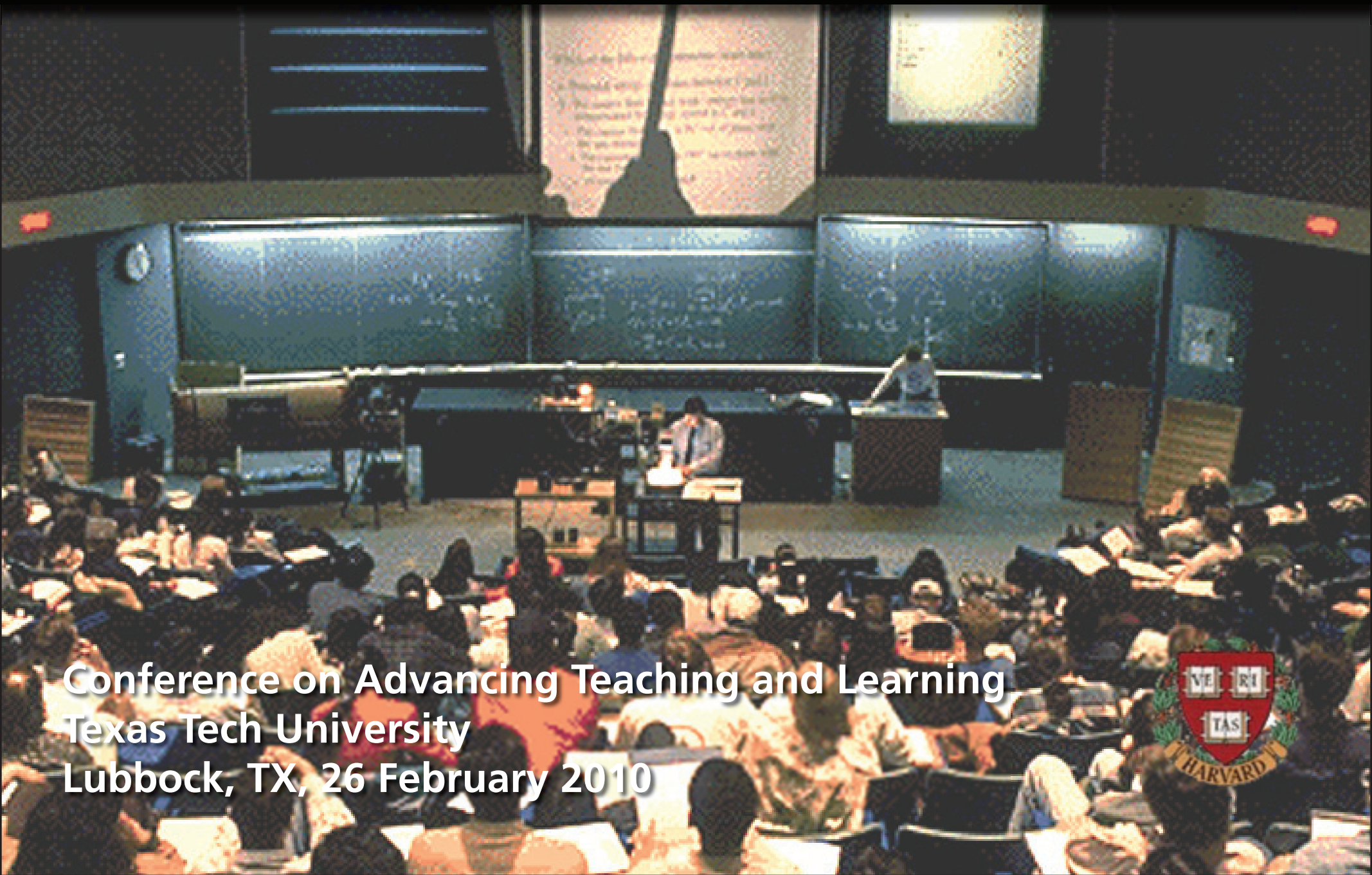


# Turning lectures into learning



Conference on Advancing Teaching and Learning  
Texas Tech University  
Lubbock, TX, 26 February 2010



# My message

shift focus from "teaching" to helping students learn



# Outline

- Education

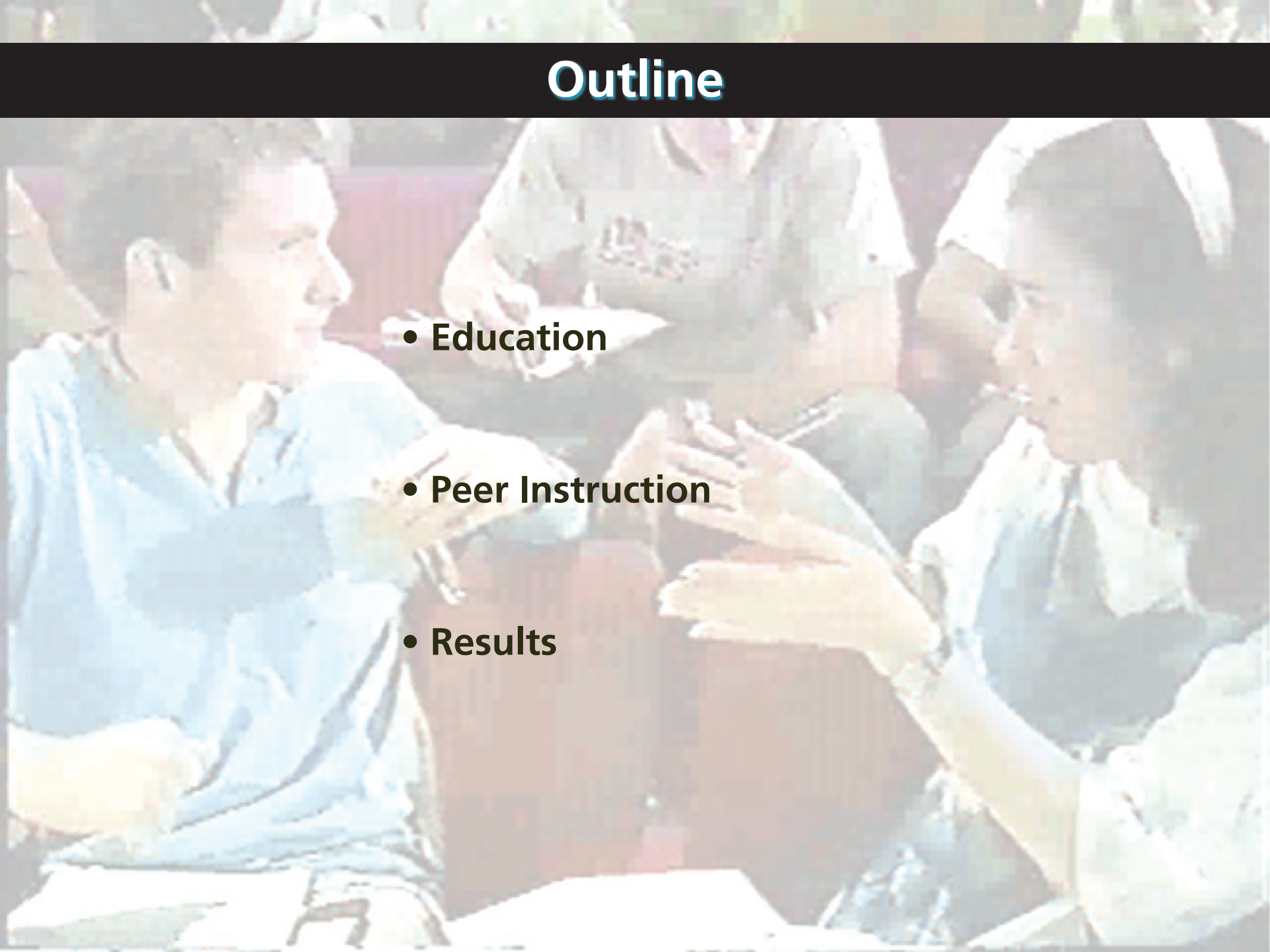


# Outline

- Education
- Peer Instruction



# Outline

- Education
  - Peer Instruction
  - Results
- 



# Education



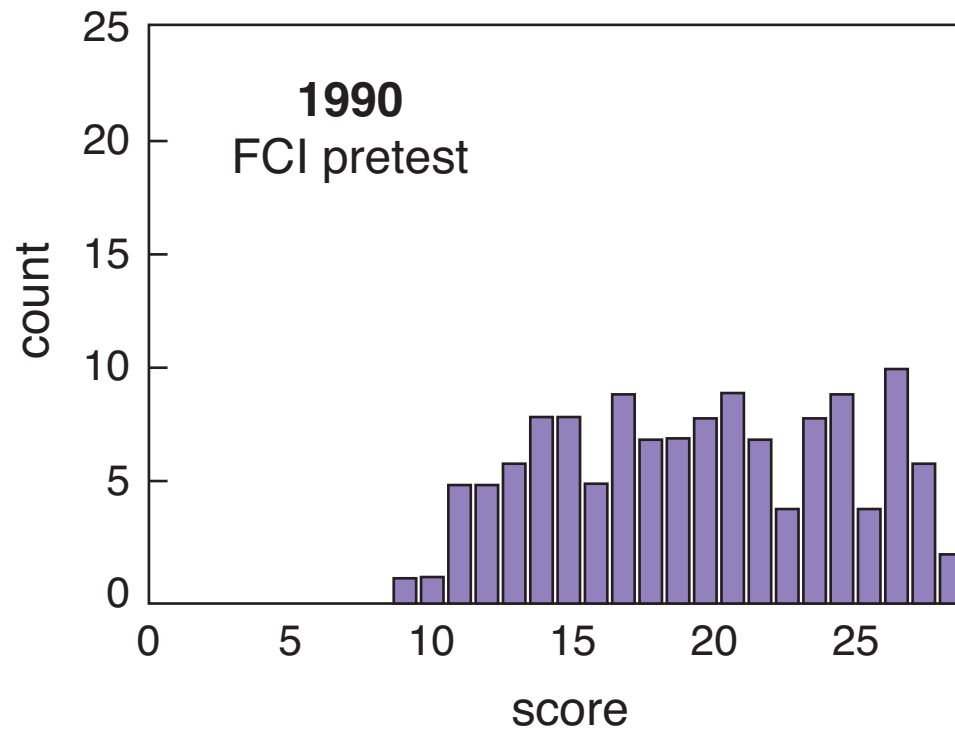
# Education

lectures focus on delivery of information

A wide-angle photograph of a large lecture hall. At the front of the room, a lecturer stands behind a podium, addressing the audience. The room is filled with students seated at long desks, many of whom are looking towards the front. The walls are dark, and there are large windows or screens at the front. The overall atmosphere is that of a formal educational setting.

# Education

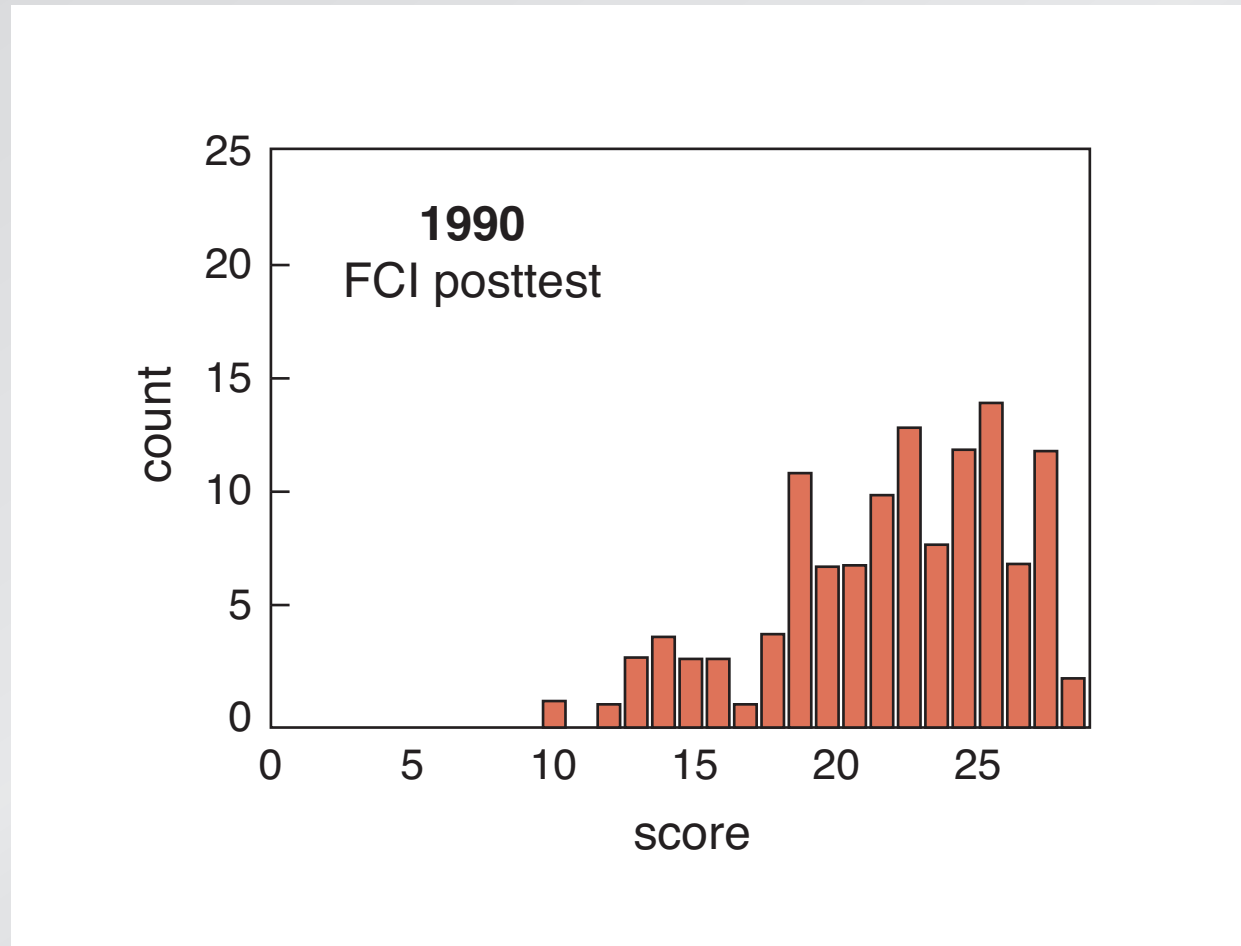
education is not just information transfer





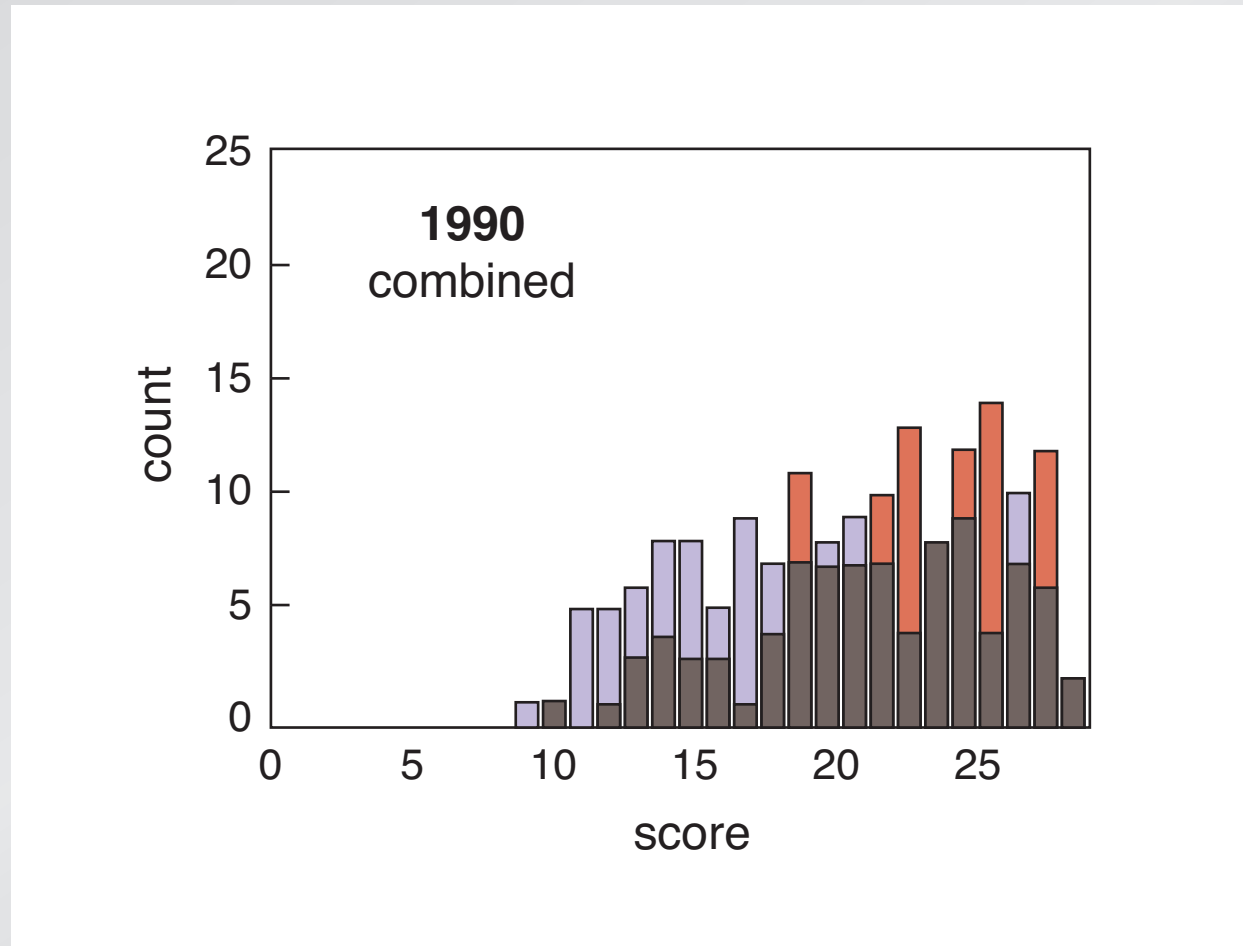
# Education

education is not just information transfer

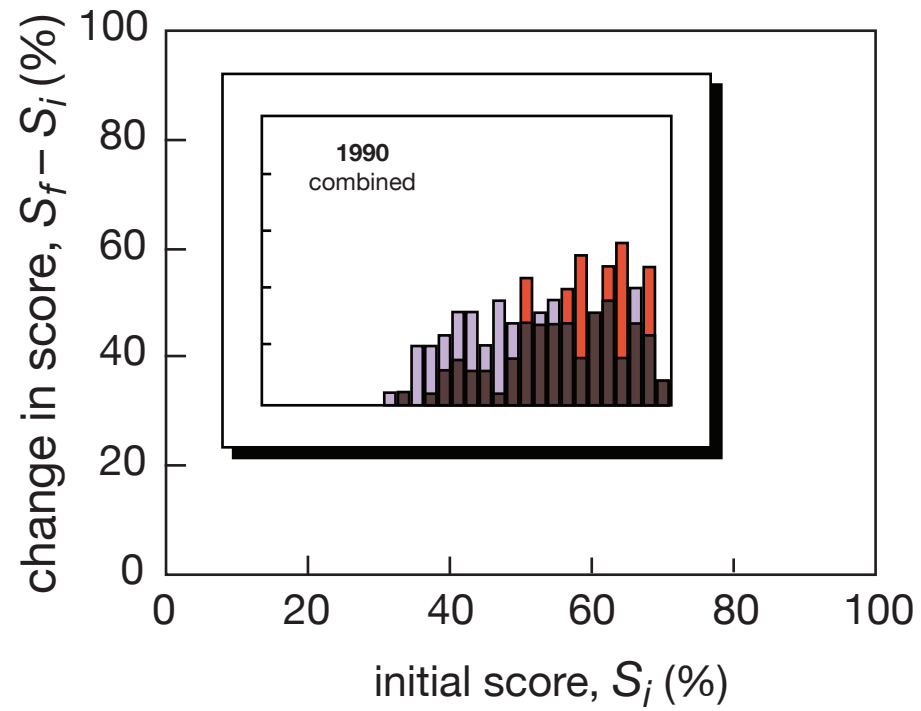


# Education

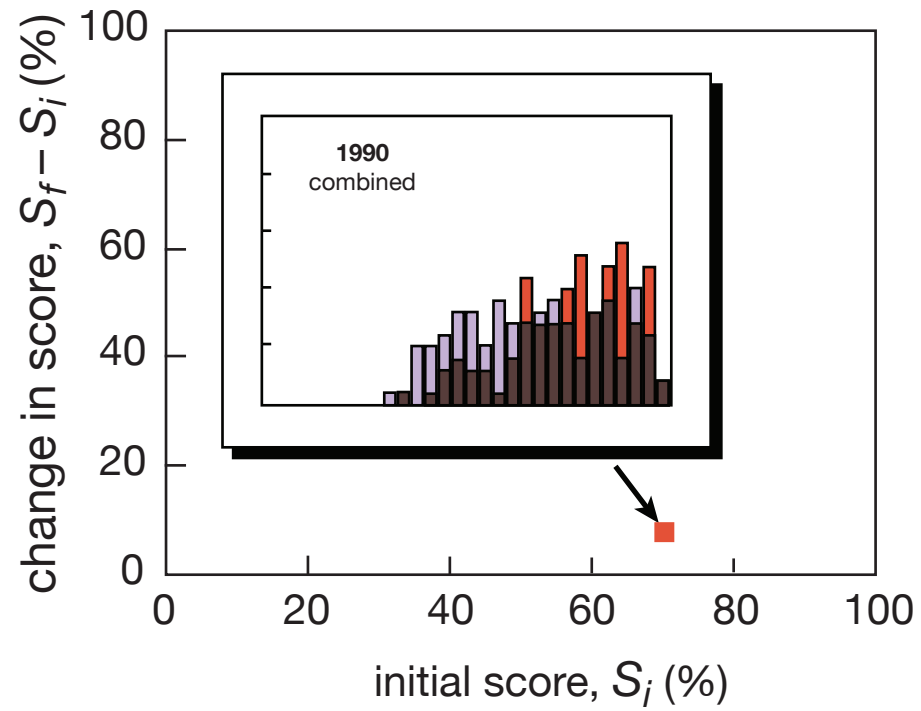
education is not just information transfer



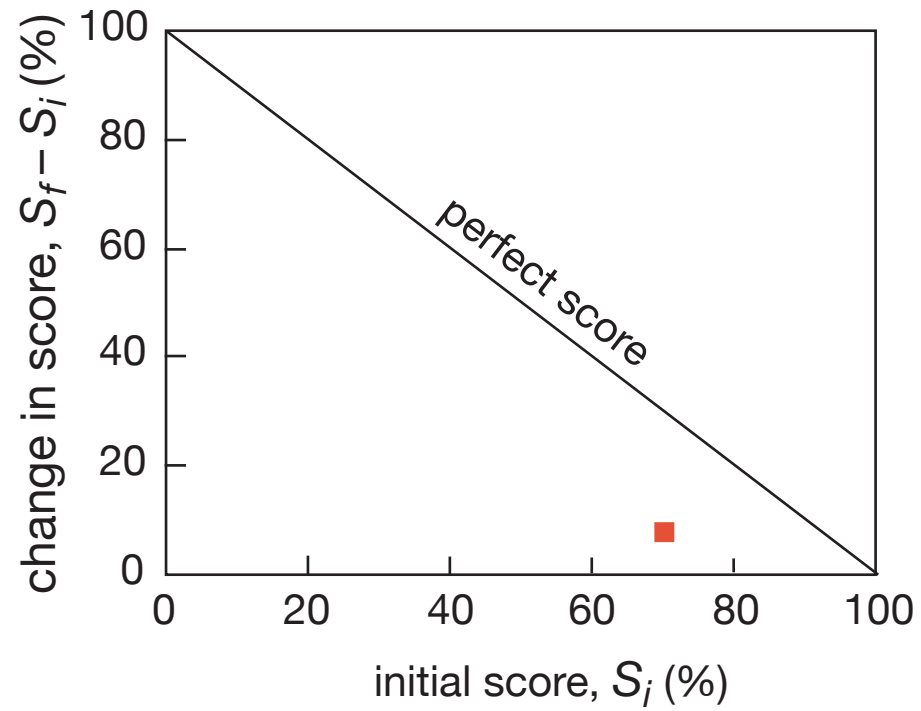
# Education



# Education

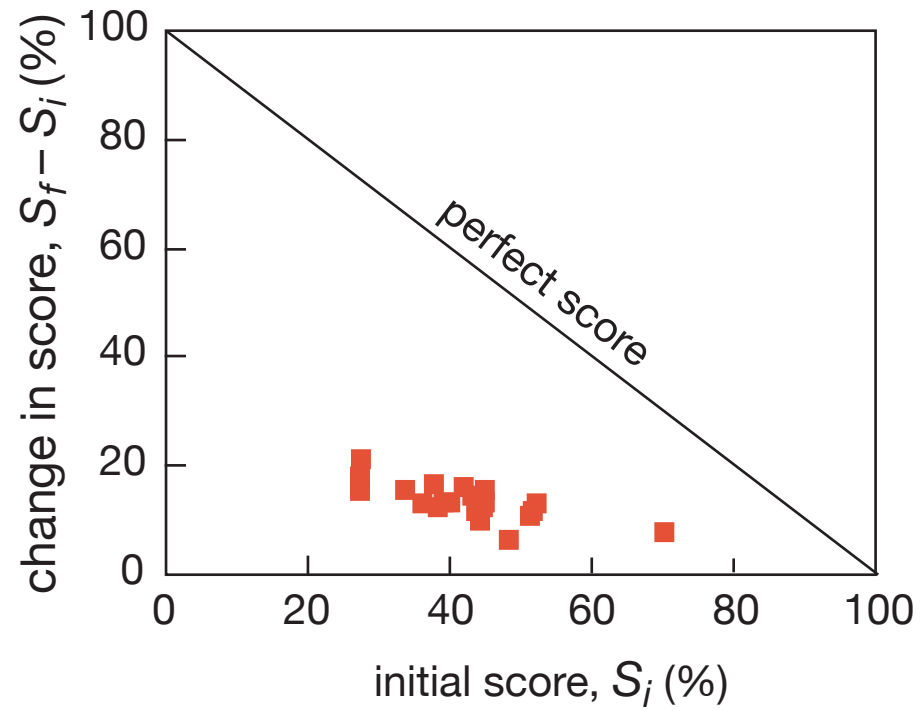


# Education



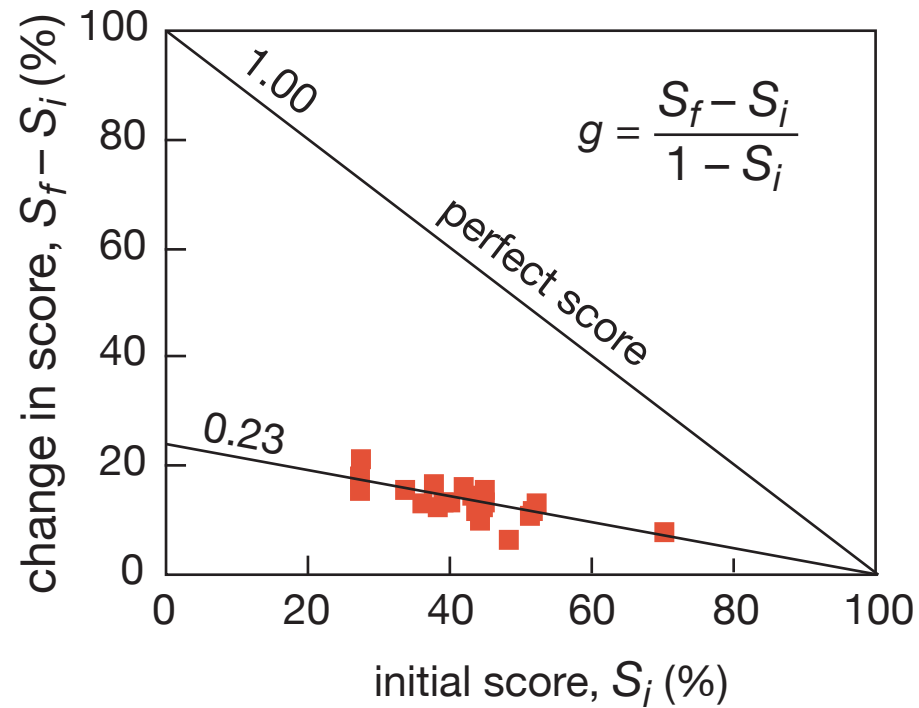


# Education



# Education

only one quarter of maximum gain realized



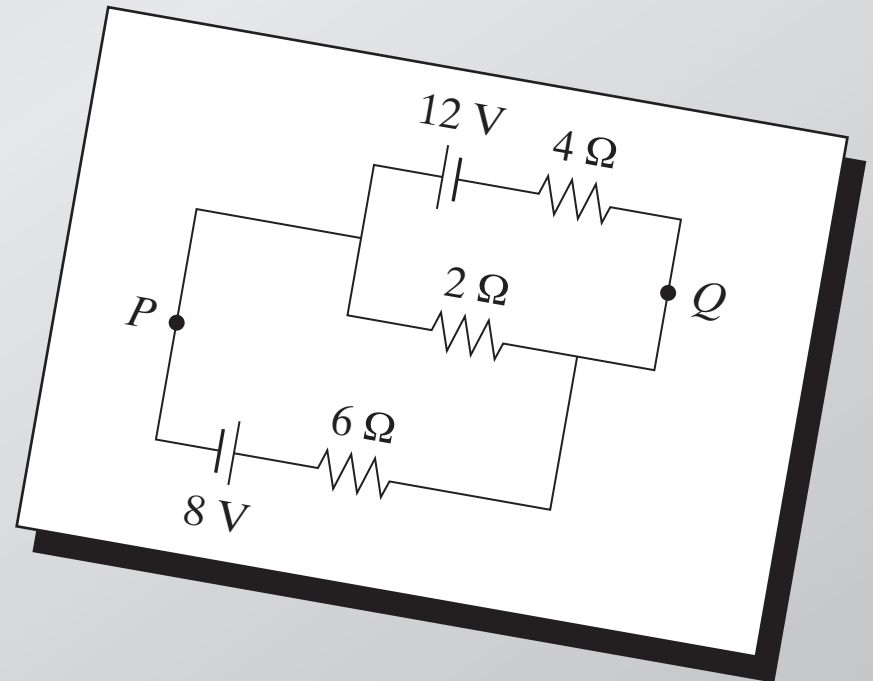
# Education

**not transfer but assimilation of information is key**

A large lecture hall with a professor at a podium and students seated at desks. The room is filled with students, many of whom are looking towards the front. The professor is standing at a podium, addressing the class. The room has a curved wall and a large screen at the front. The text "not transfer but assimilation of information is key" is overlaid on the image.

# Education

conventional problems misleading



# Education

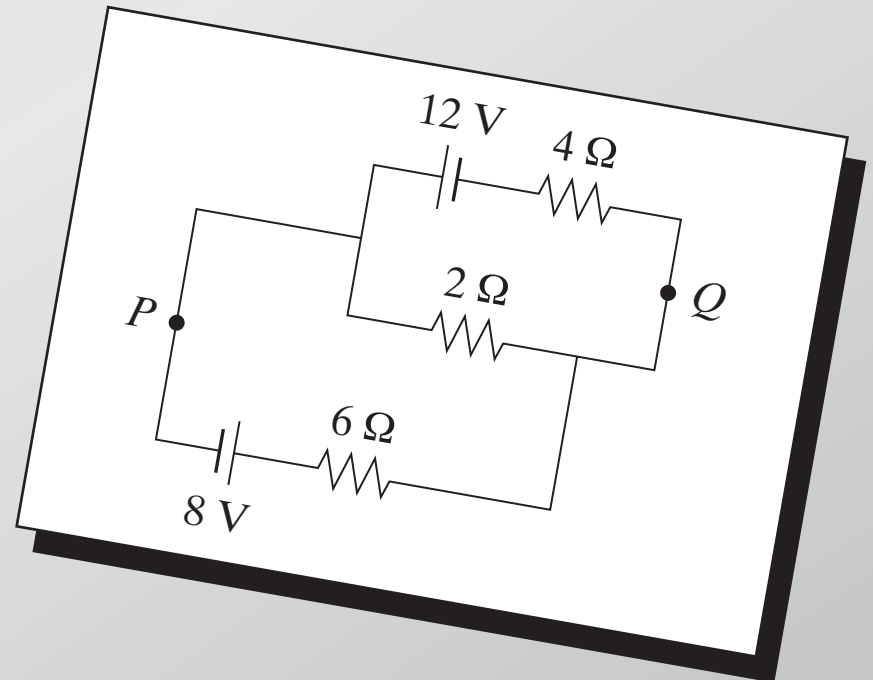
conventional problems misleading

Calculate:

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

(b) potential difference

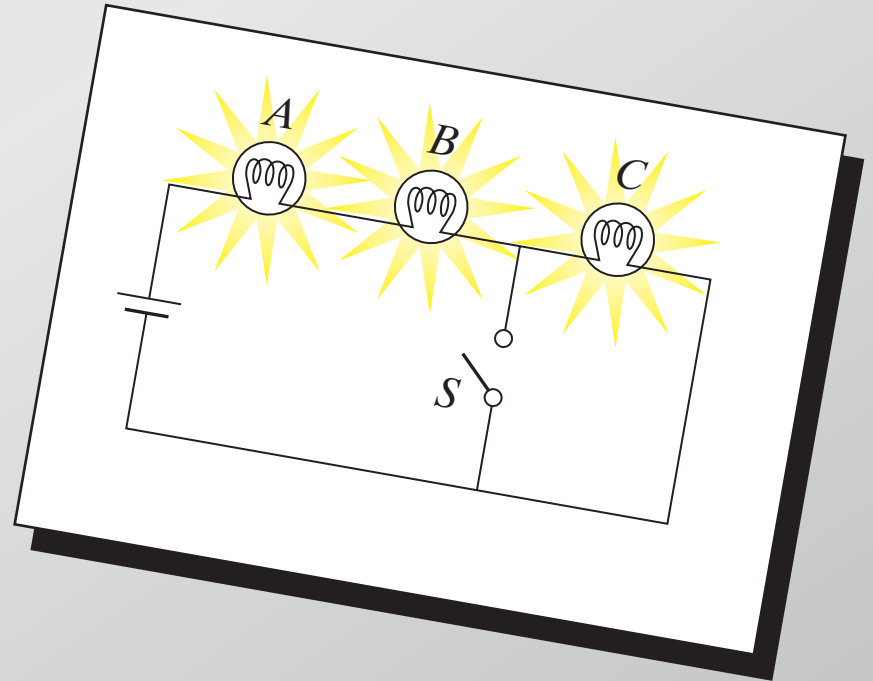
between  $P$  and  $Q$





# Education

are the basic principles understood?

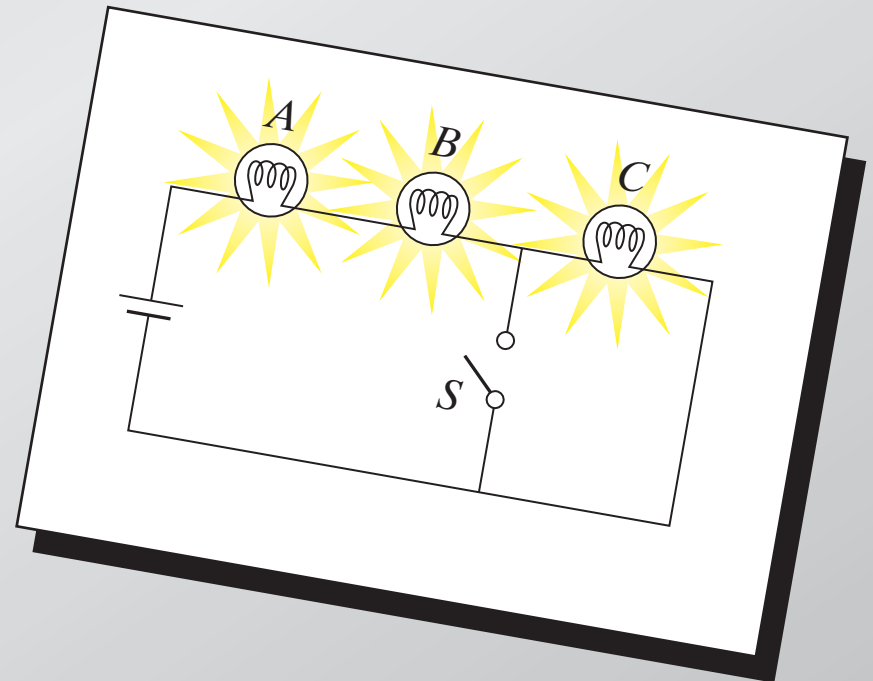


# Education

are the basic principles understood?

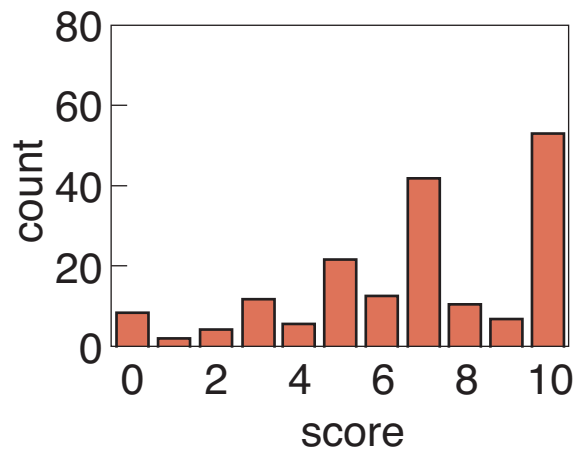
When  $S$  is closed, what happens to:

- (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?

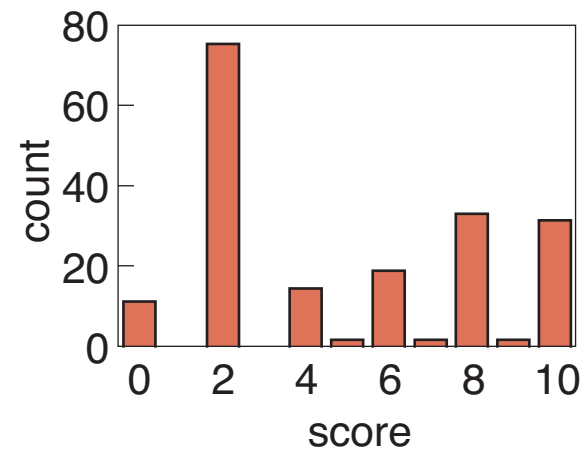


# Education

**conventional**

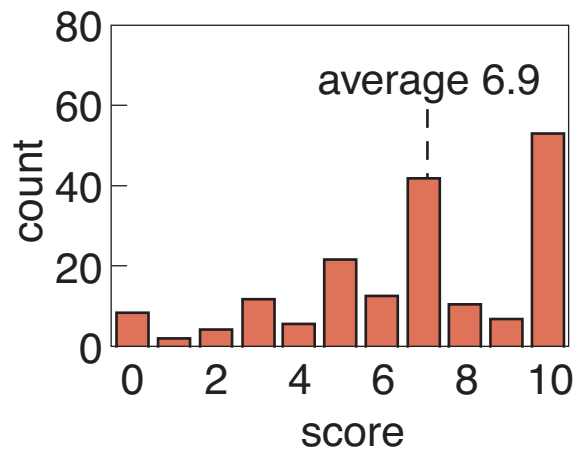


**conceptual**

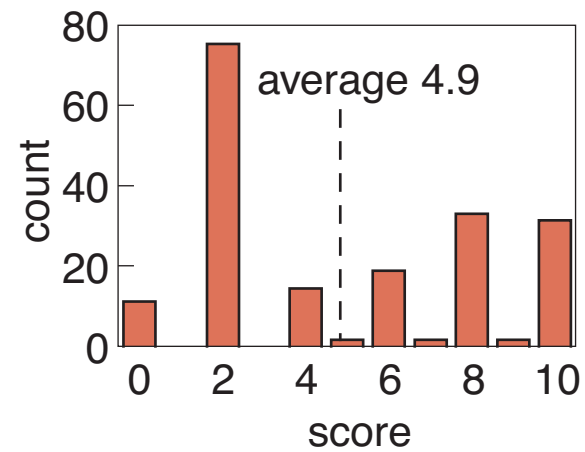


# Education

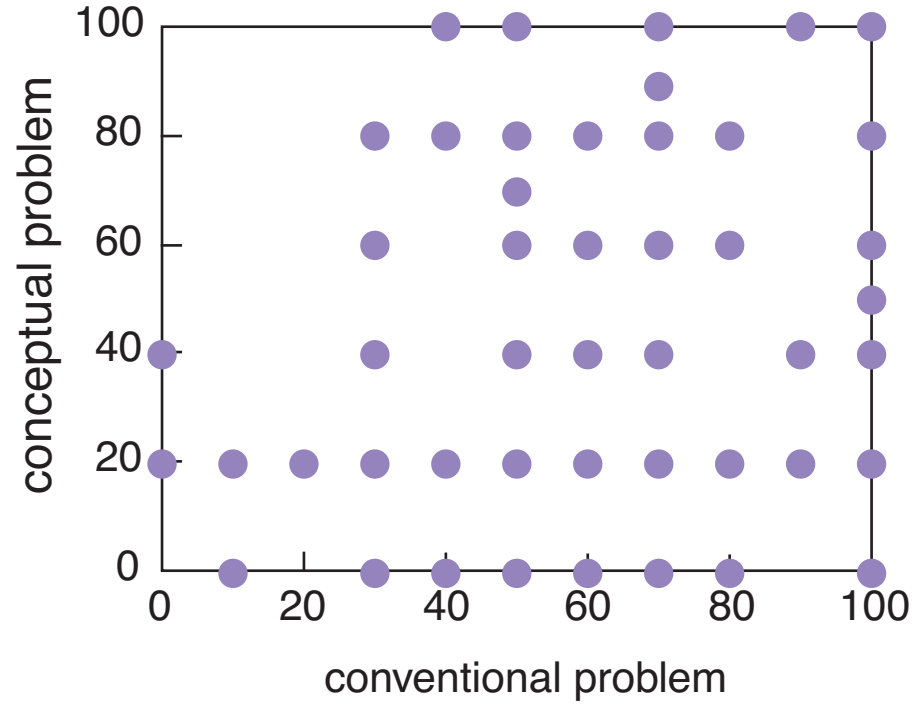
## conventional



## conceptual

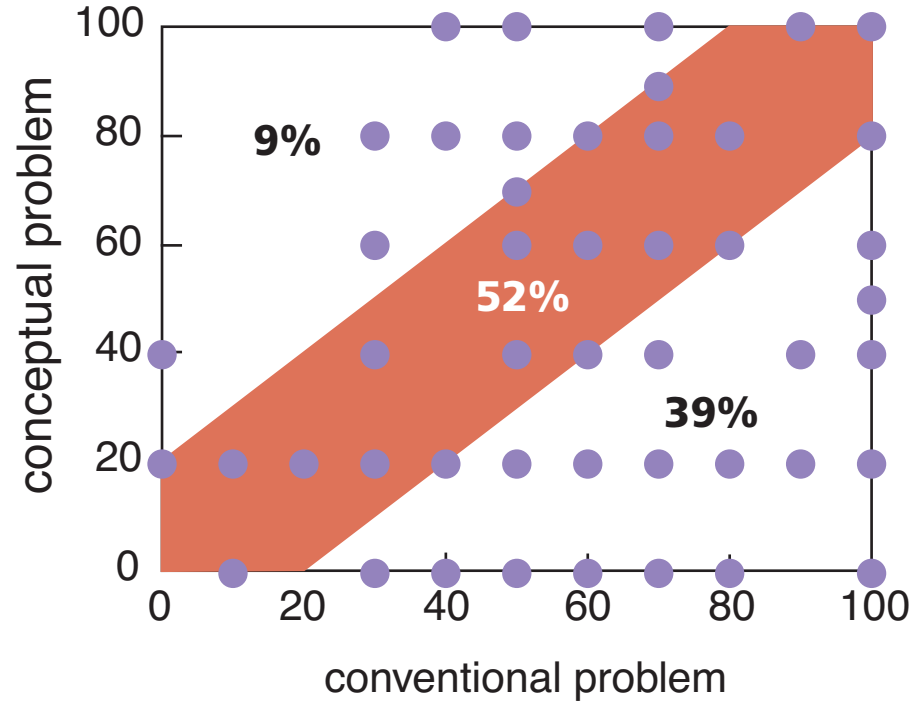


# Education





# Education



A large lecture hall filled with students seated at desks, facing a stage. A lecturer is standing at a podium on the stage, and a large screen behind them displays text. The text on the screen is partially legible and appears to be a list or a set of instructions. The room is dimly lit, with the stage area being the primary light source.

So what should we do?

# Peer Instruction

**Give students more responsibility for gathering information...**

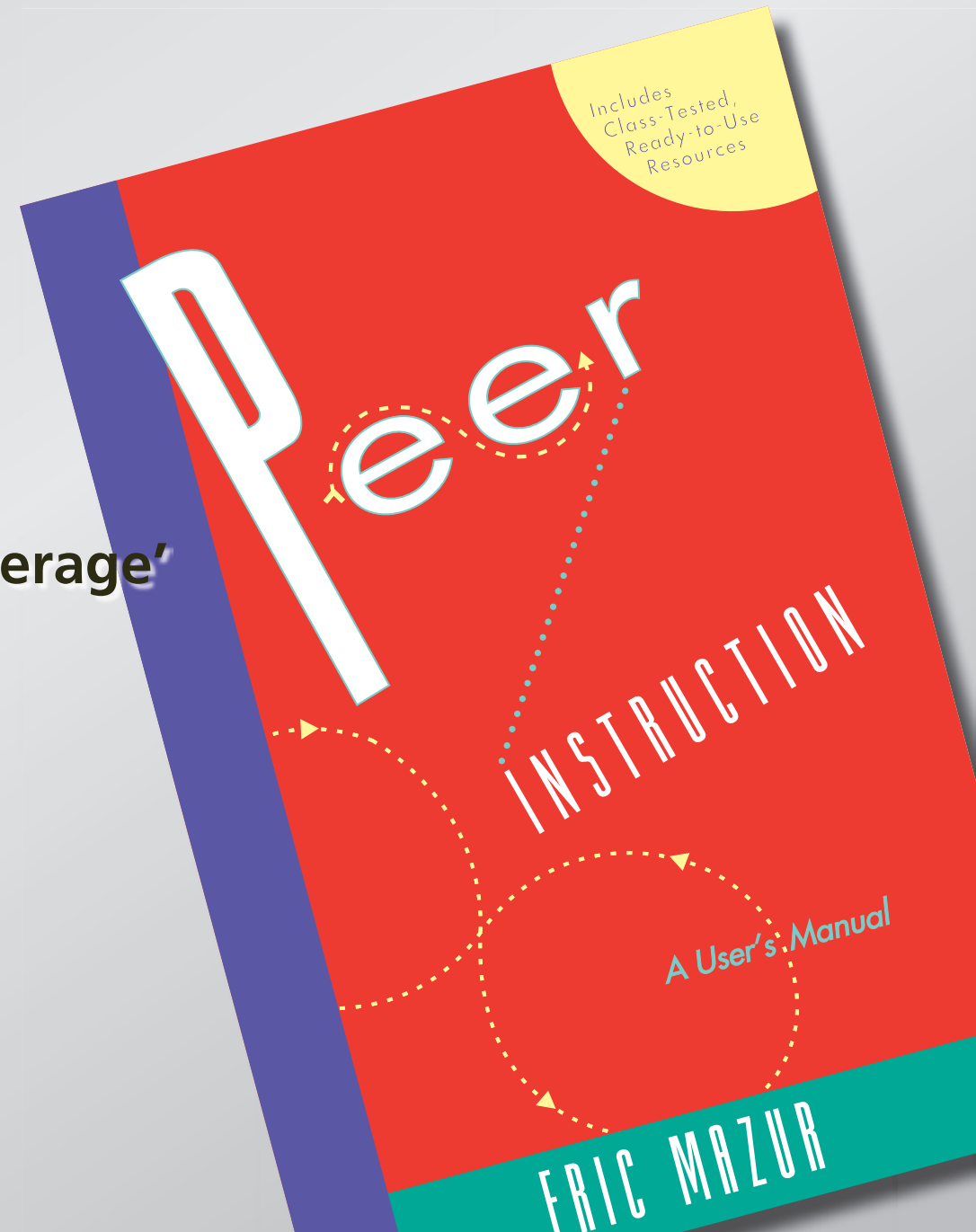
# Peer Instruction

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

# Peer Instruction

## 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**



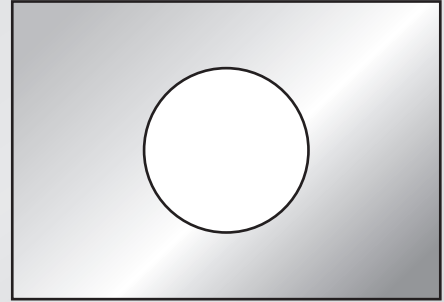
# Let's try it!



- no ON/OFF button
- only last "click" counts
- display shows recorded answer

# Let's try it!

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

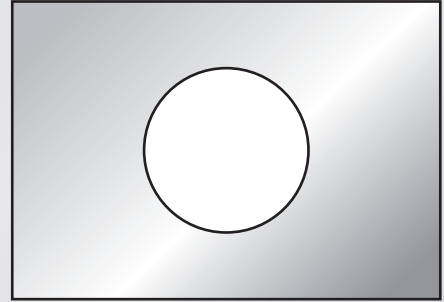


# Let's try it!

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.

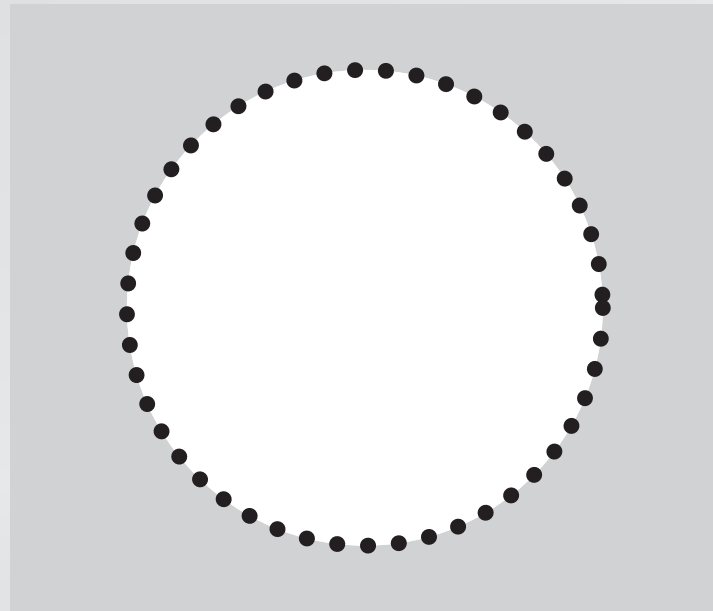


**Let's try it!**

*It's easy to fire up the audience!*

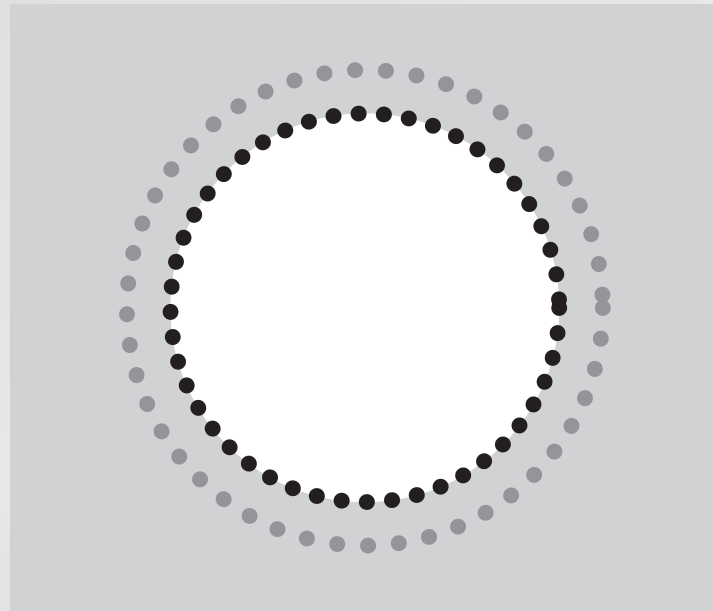
# Let's try it!

consider the atoms at the rim of the hole



# Let's try it!

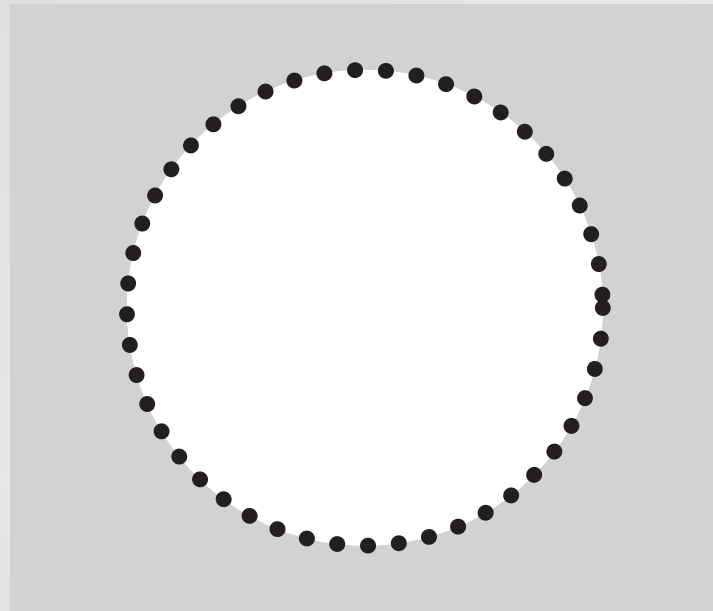
consider the atoms at the rim of the hole





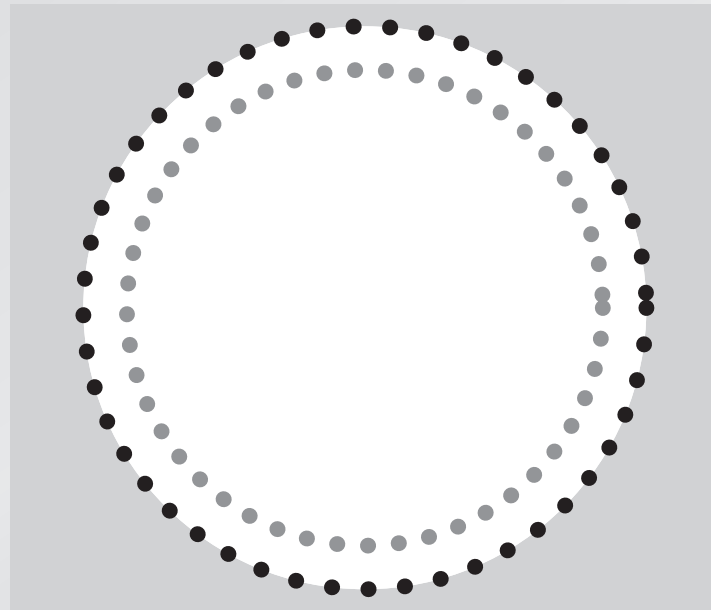
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# Let's try it!

consider the atoms at the rim of the hole

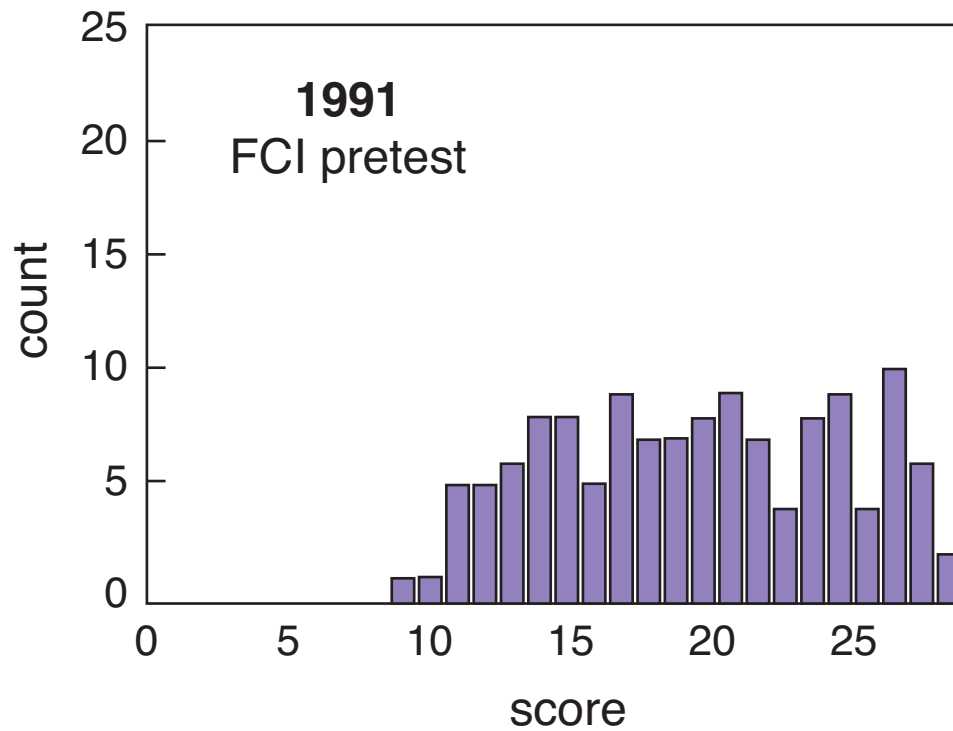


# Results

**is it any good?**

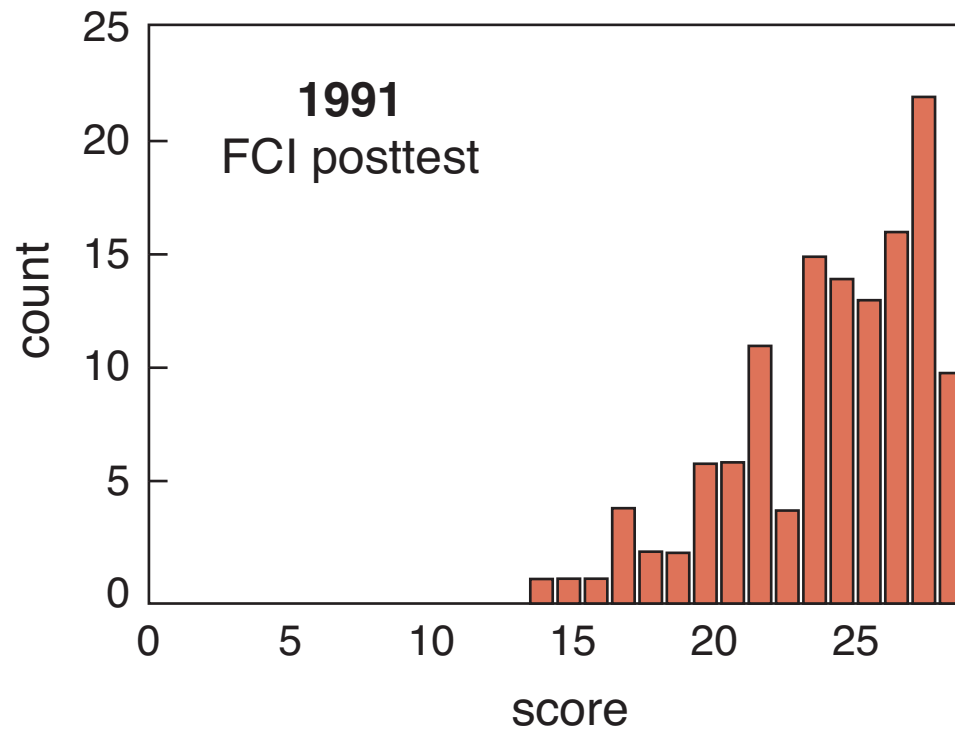
# Results

## first year of implementing PI



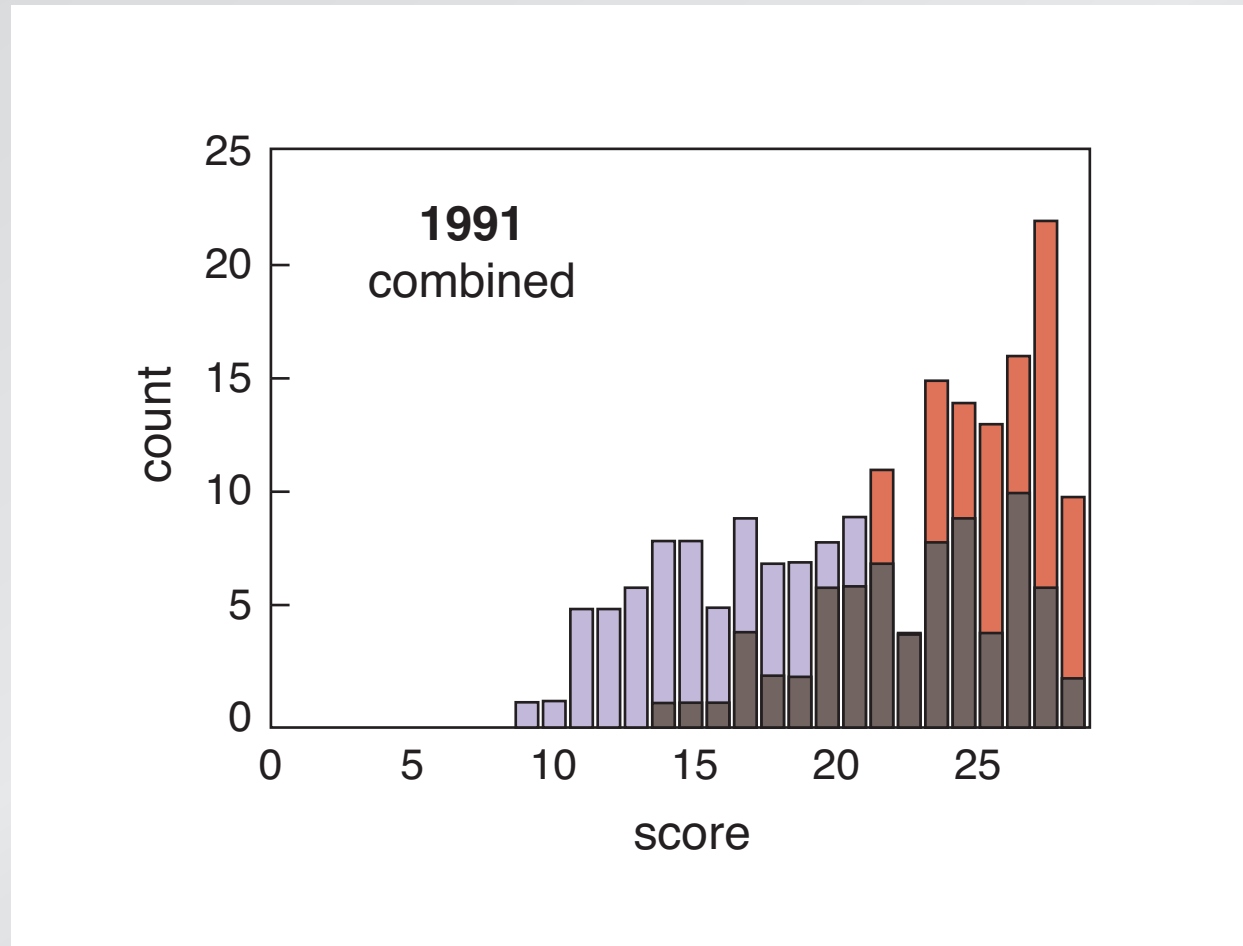
# Results

## first year of implementing PI

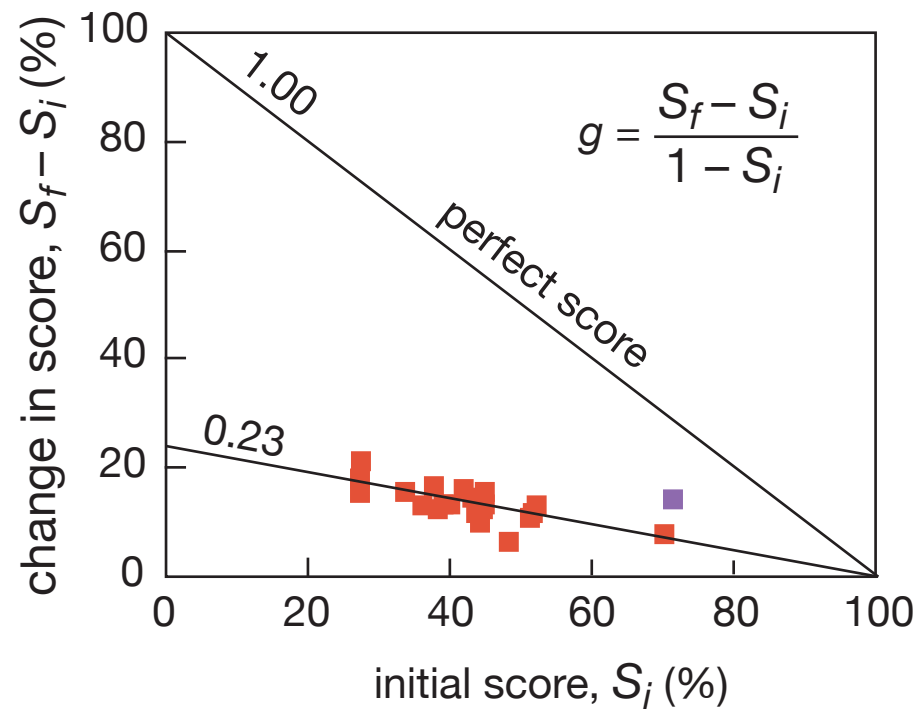


# Results

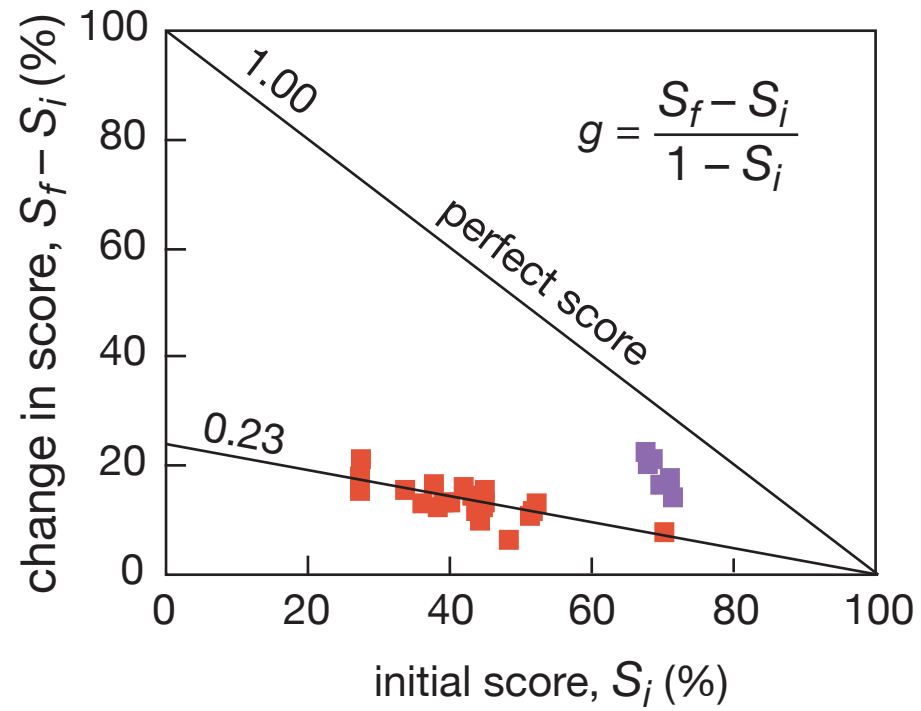
## first year of implementing PI



# Results

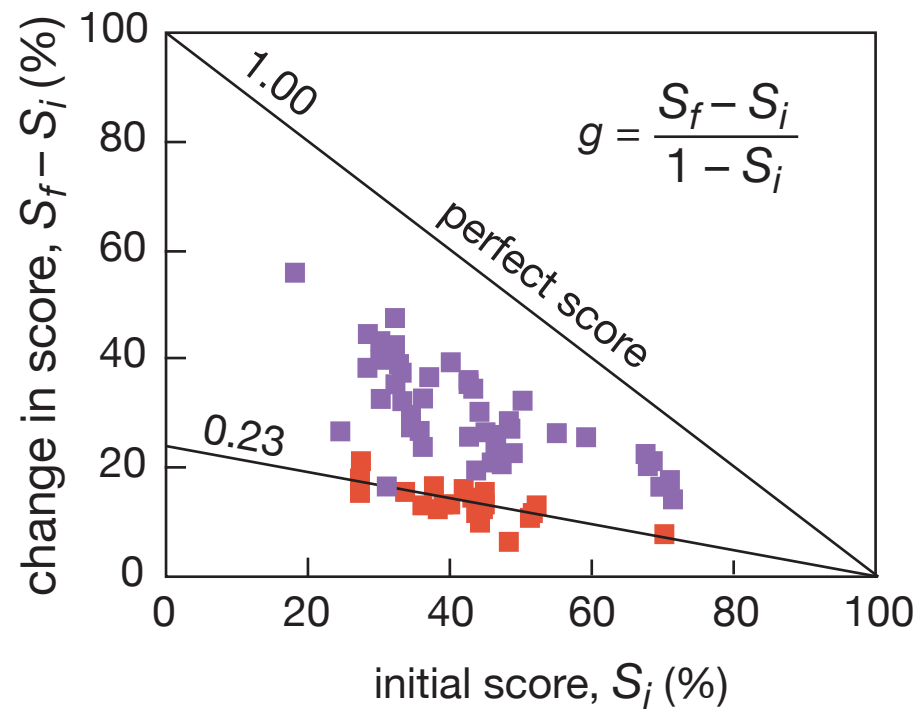


# Results

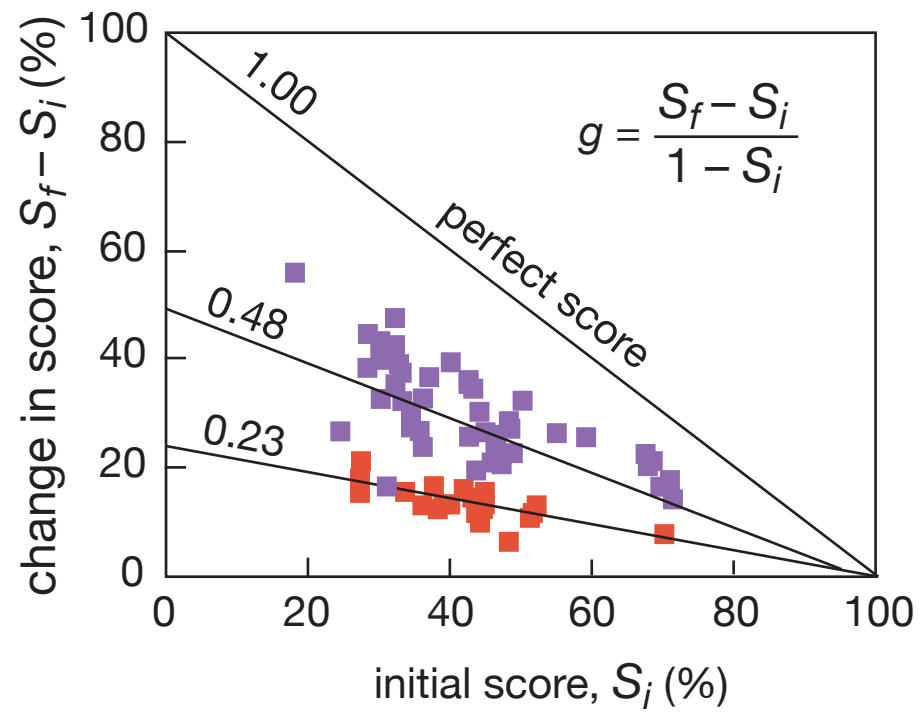




# Results



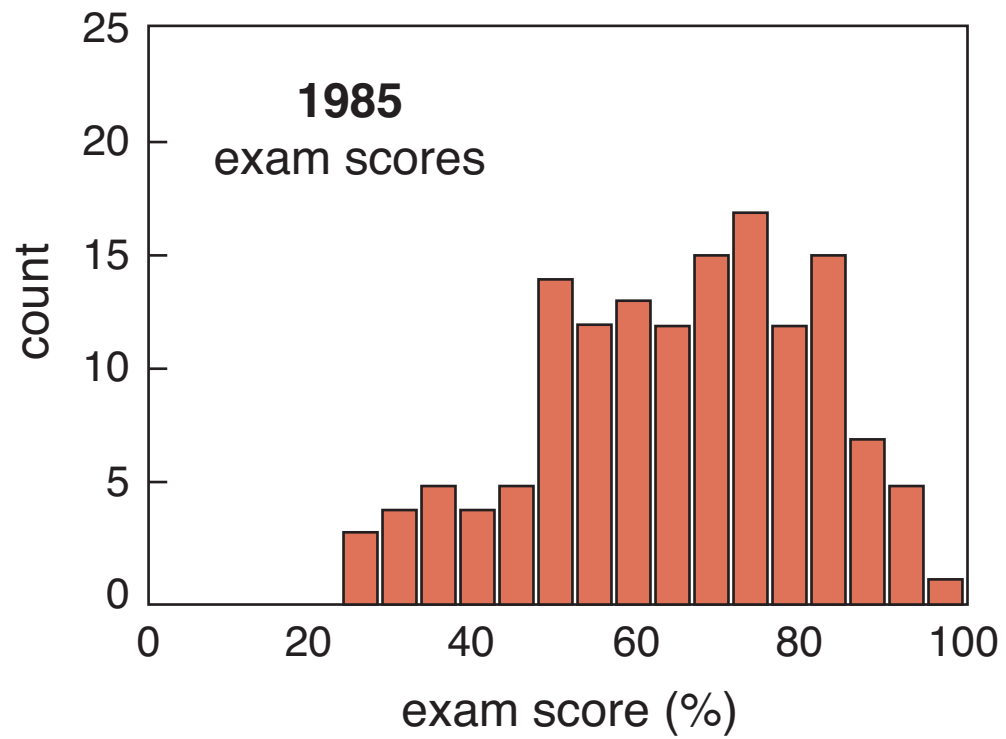
# Results



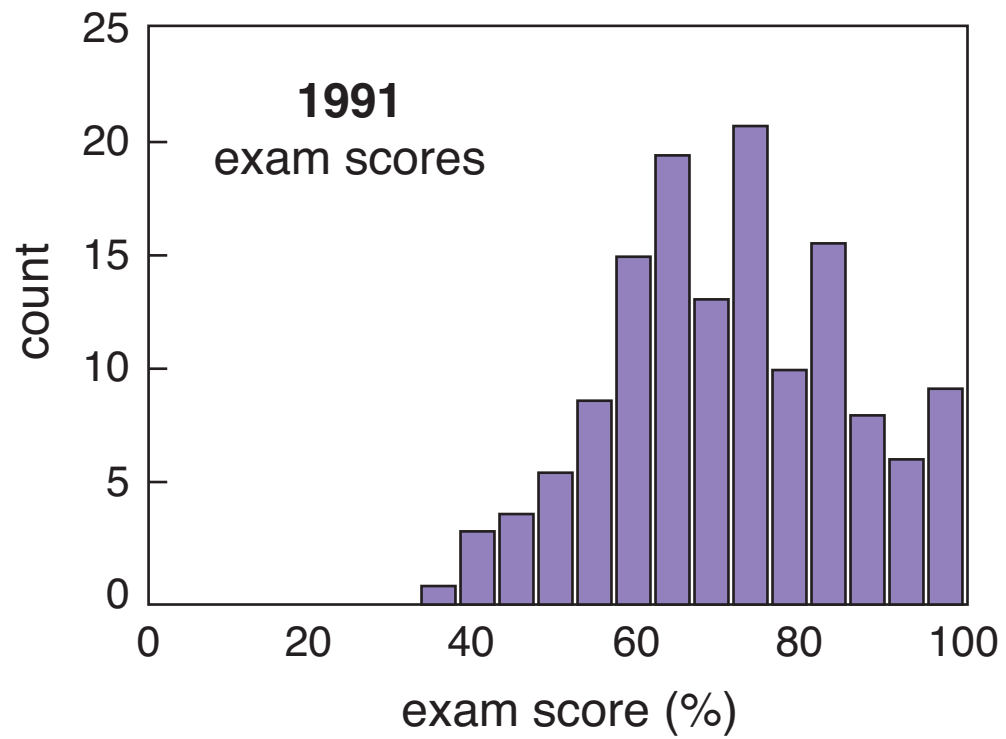
# Results

**what about problem solving?**

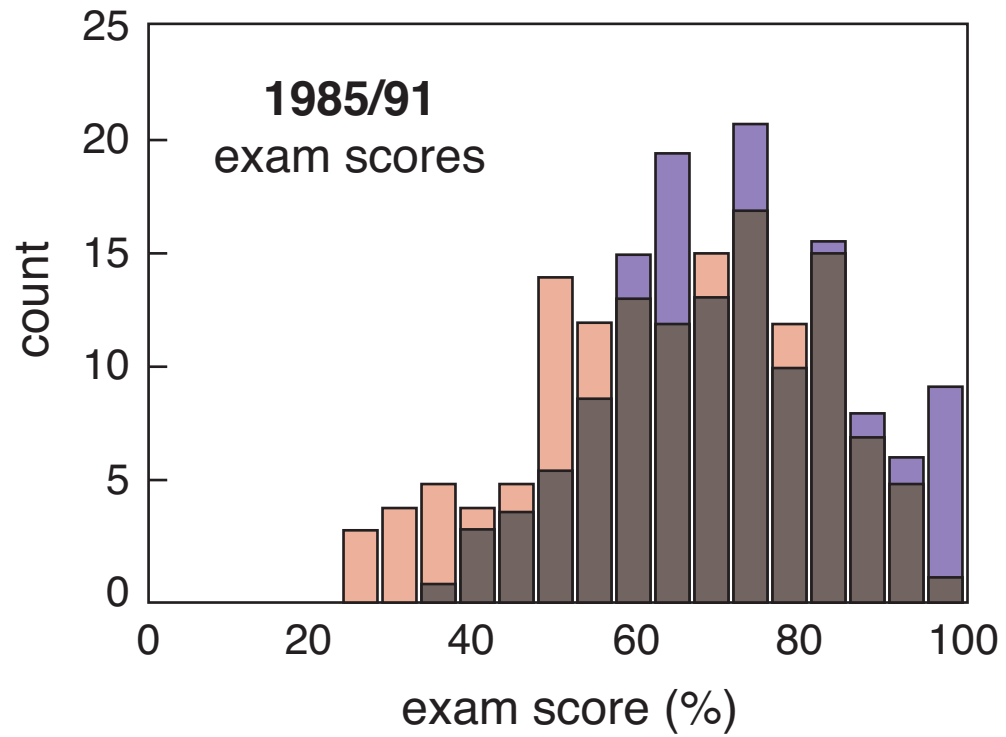
# Results



# Results



# Results



# Conclusion

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

# Conclusion

**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



# Summary

**Traditional indicators of success misleading**

# Summary

**Traditional indicators of success misleading**

**Education is no longer about information**

**Funding:**

**National Science Foundation**

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