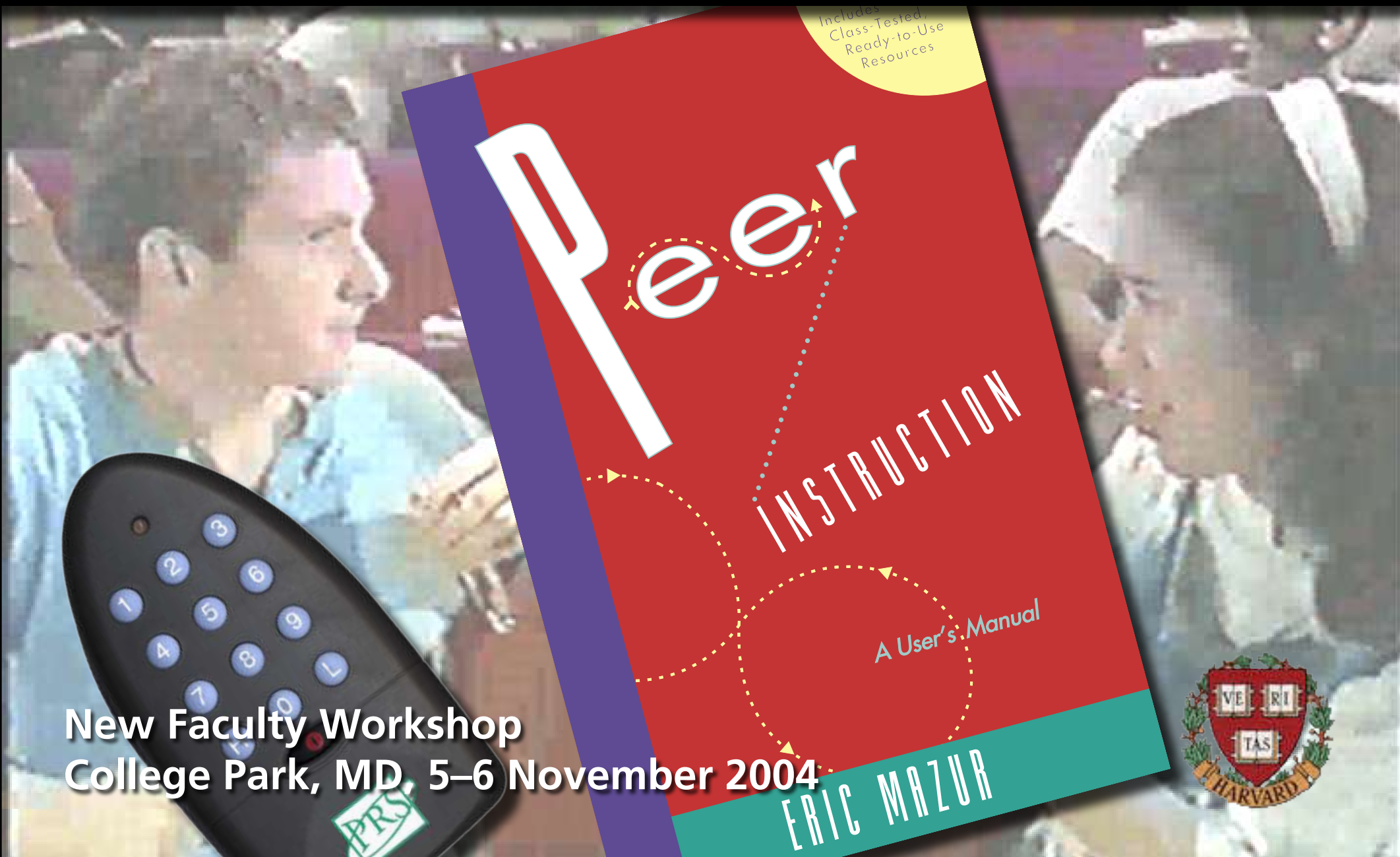


Active learning and interactive lectures



New Faculty Workshop
College Park, MD, 5–6 November 2004

Survey results

familiar with PI

60%



Survey results

familiar with PI

60%

A horizontal bar chart with a red segment representing 60% and a white segment representing the remaining 40%.

heard EM speak on PI

13%

A horizontal bar chart with a red segment representing 13% and a white segment representing the remaining 87%.

Survey results

familiar with PI

60%



heard EM speak on PI

13%



use(d) PI

43%



Survey results

familiar with PI

60%



heard EM speak on PI

13%



use(d) PI

43%



colleague(s) use(s) PI

43%



My message



shift focus from "teaching" to helping students learn

Outline

- Education



Outline

- Education

- Peer Instruction



Outline

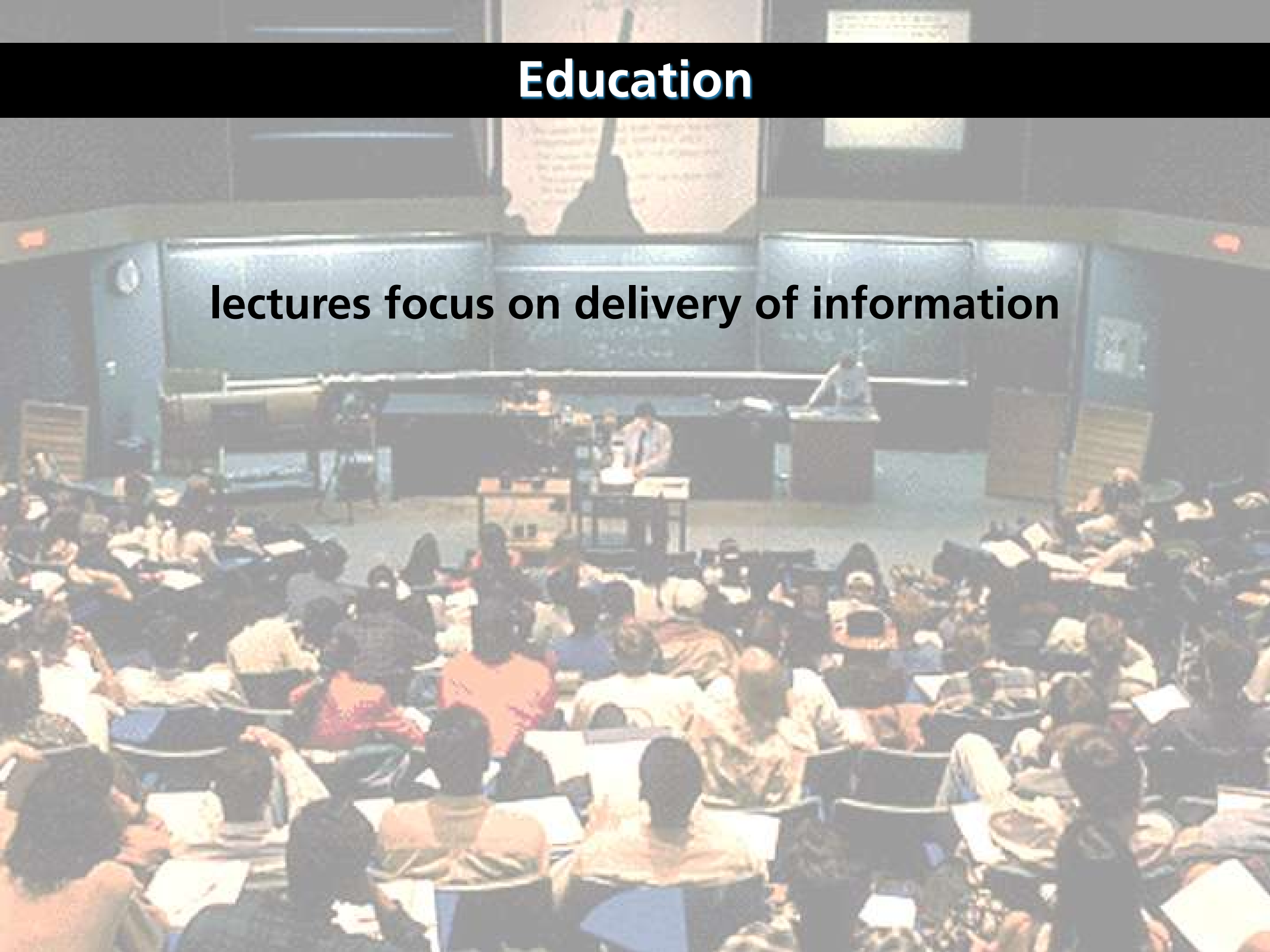
- Education
- Peer Instruction
- Results

Education



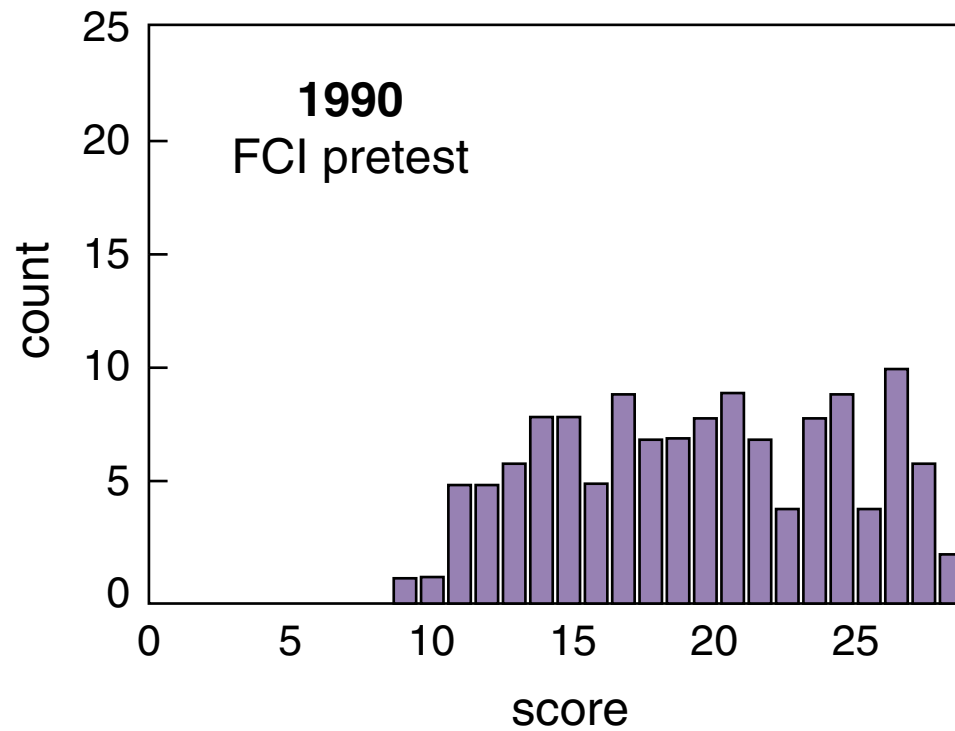
Education

lectures focus on delivery of information



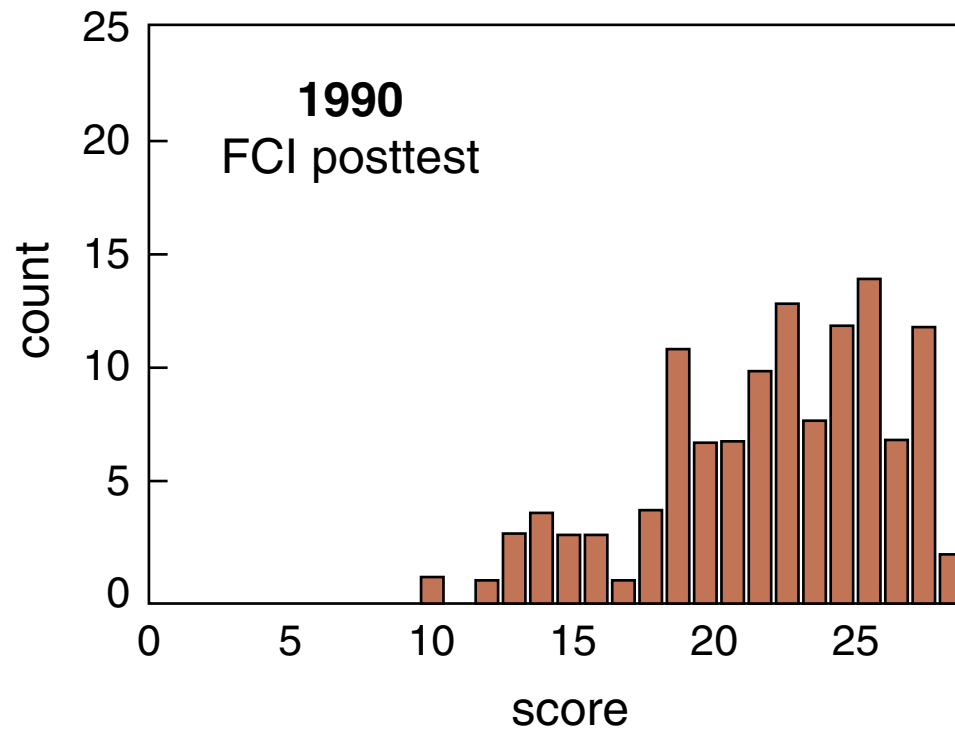
Education

education is not just information transfer



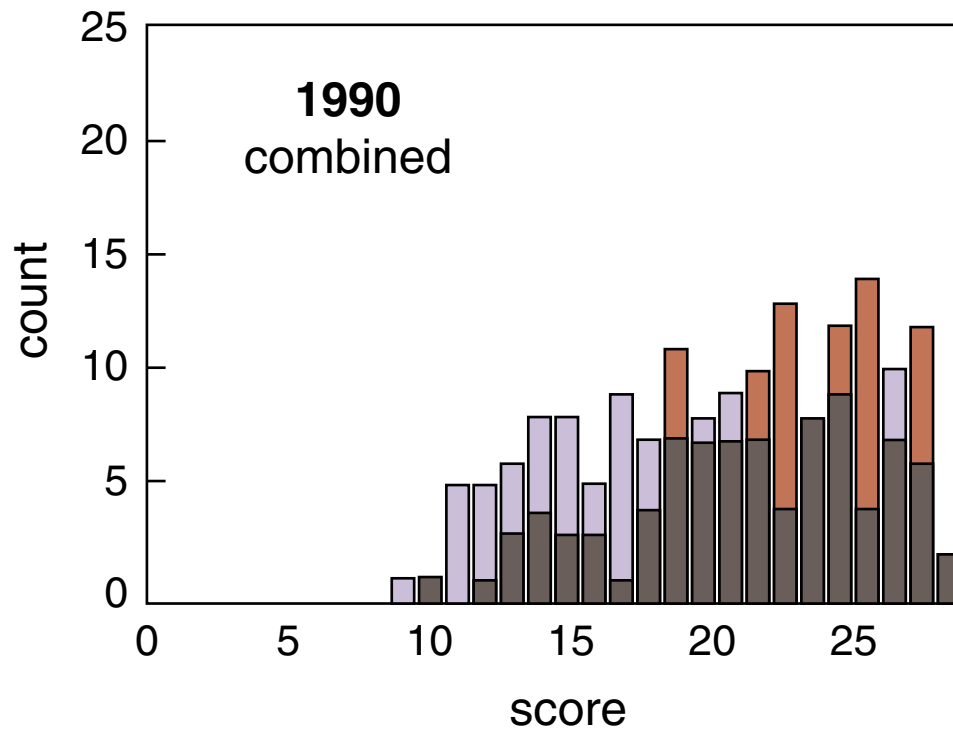
Education

education is not just information transfer

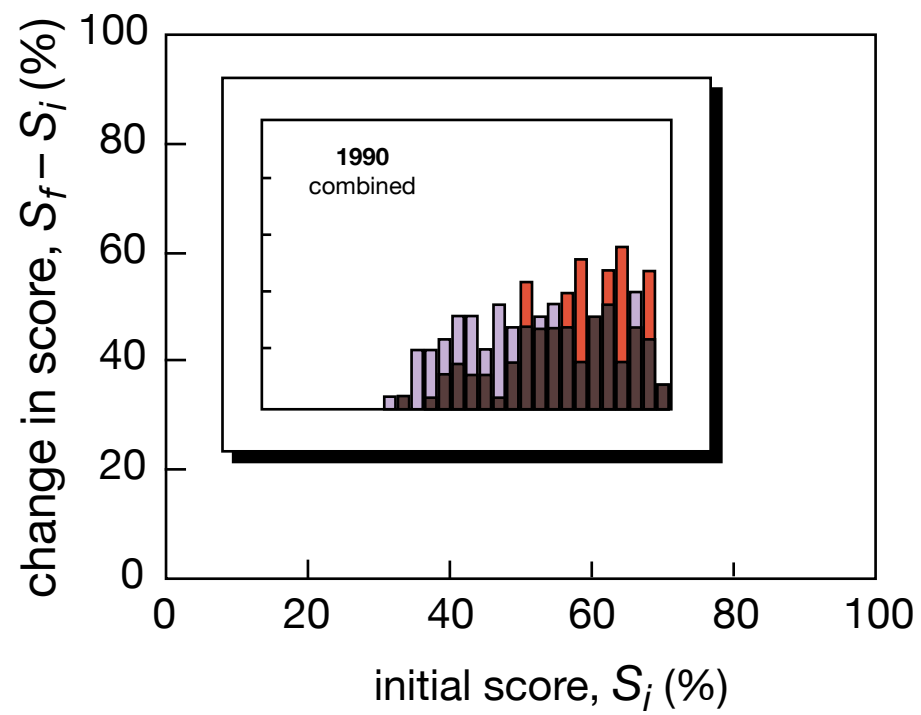


Education

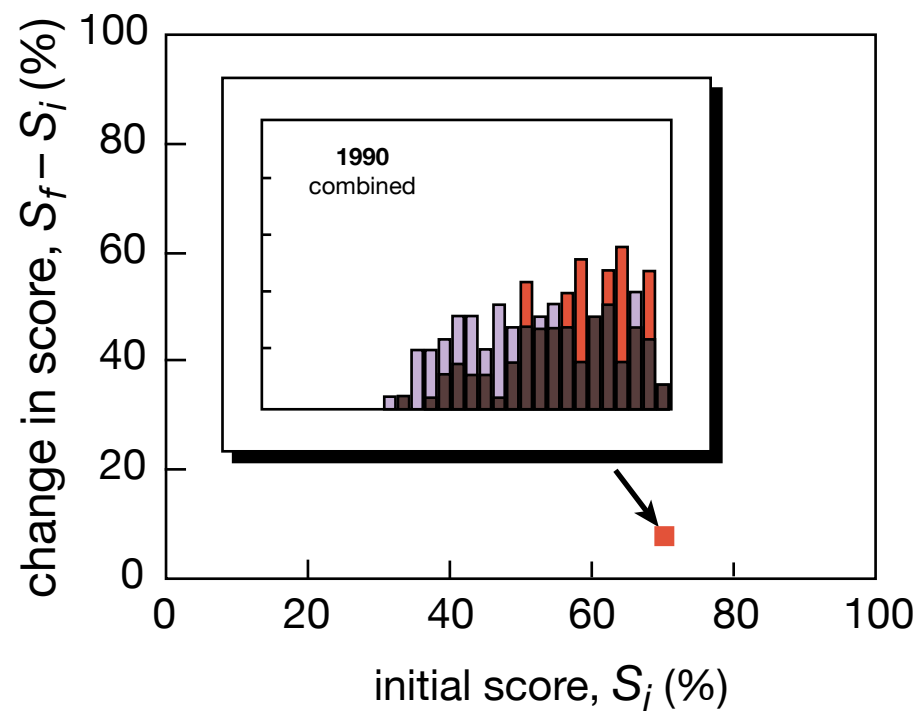
education is not just information transfer



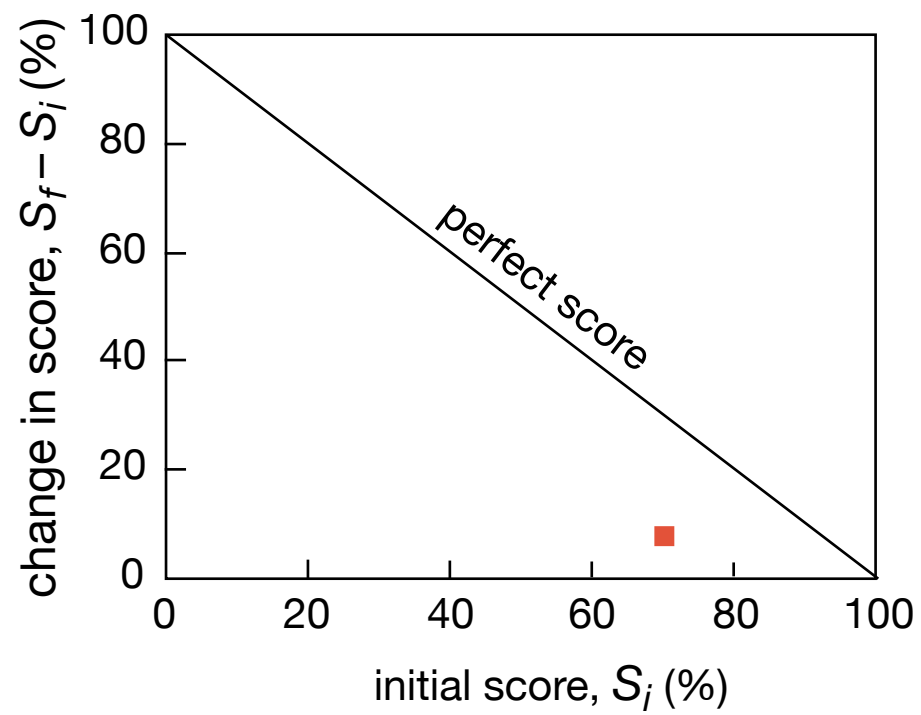
Education



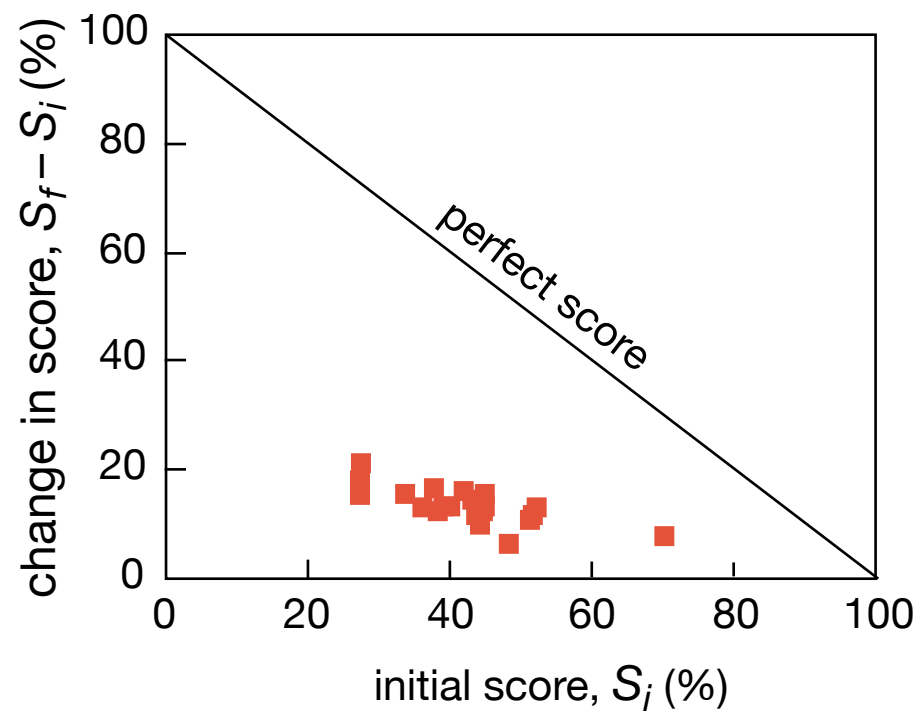
Education



Education

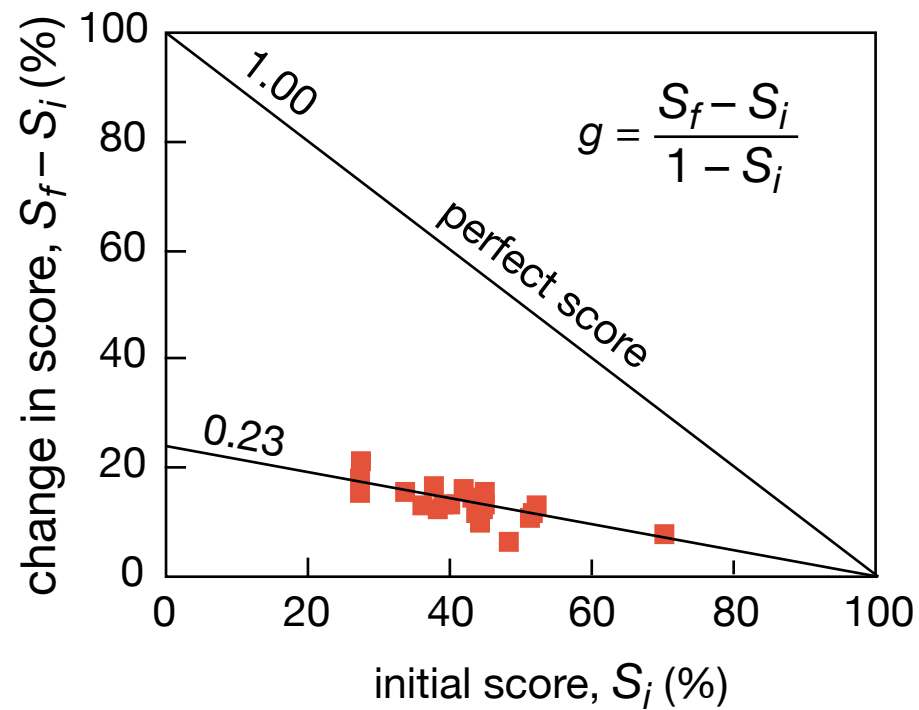


Education



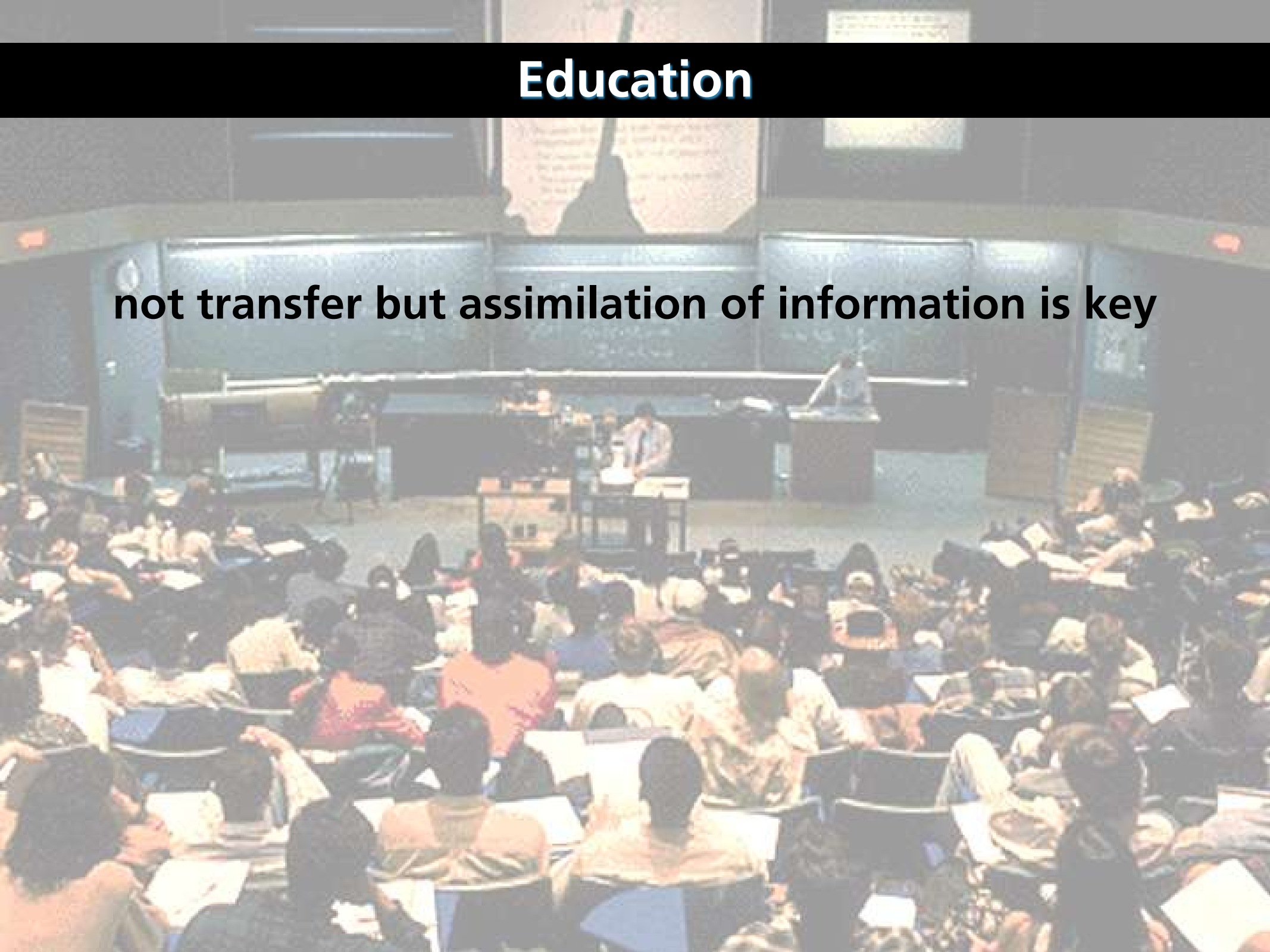
Education

only one quarter of maximum gain realized



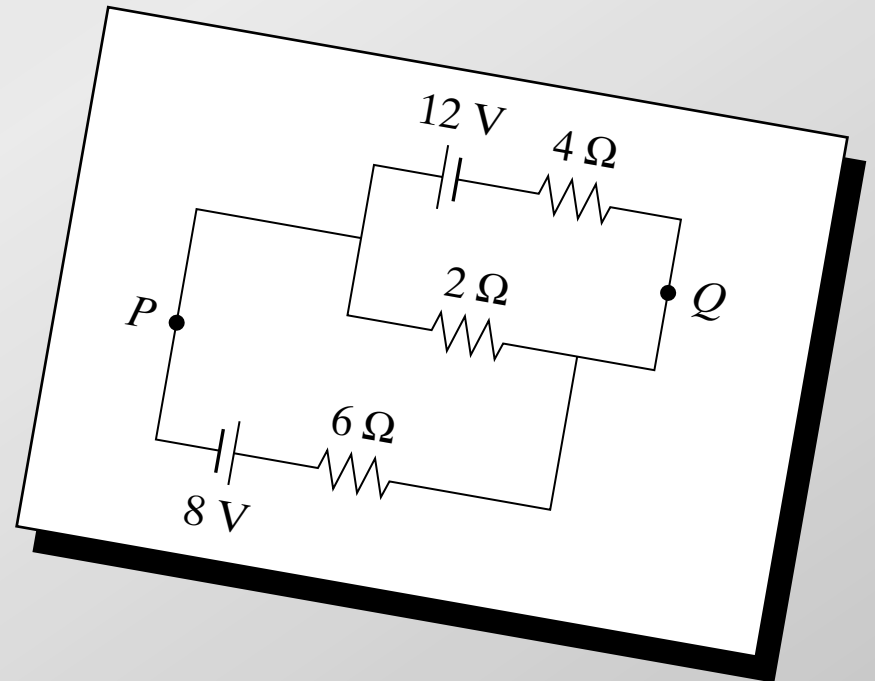
Education

not transfer but assimilation of information is key



Education

conventional problems misleading



Education

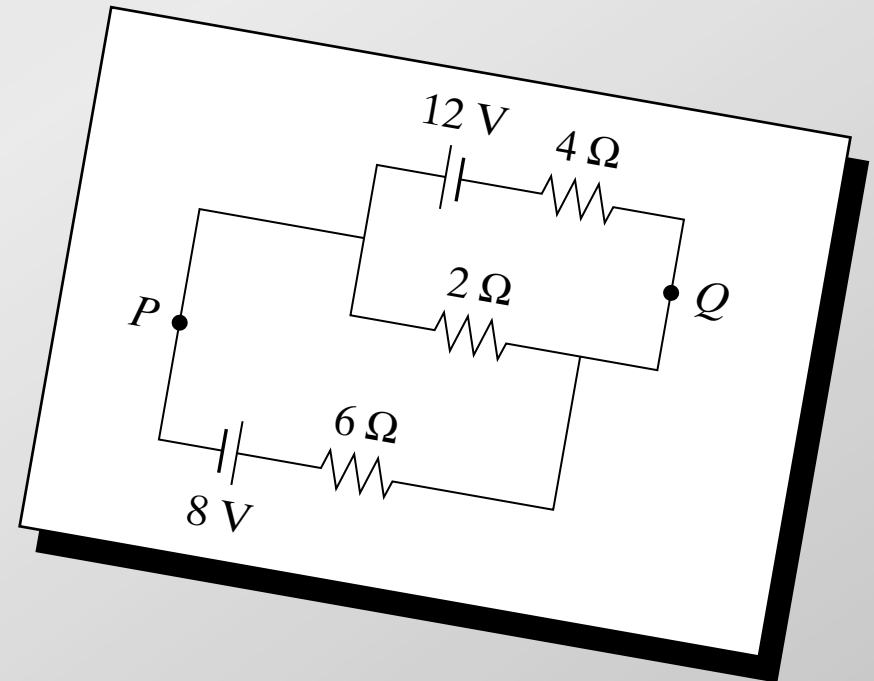
conventional problems misleading

Calculate:

(a) current in $2\text{-}\Omega$ resistor

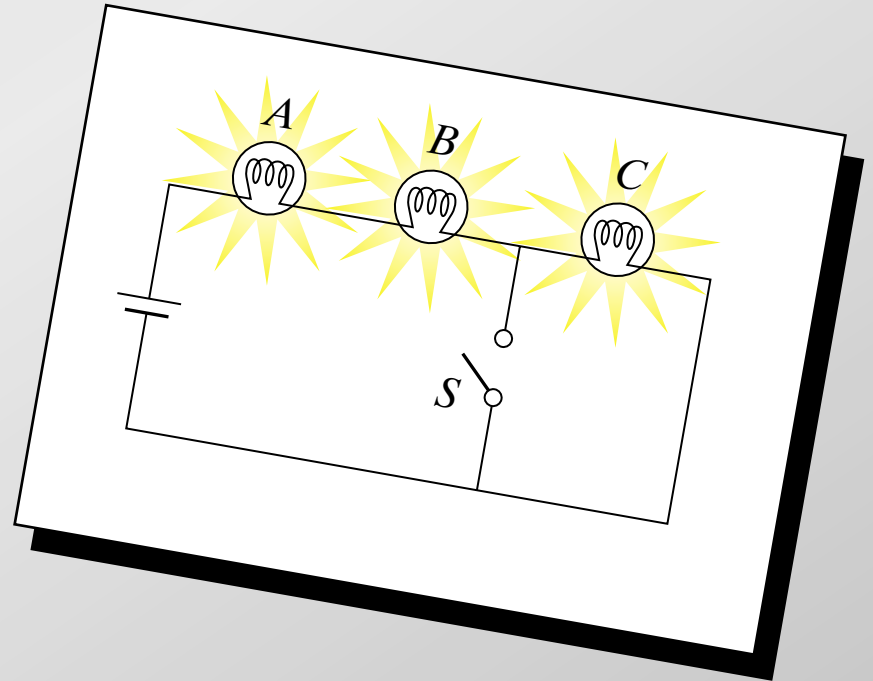
(b) potential difference

between P and Q



Education

are the basic principles understood?

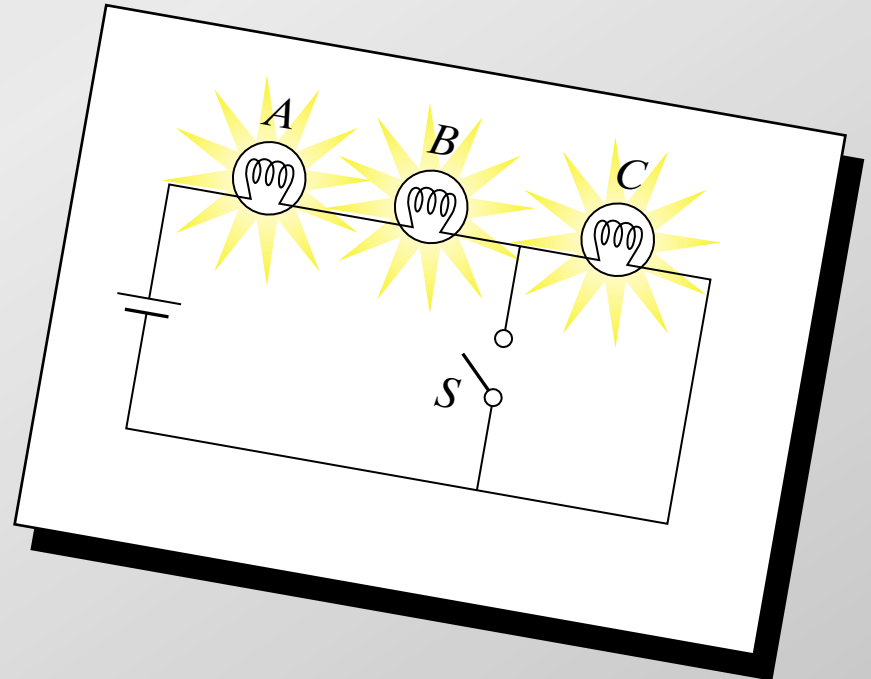


Education

are the basic principles understood?

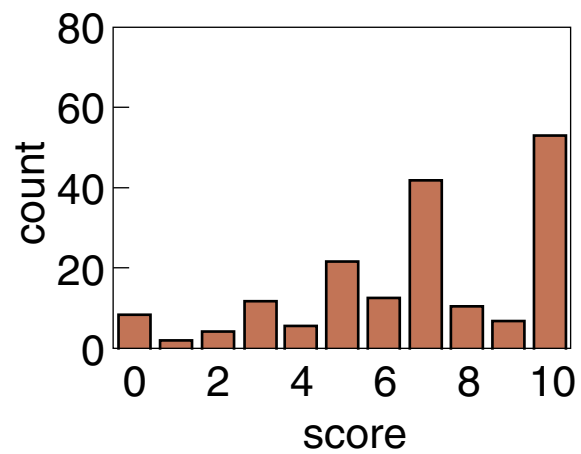
When S is closed, what happens to:

- (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?

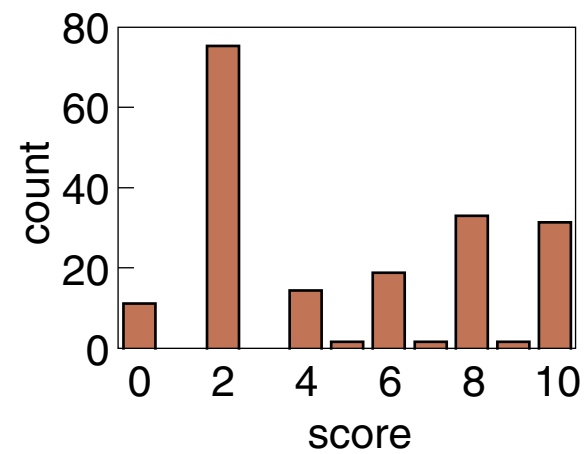


Education

conventional

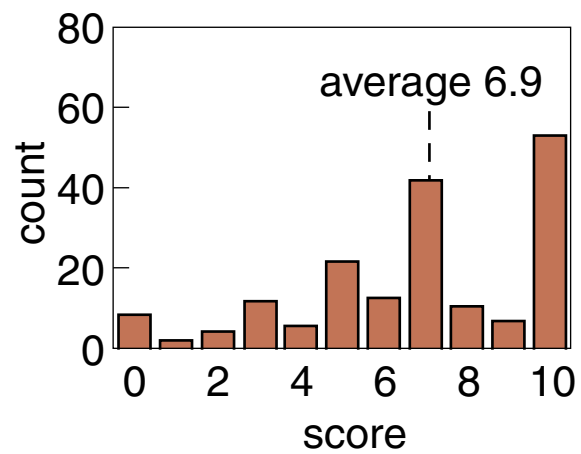


conceptual

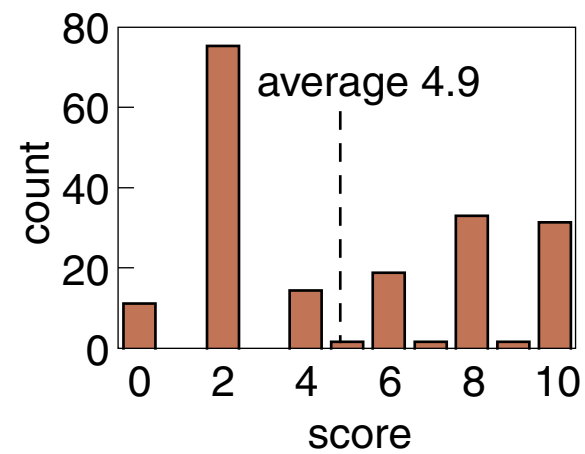


Education

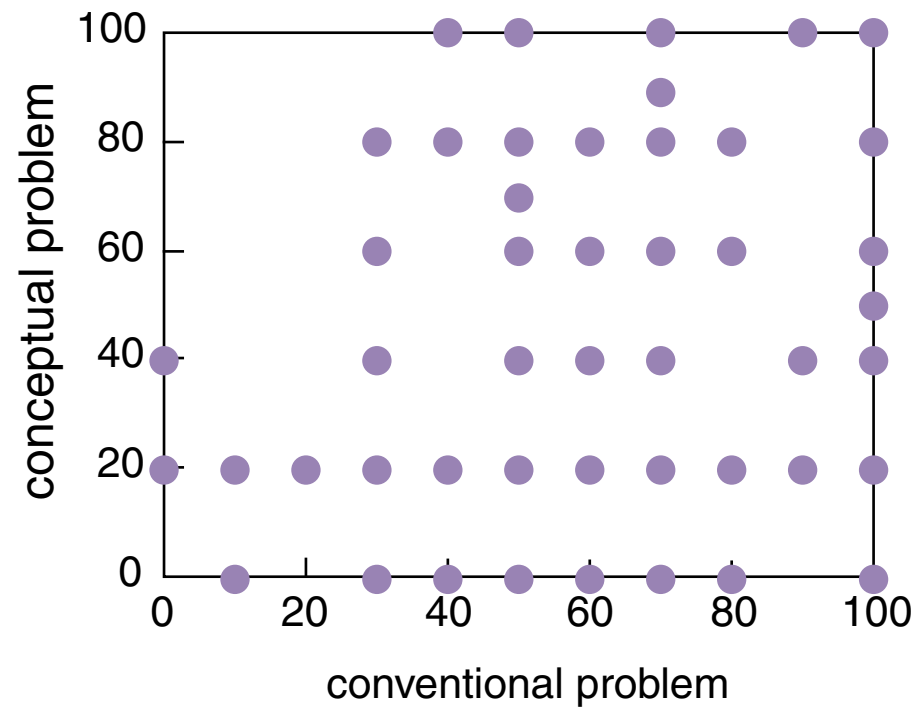
conventional



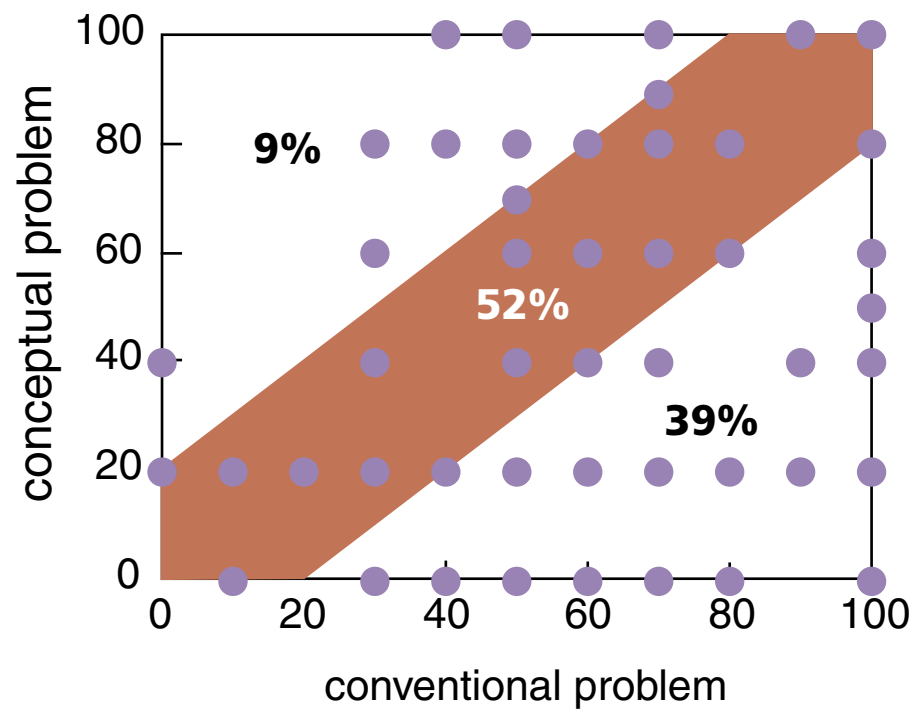
conceptual



Education



Education



So what should we do?



Peer Instruction

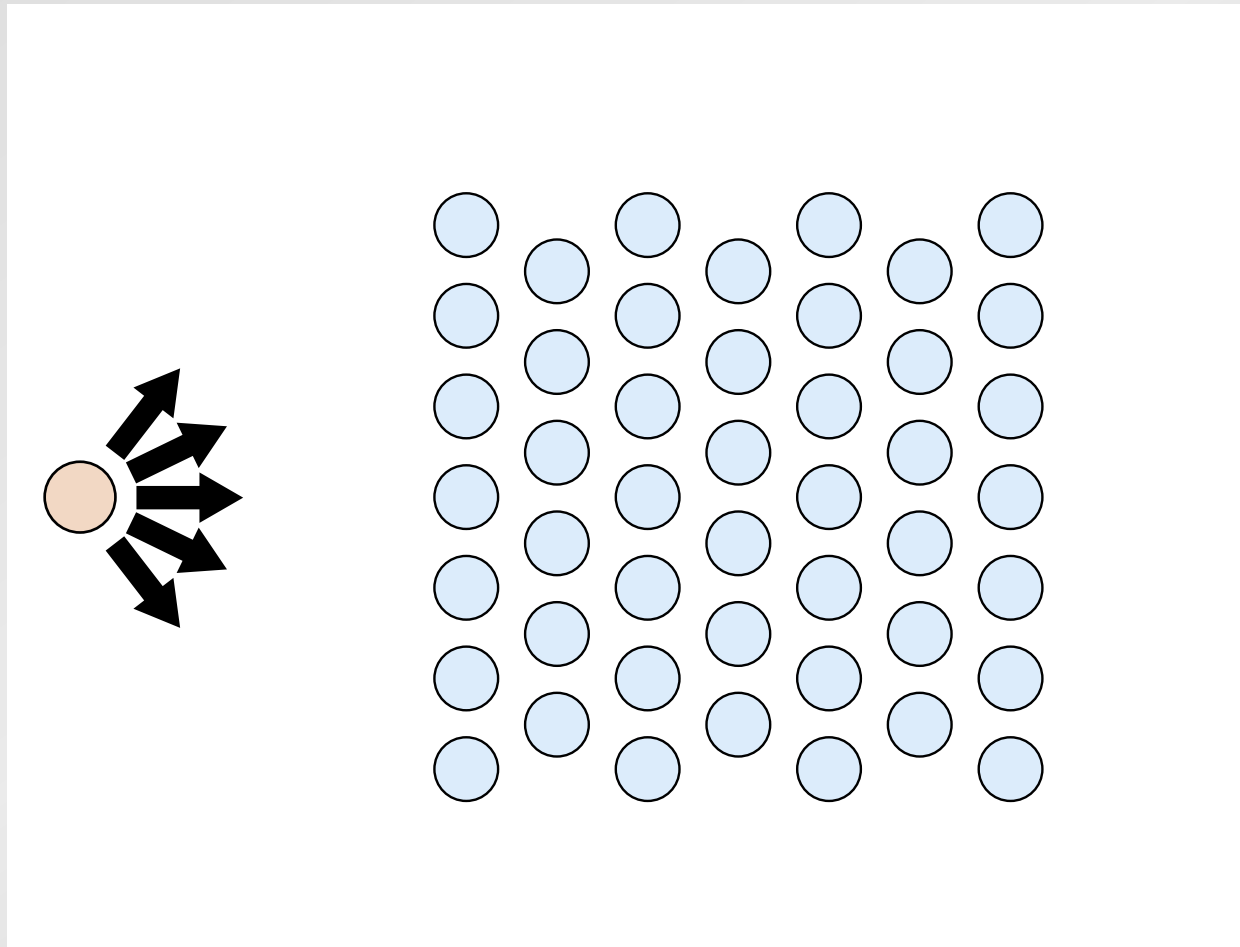
Give students more responsibility for gathering information...

Peer Instruction

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

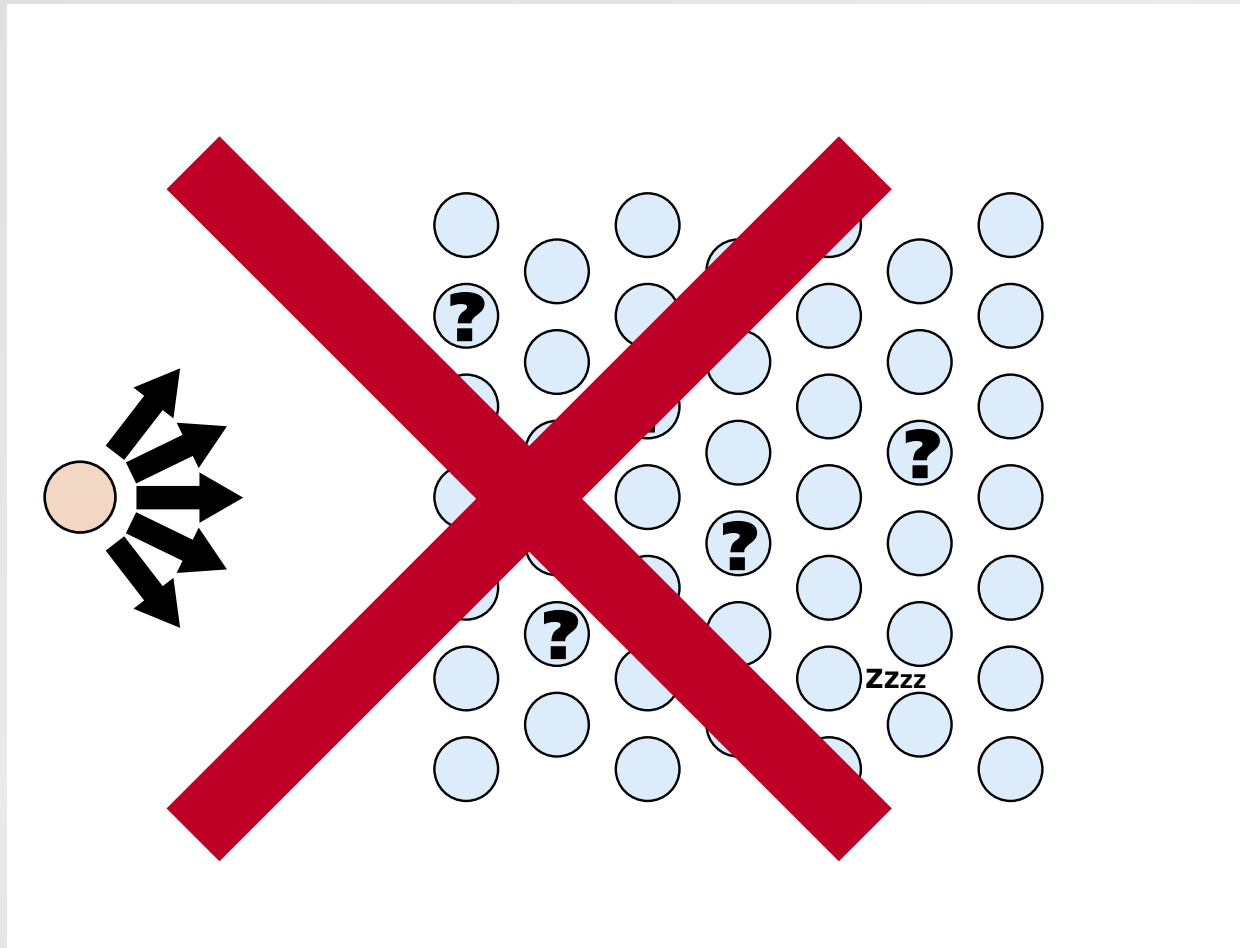
Peer Instruction

1. Recognize the inefficacy of the lecture method



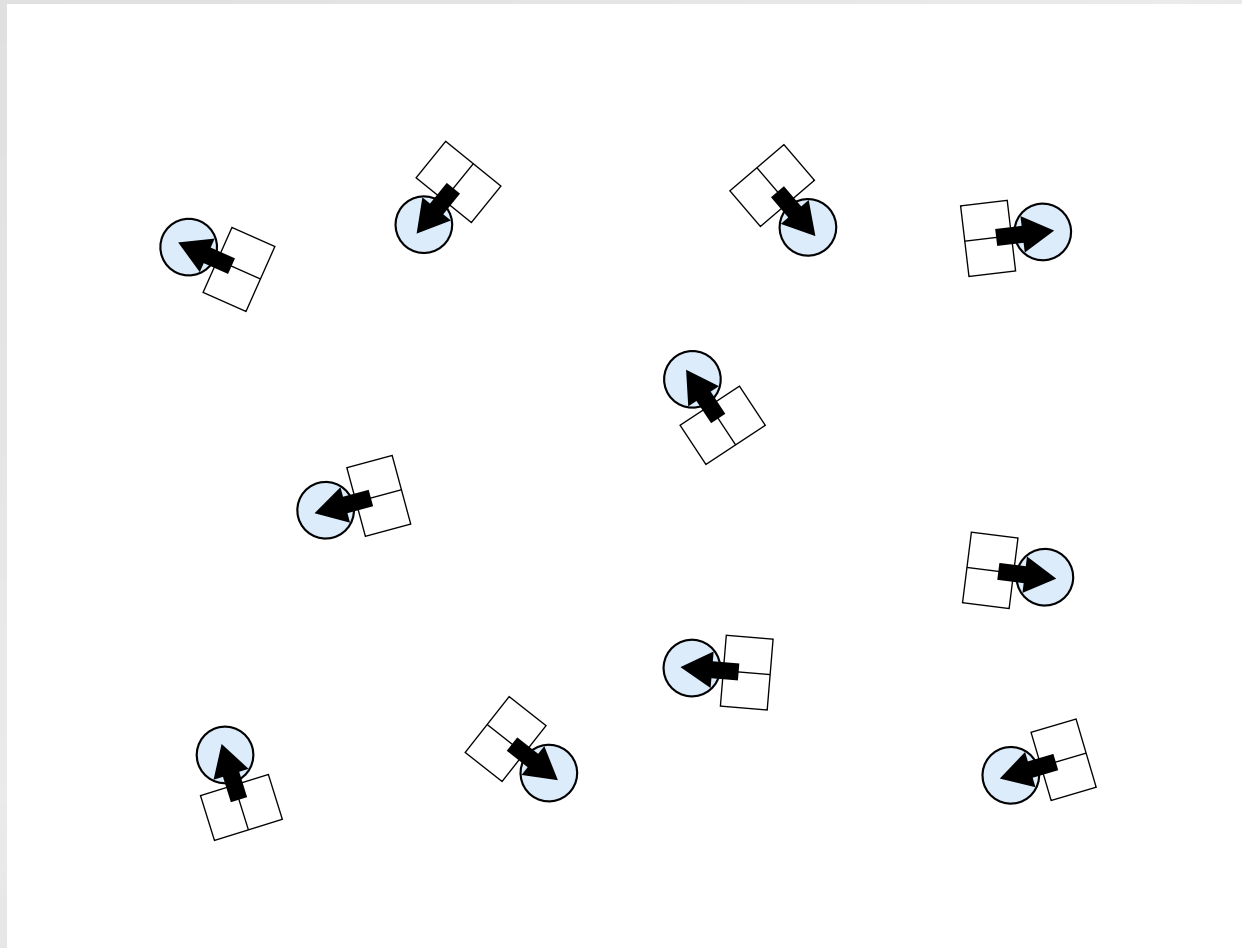
Peer Instruction

1. Recognize the inefficacy of the lecture method



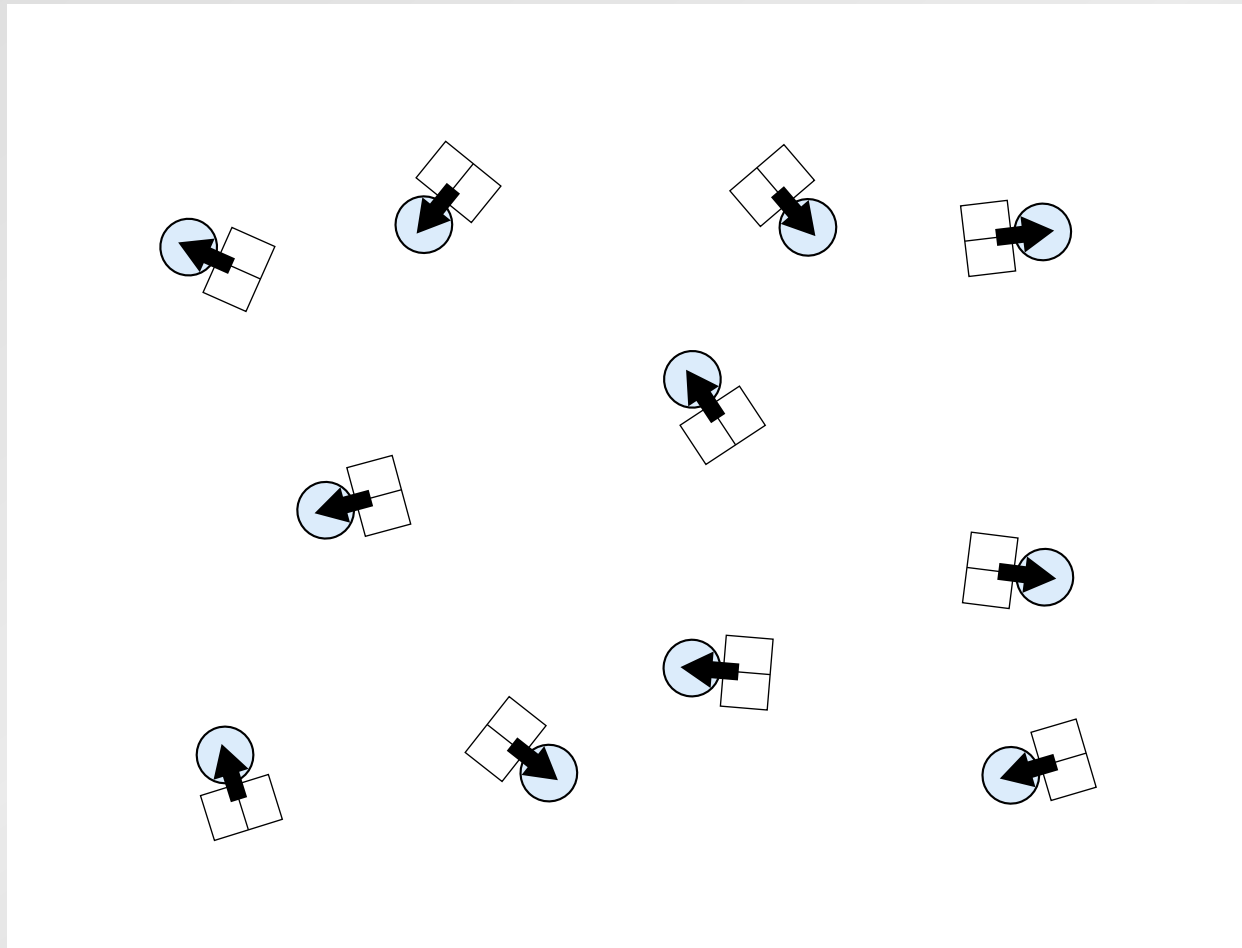
Peer Instruction

2. Move first exposure to material out of classroom



Peer Instruction

2. Move first exposure to material out of classroom



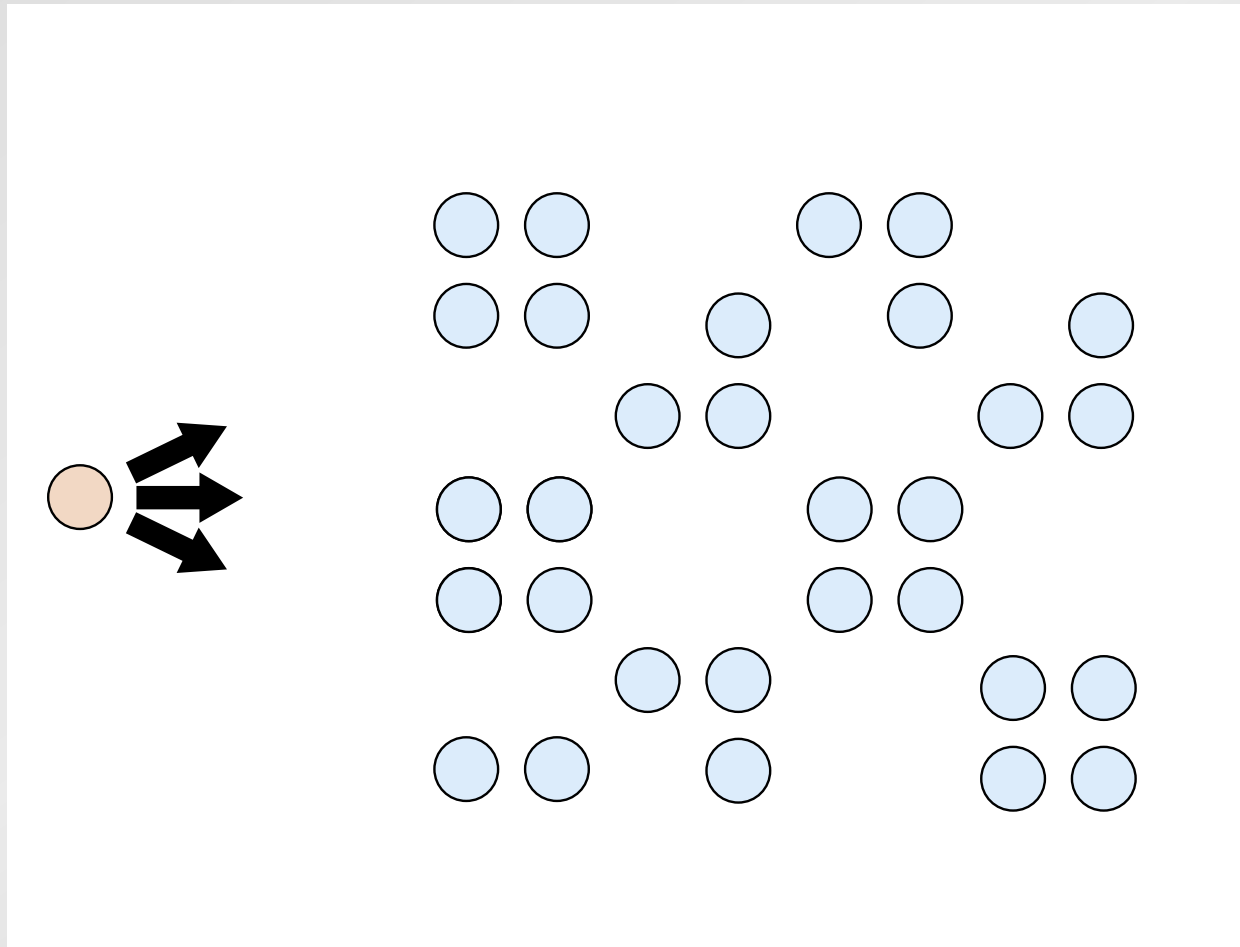
...assign reading!

Peer Instruction

3. Use class period to deepen and broaden understanding

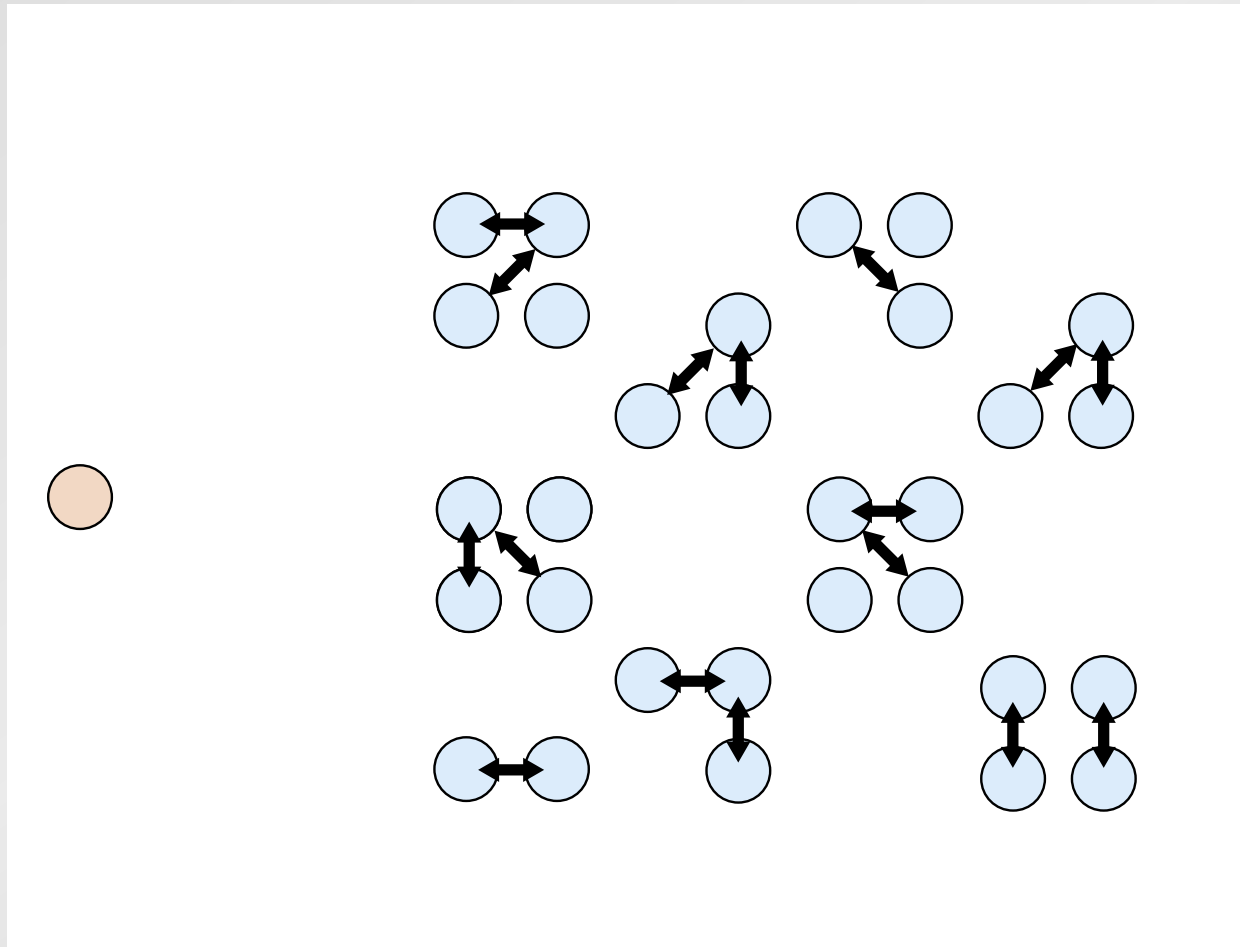
Peer Instruction

...by painting the big picture...



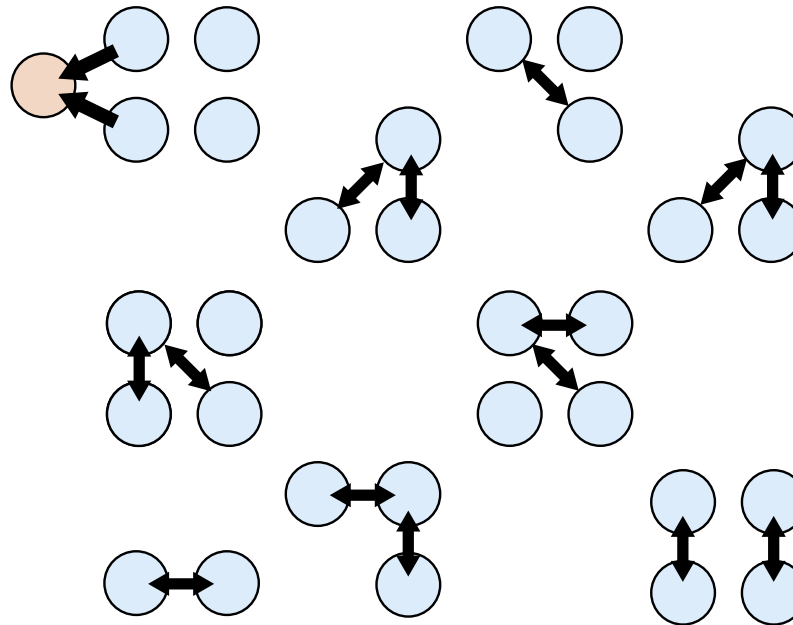
Peer Instruction

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



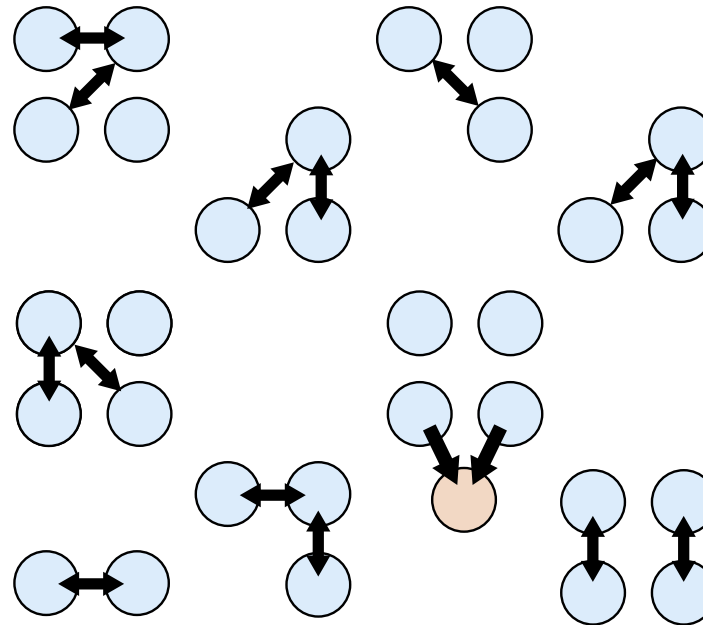
Peer Instruction

Better yet: Learn from your students...



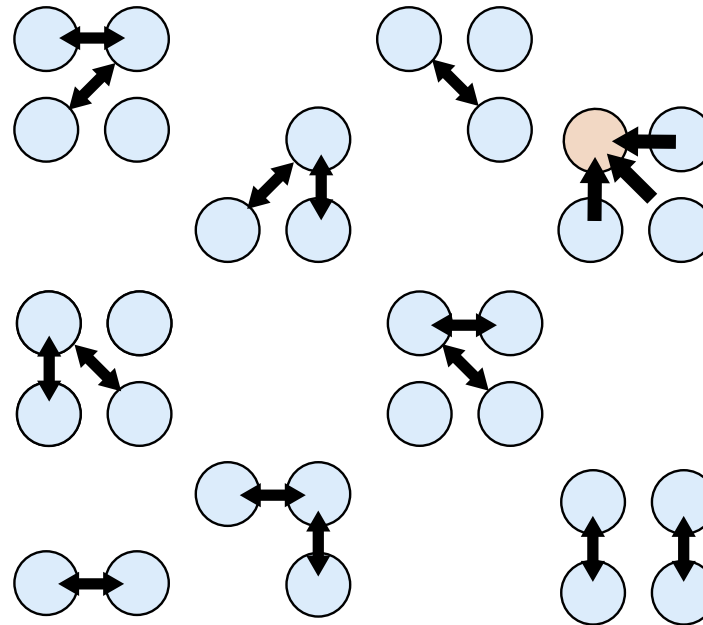
Peer Instruction

Better yet: Learn from your students...



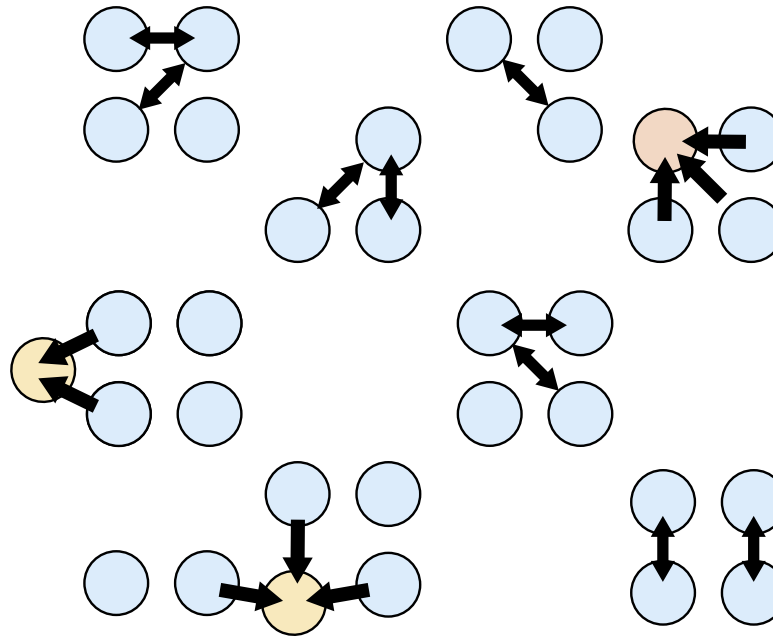
Peer Instruction

Better yet: Learn from your students...



Peer Instruction

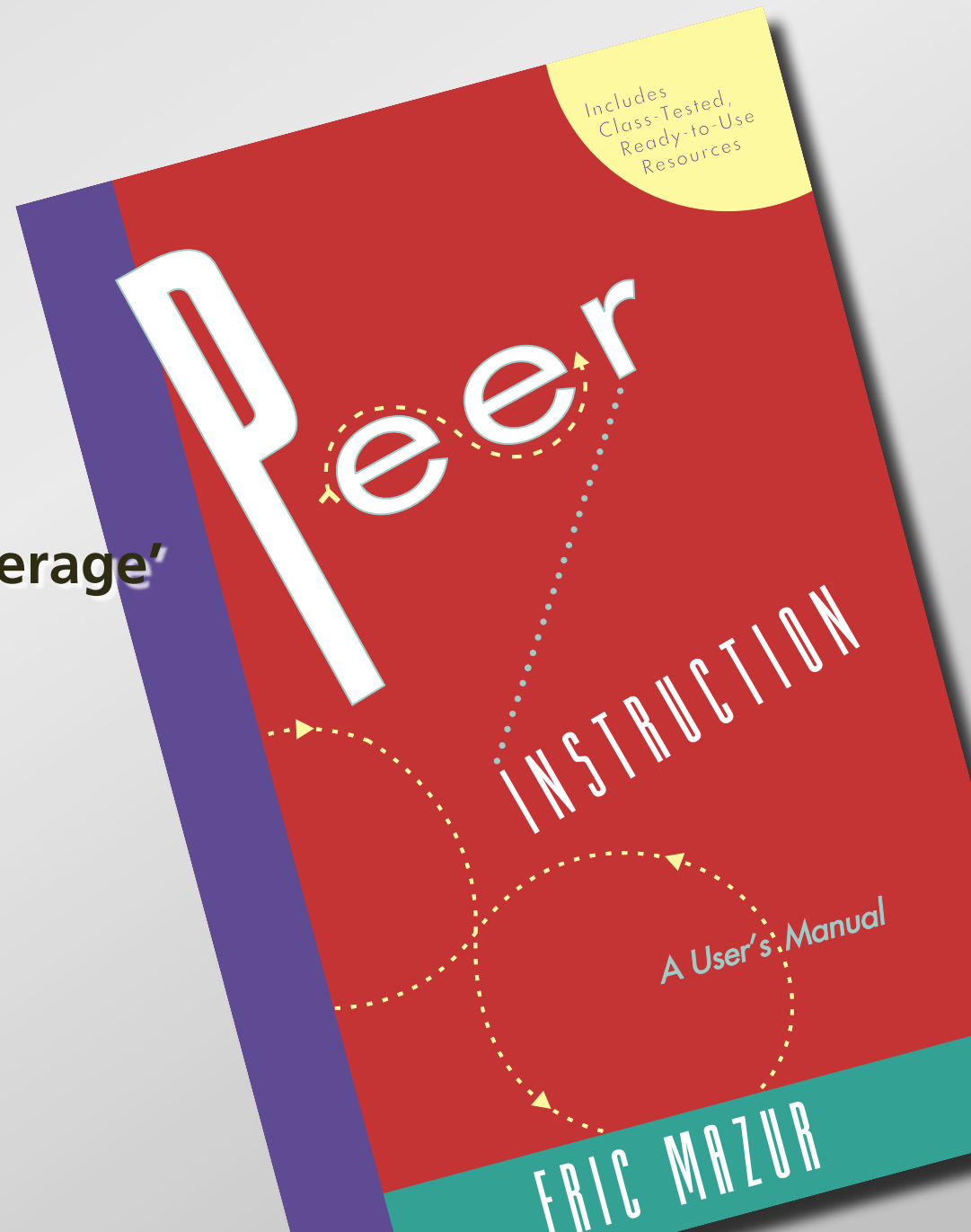
...bring in your Teaching Assistants too!



Peer Instruction

Main features:

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



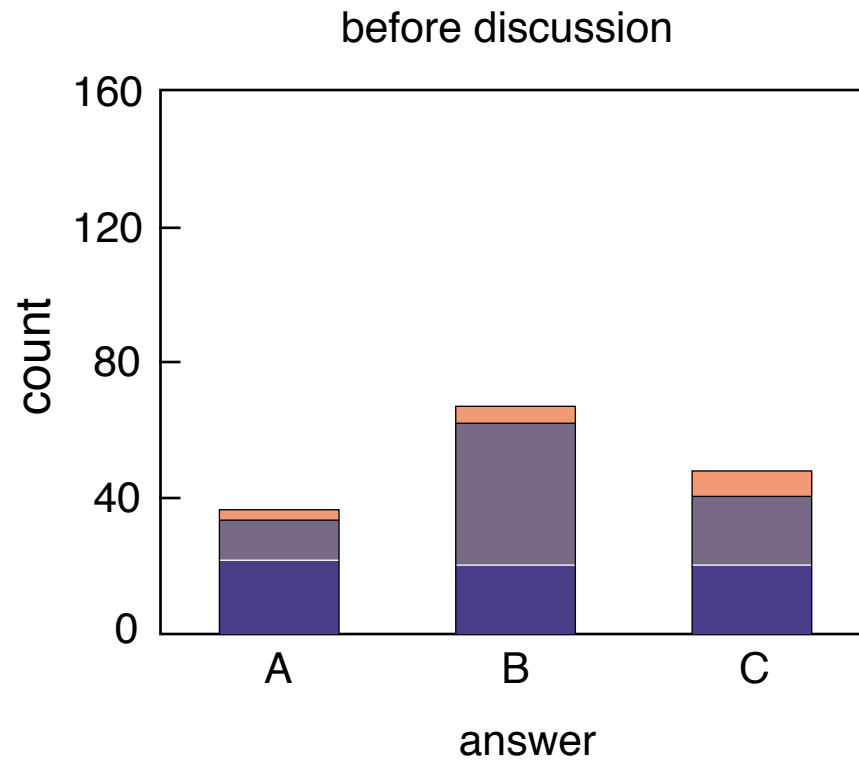
Peer Instruction

ConcepTest:

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

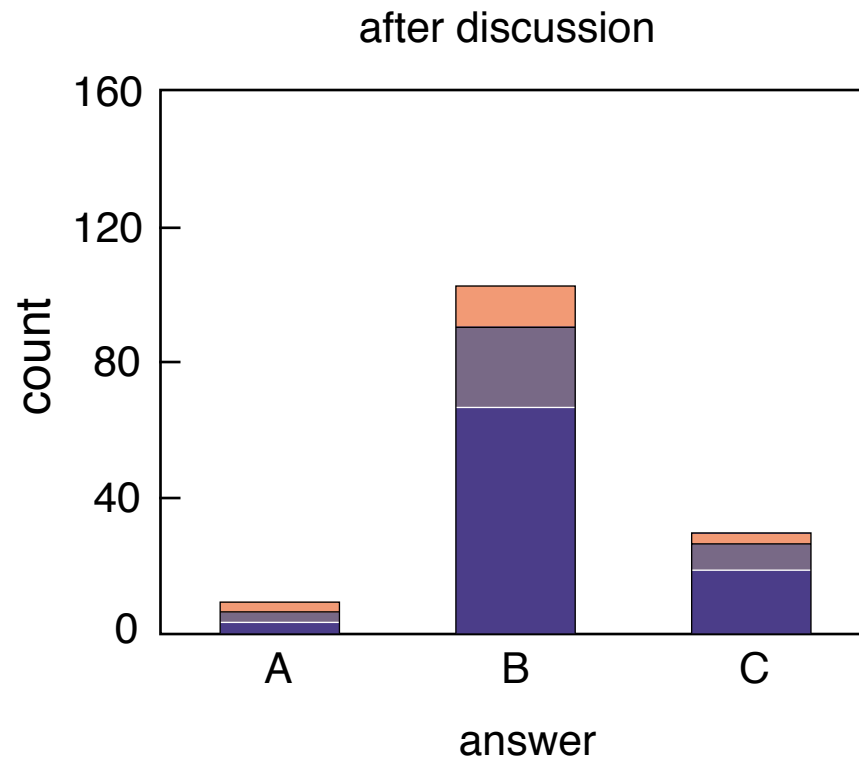
Peer Instruction

Individual answers



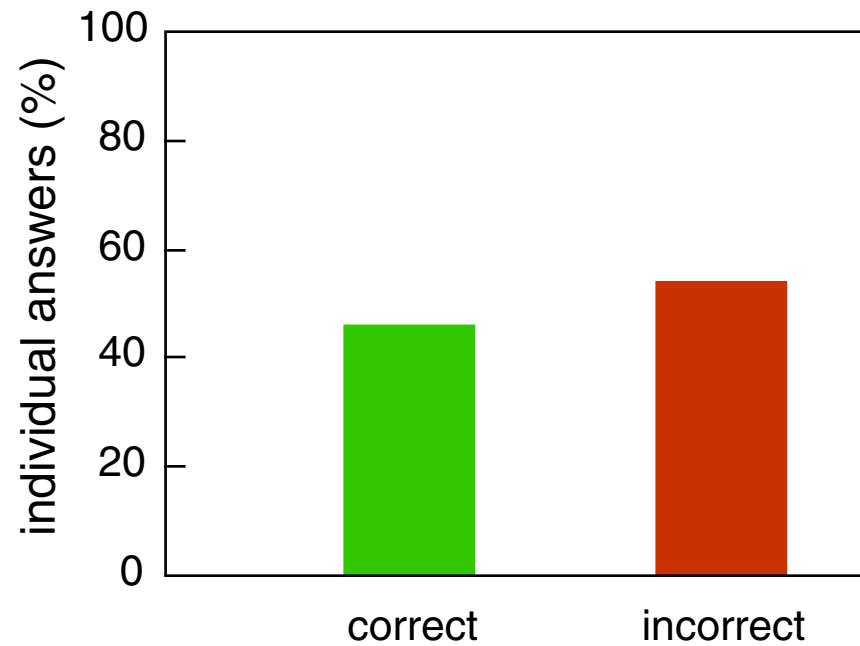
Peer Instruction

group answers



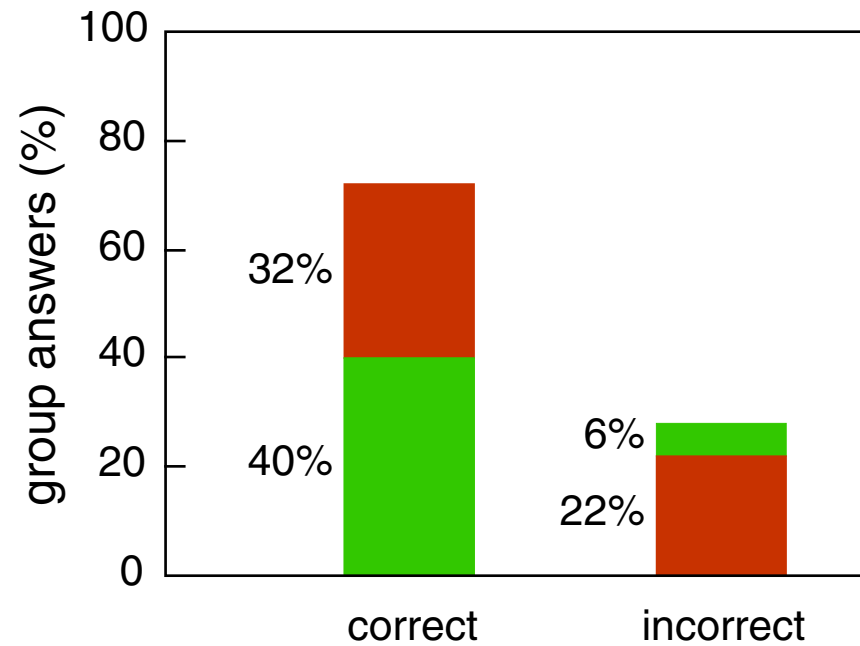
Peer Instruction

40 ConcepTests (± 5000 data points)



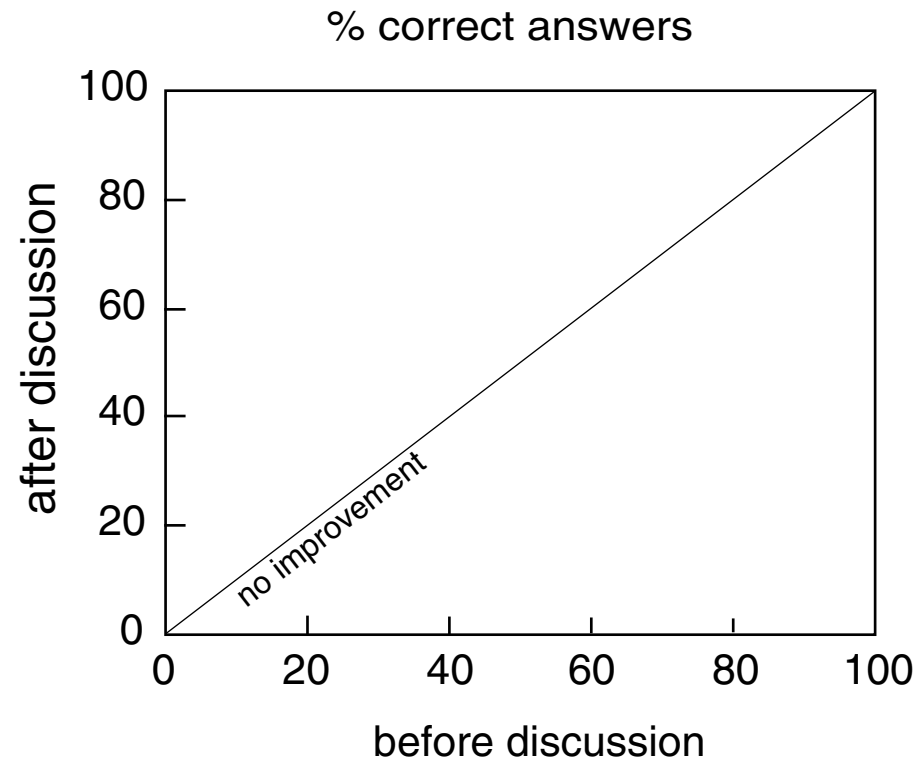
Peer Instruction

students converge on correct answer!



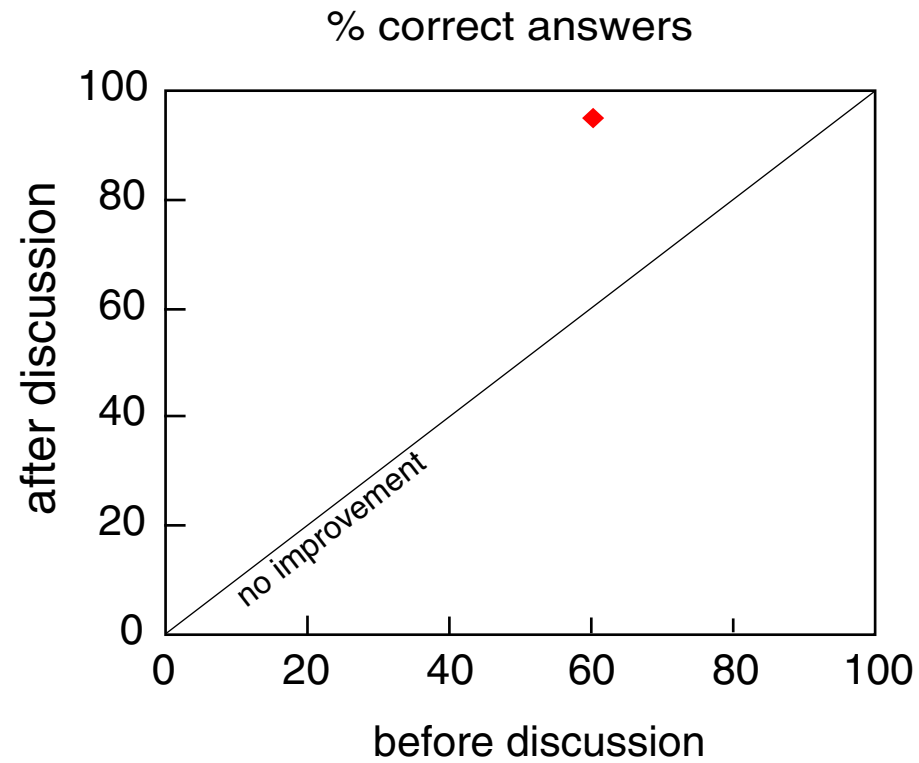
Peer Instruction

ConceptTest data



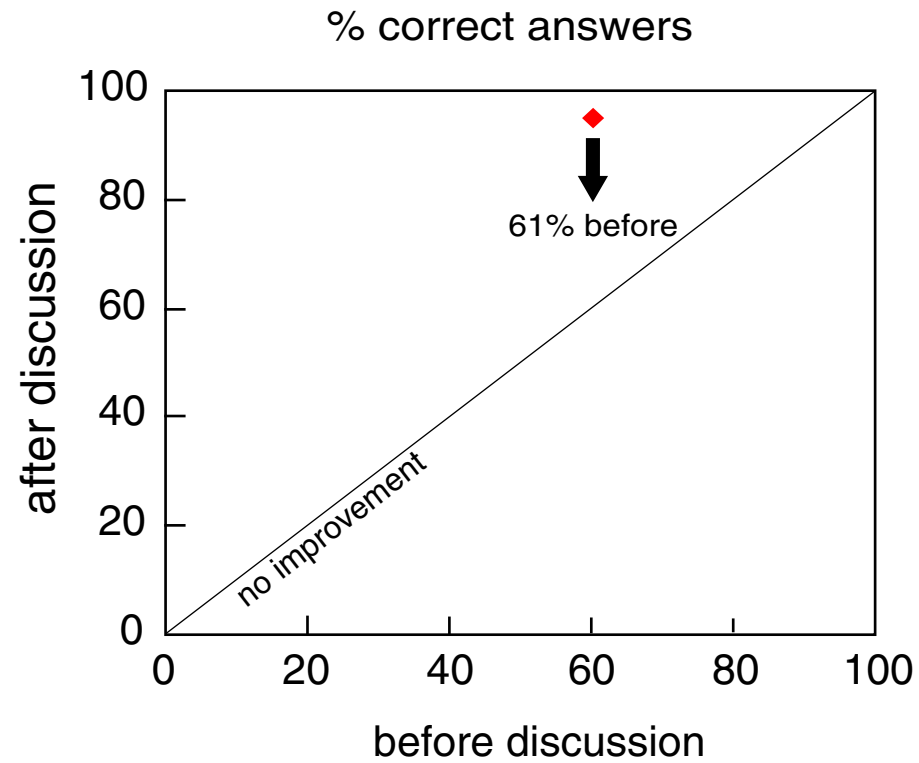
Peer Instruction

ConceptTest data



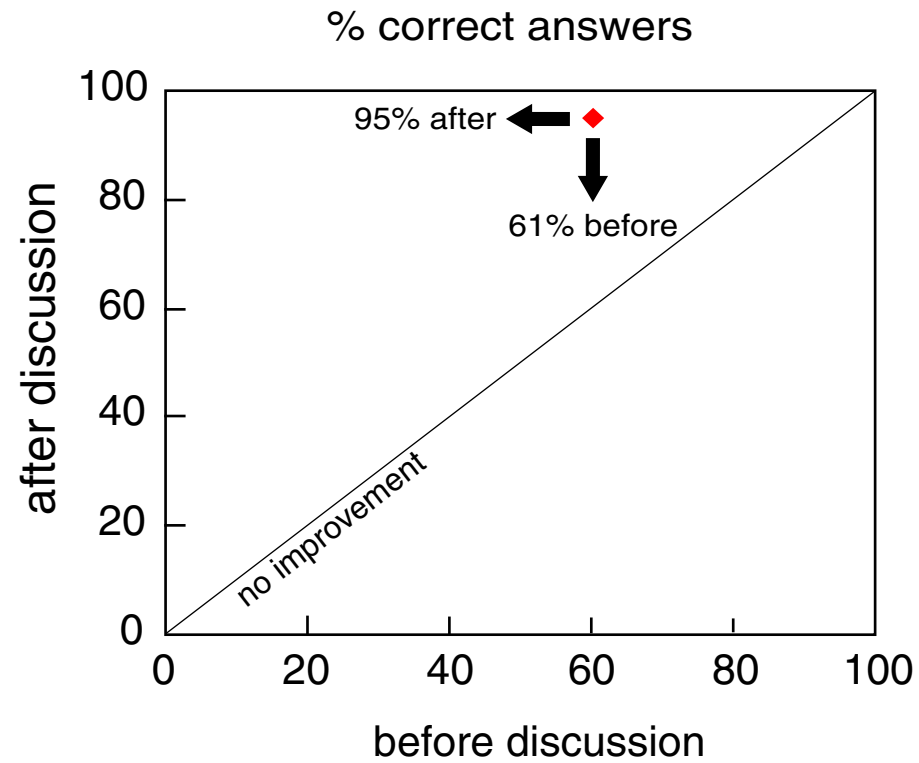
Peer Instruction

ConceptTest data



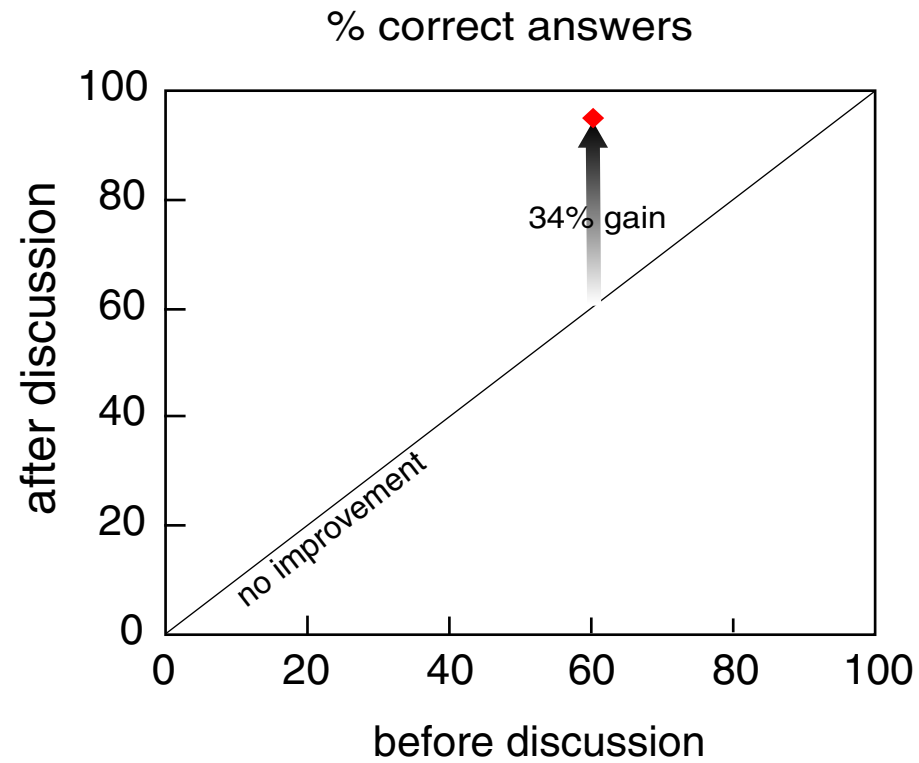
Peer Instruction

ConceptTest data



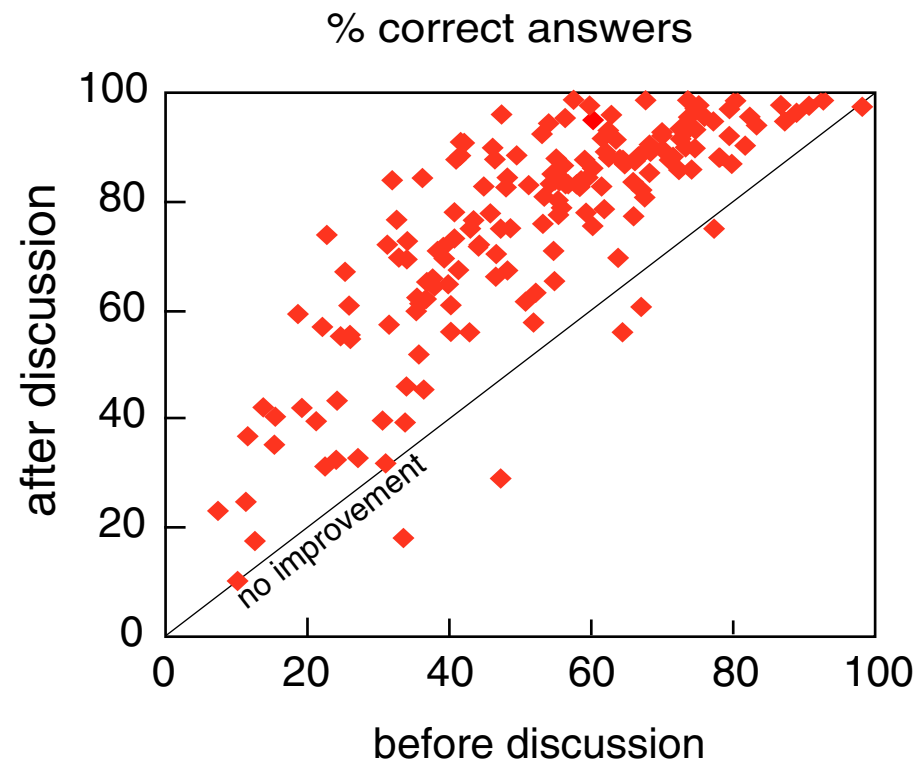
Peer Instruction

ConceptTest data



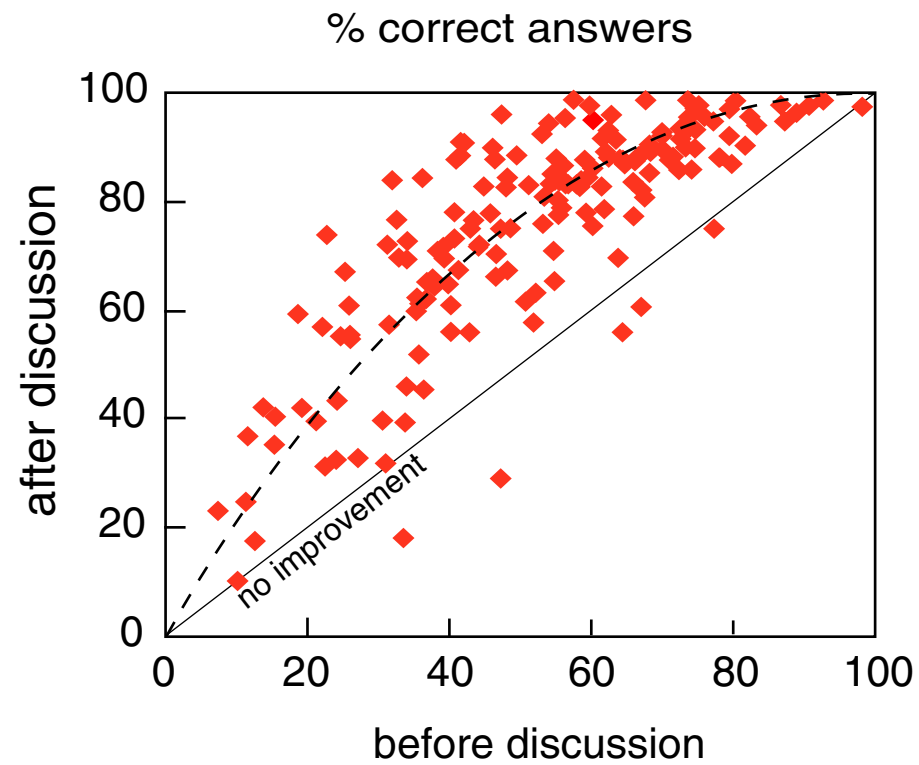
Peer Instruction

ConcepTest data



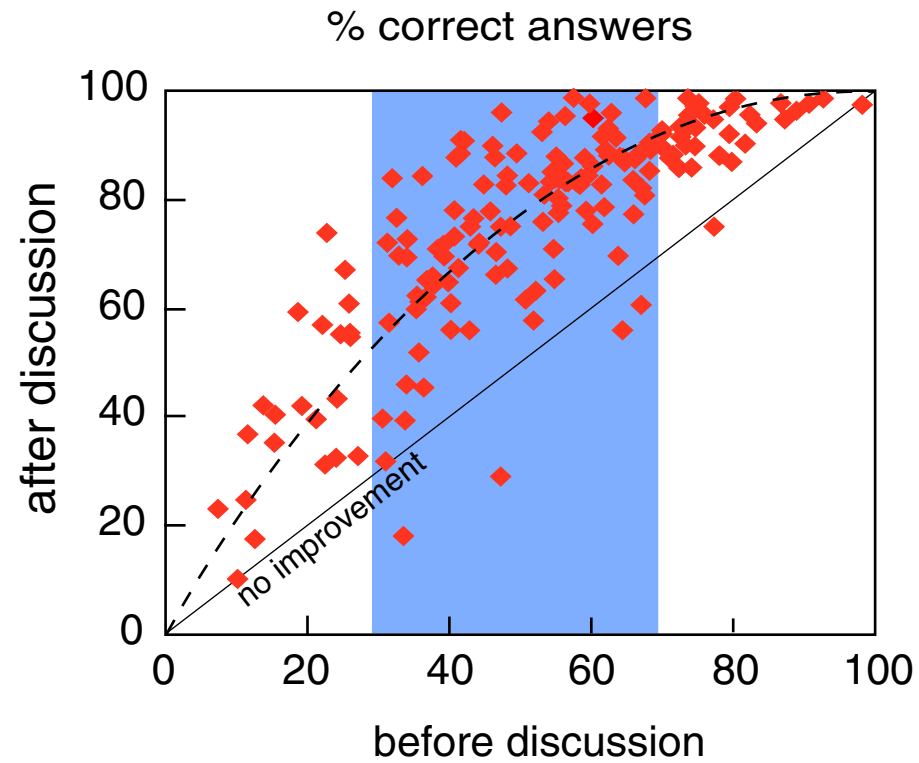
Peer Instruction

ConcepTest data



Peer Instruction

optimum range: 30–70%

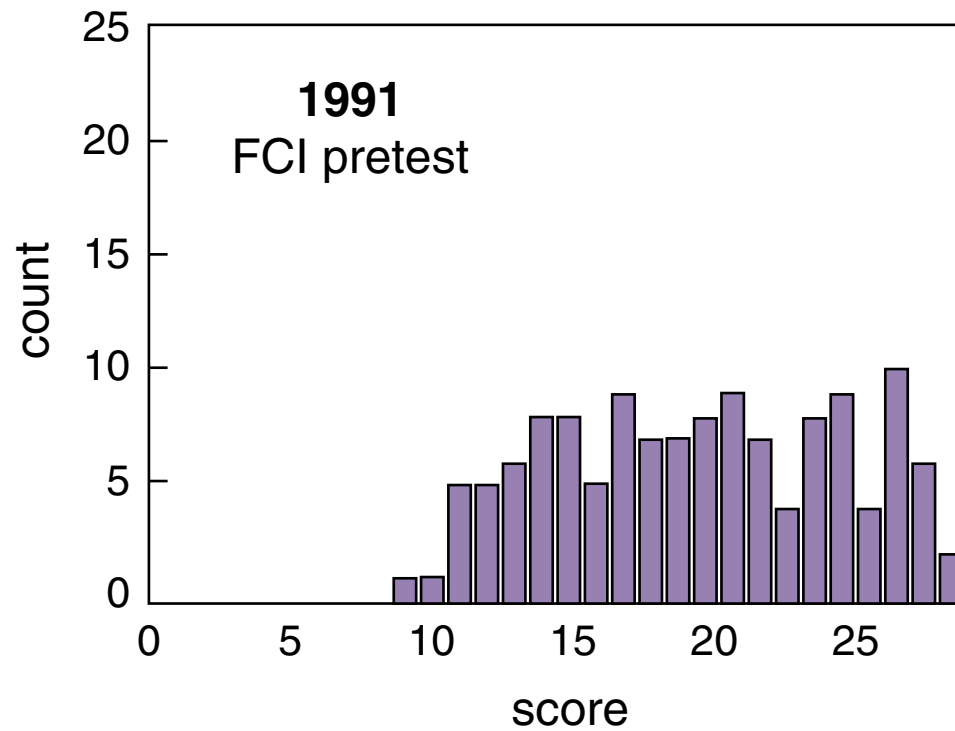


Results

is it any good?

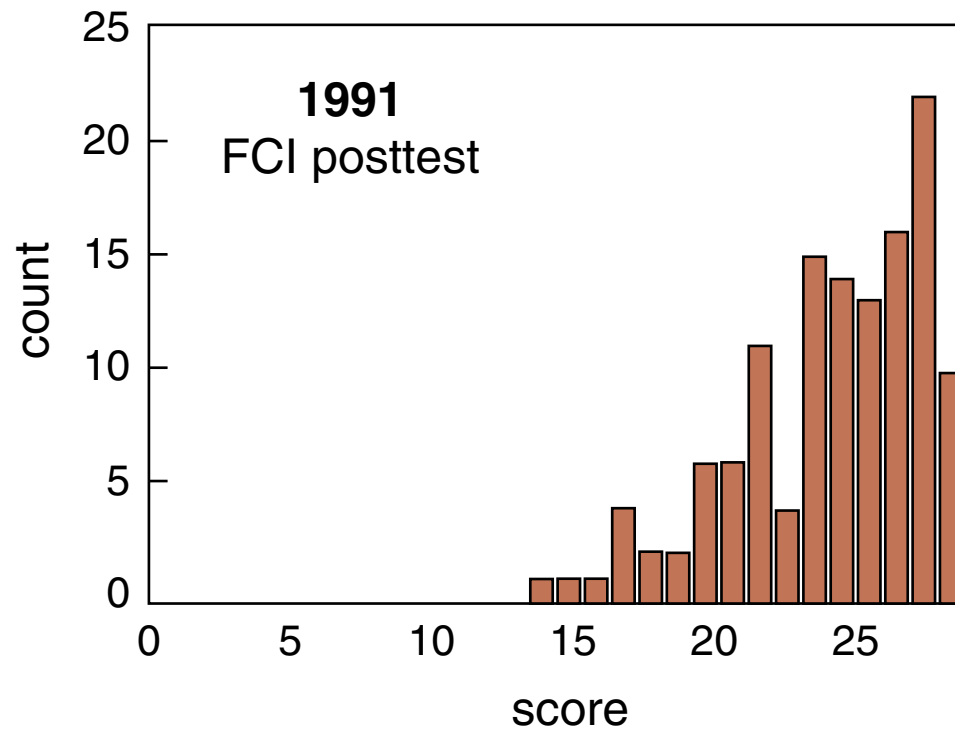
Results

first year of implementing PI



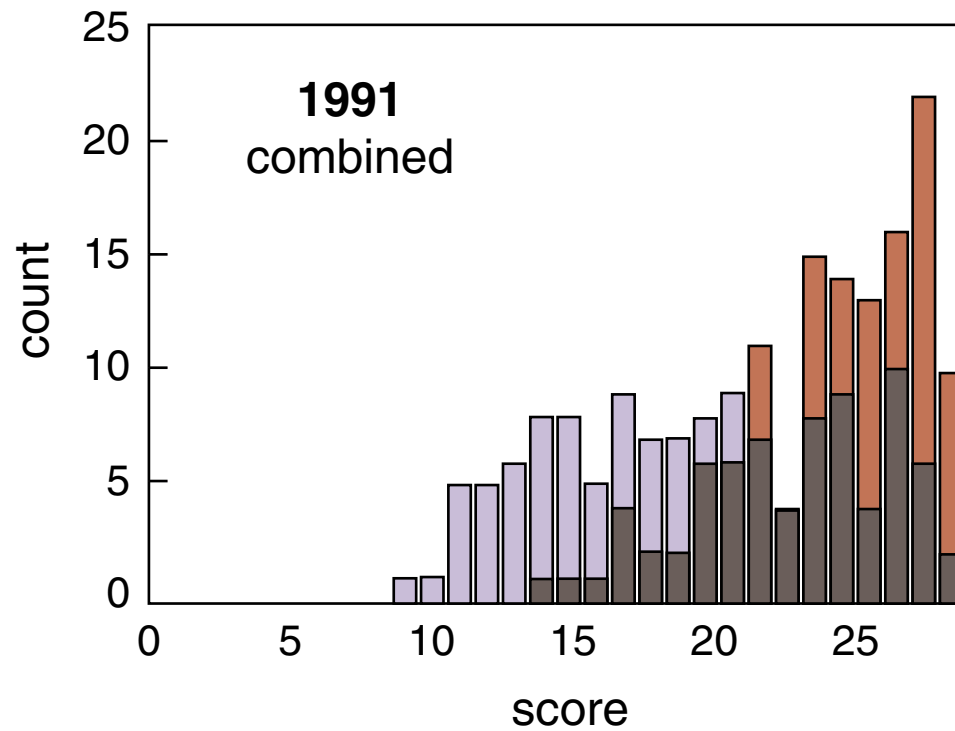
Results

first year of implementing PI

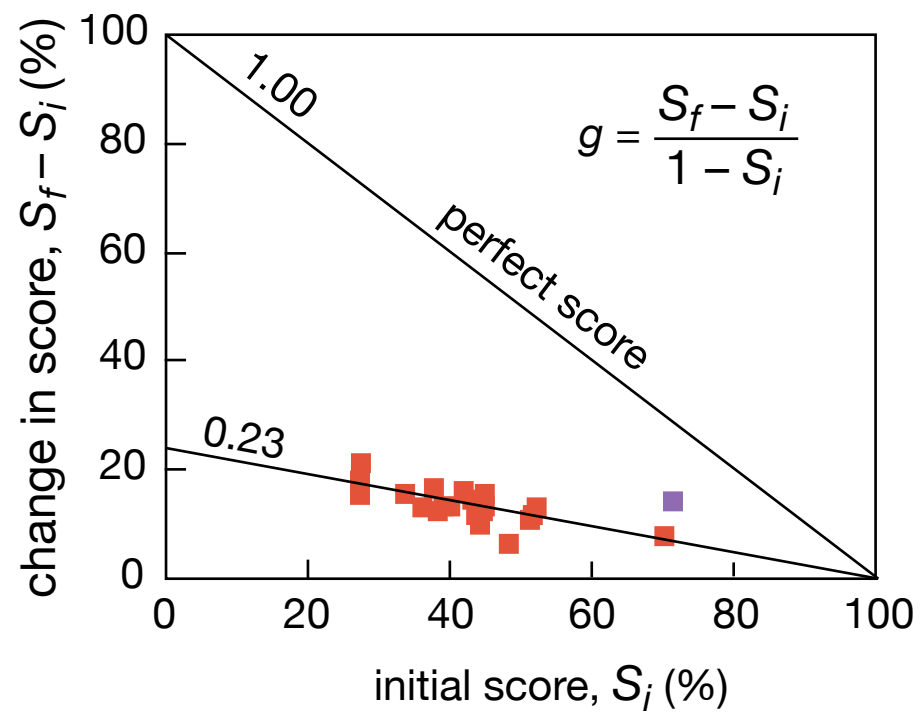


Results

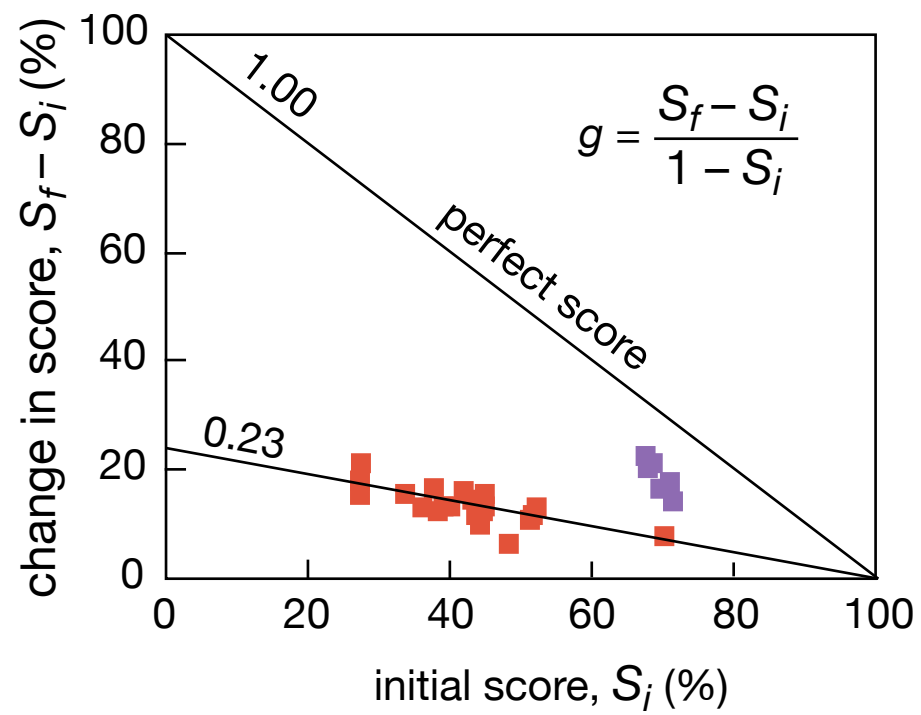
first year of implementing PI



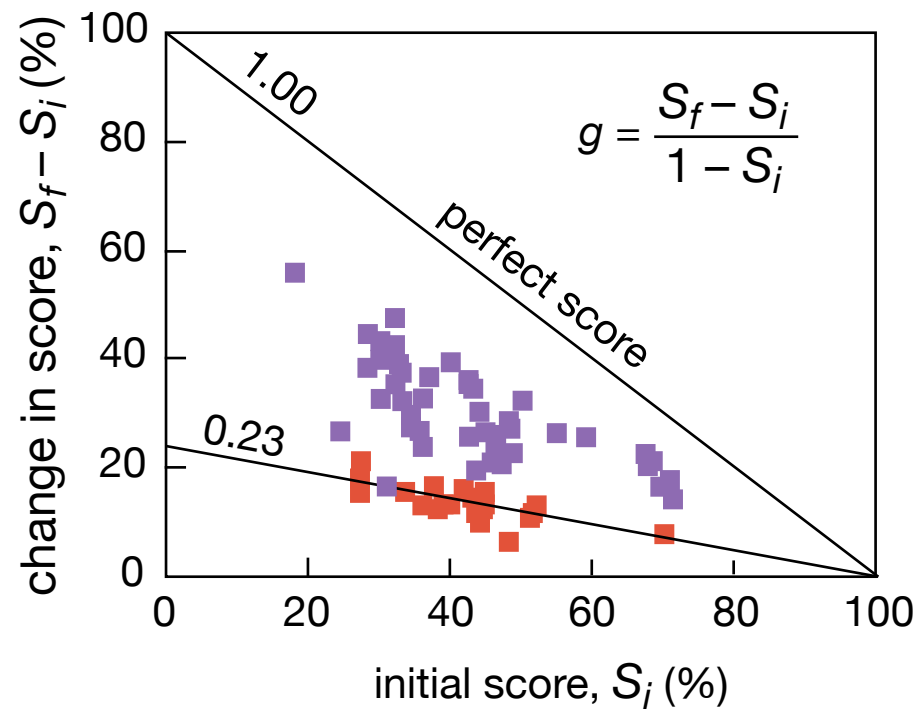
Results



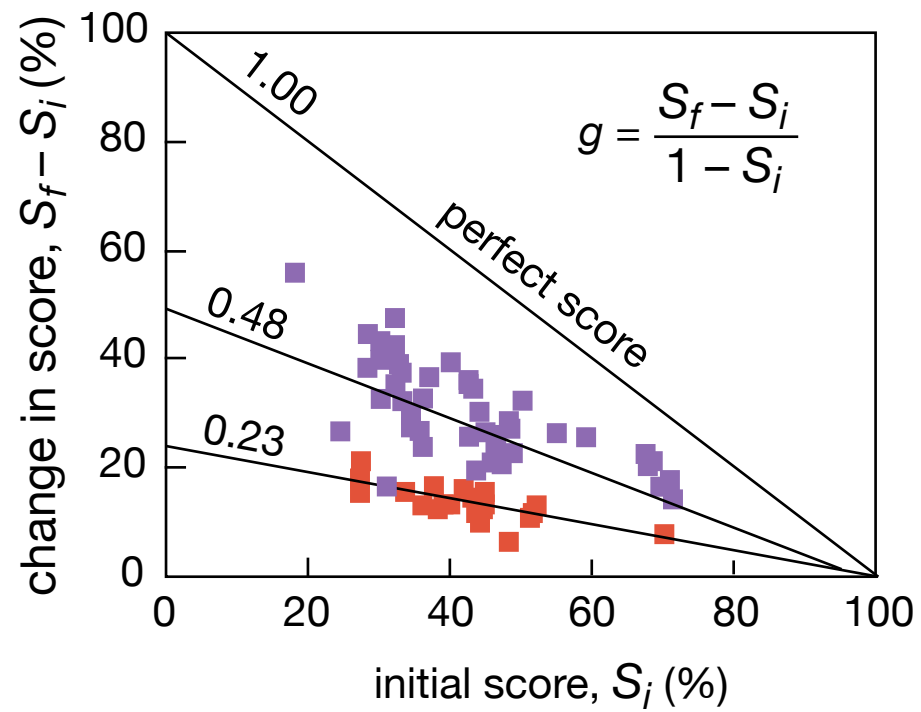
Results



Results



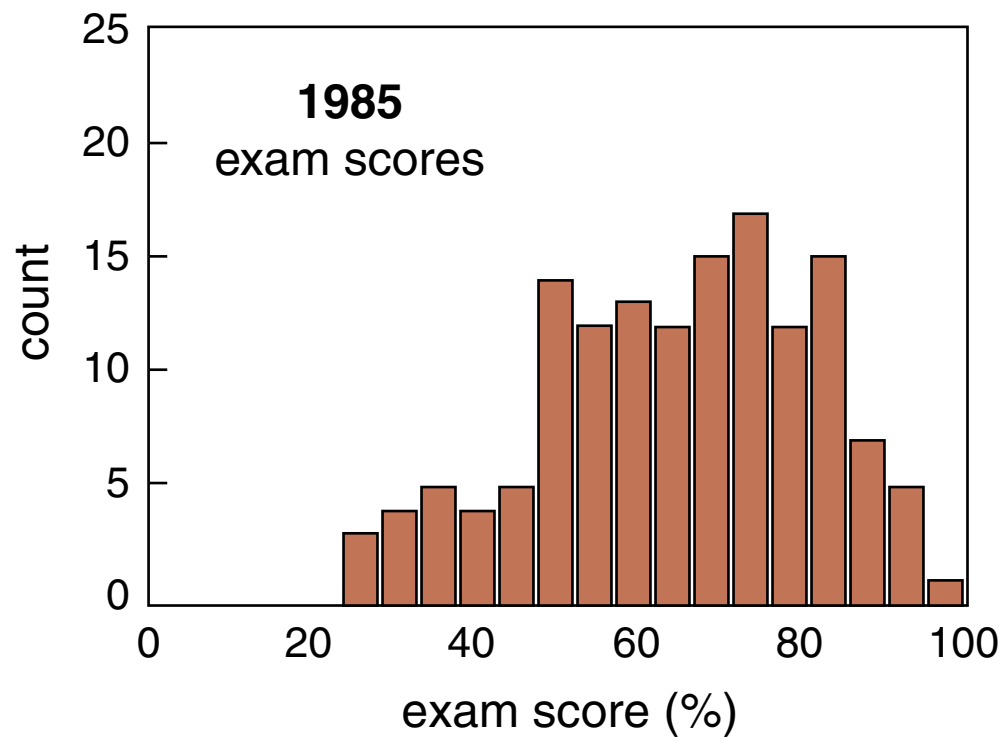
Results



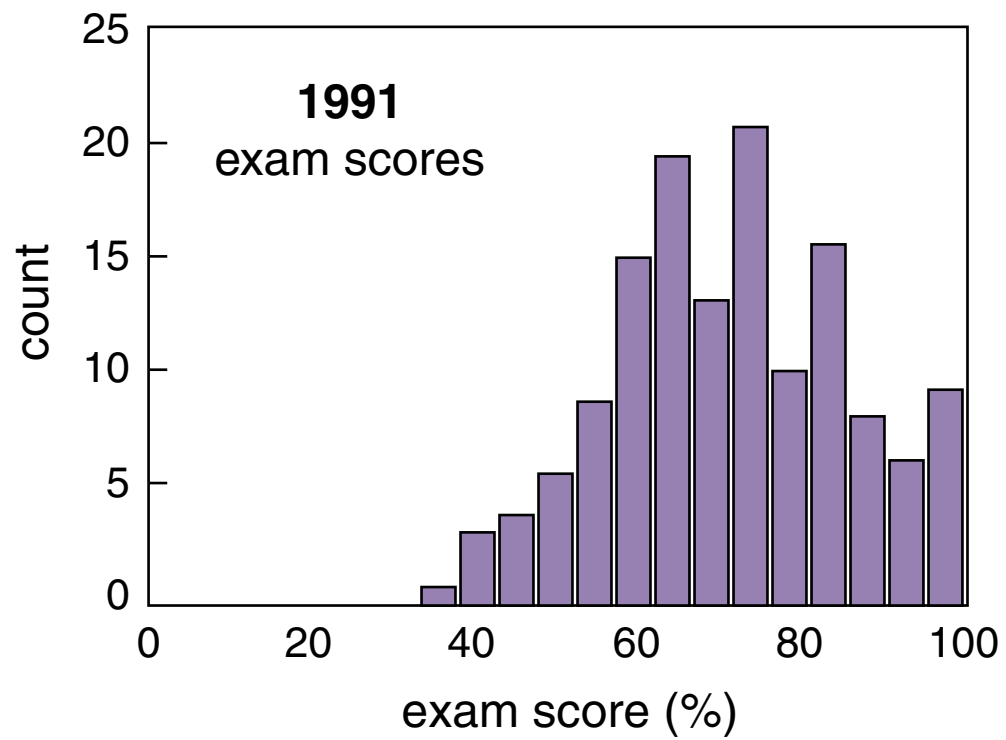
Results

what about problem solving?

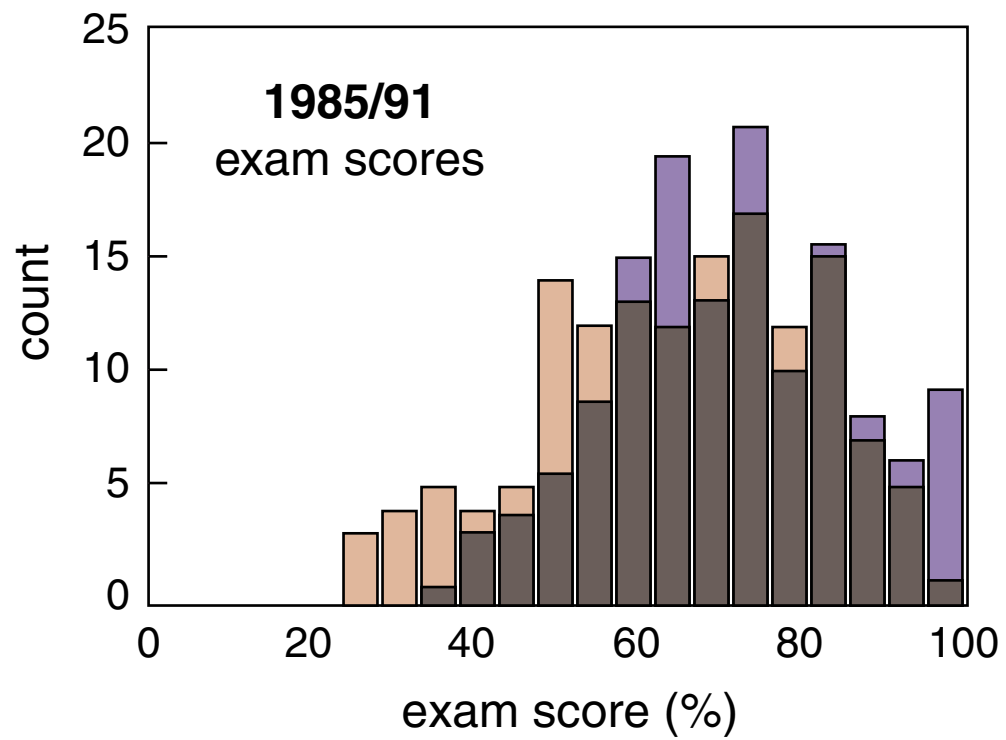
Results



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>