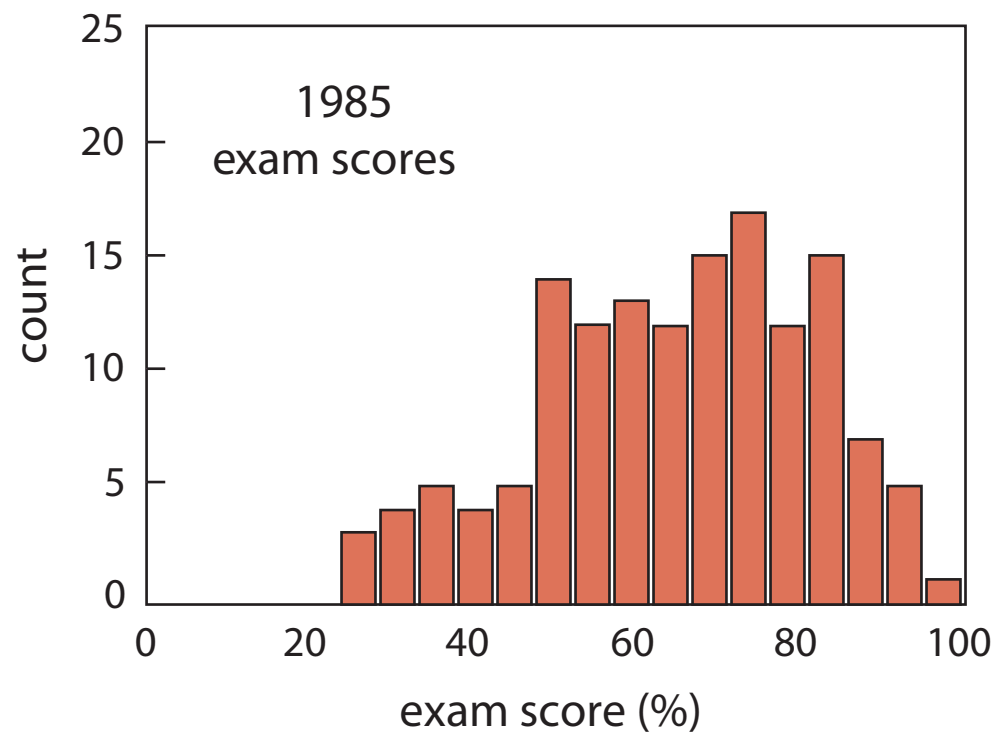
Results



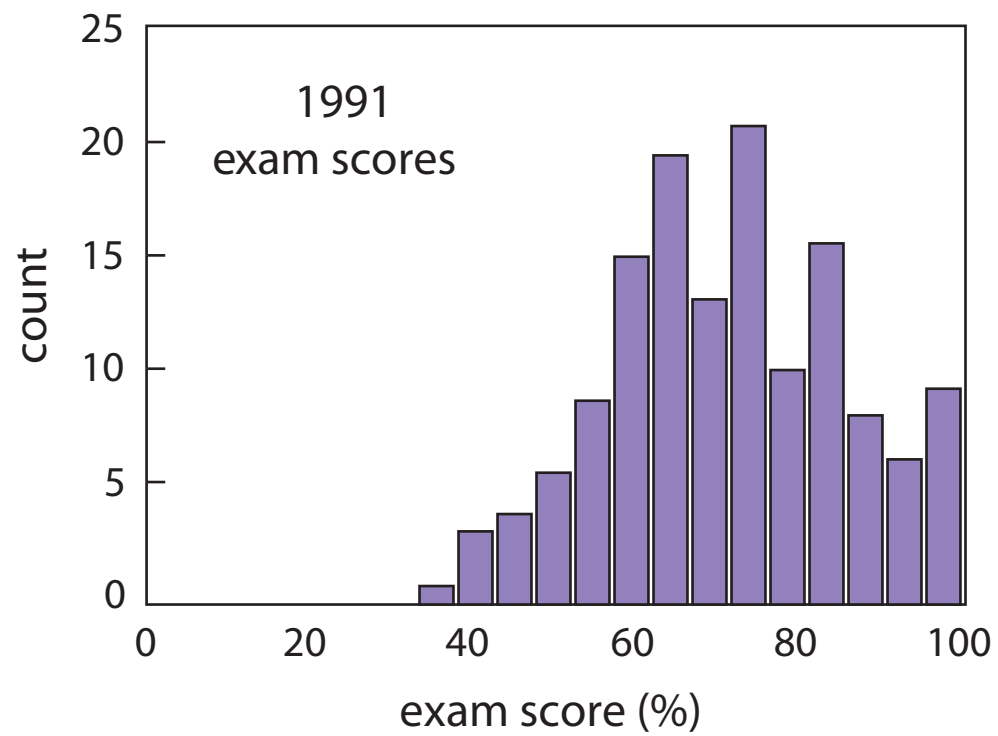
Results

what about problem solving?

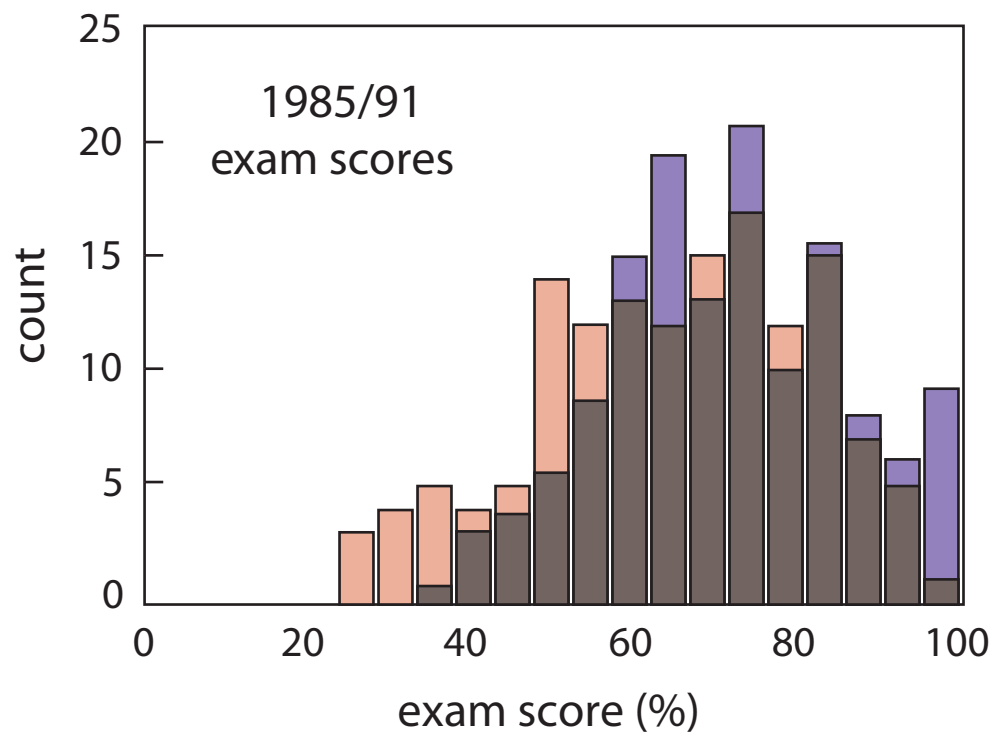
Results



Results



Results



Summary

**So better understanding leads to better
problem solving!**

Summary

So better understanding leads to better problem solving!

(but “good” problem solving doesn’t always indicate understanding!)

Why does it work?

Students:

- promotes thinking
- helps uncover and address misunderstanding
- boosts confidence

Why does it work?

Students:

- promotes thinking
- helps uncover and address misunderstanding
- boosts confidence

Faculty:

- change of format, not content
- with existing questions, little effort
- adaptable

Conclusion

A little reorganization goes a long way!

Funding:

National Science Foundation

for a copy of this presentation:

<http://mazur-www.harvard.edu>