

# Confessions of a converted lecturer

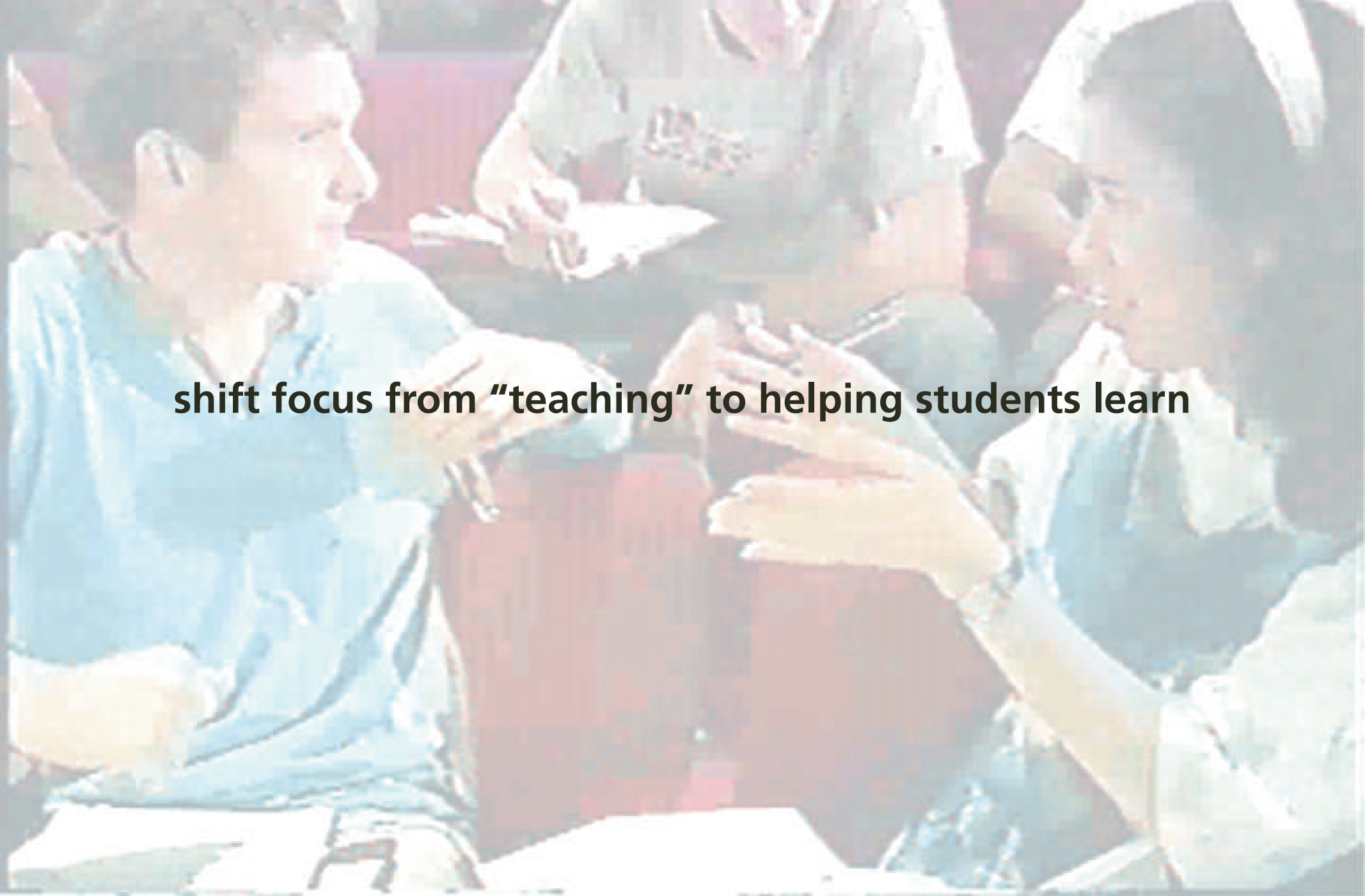


NYU-Poly  
Brooklyn, NY, 11 March 2009



# My message

**shift focus from “teaching” to helping students learn**



# Outline

- Education





# Outline

- Education
- Peer Instruction



# Outline

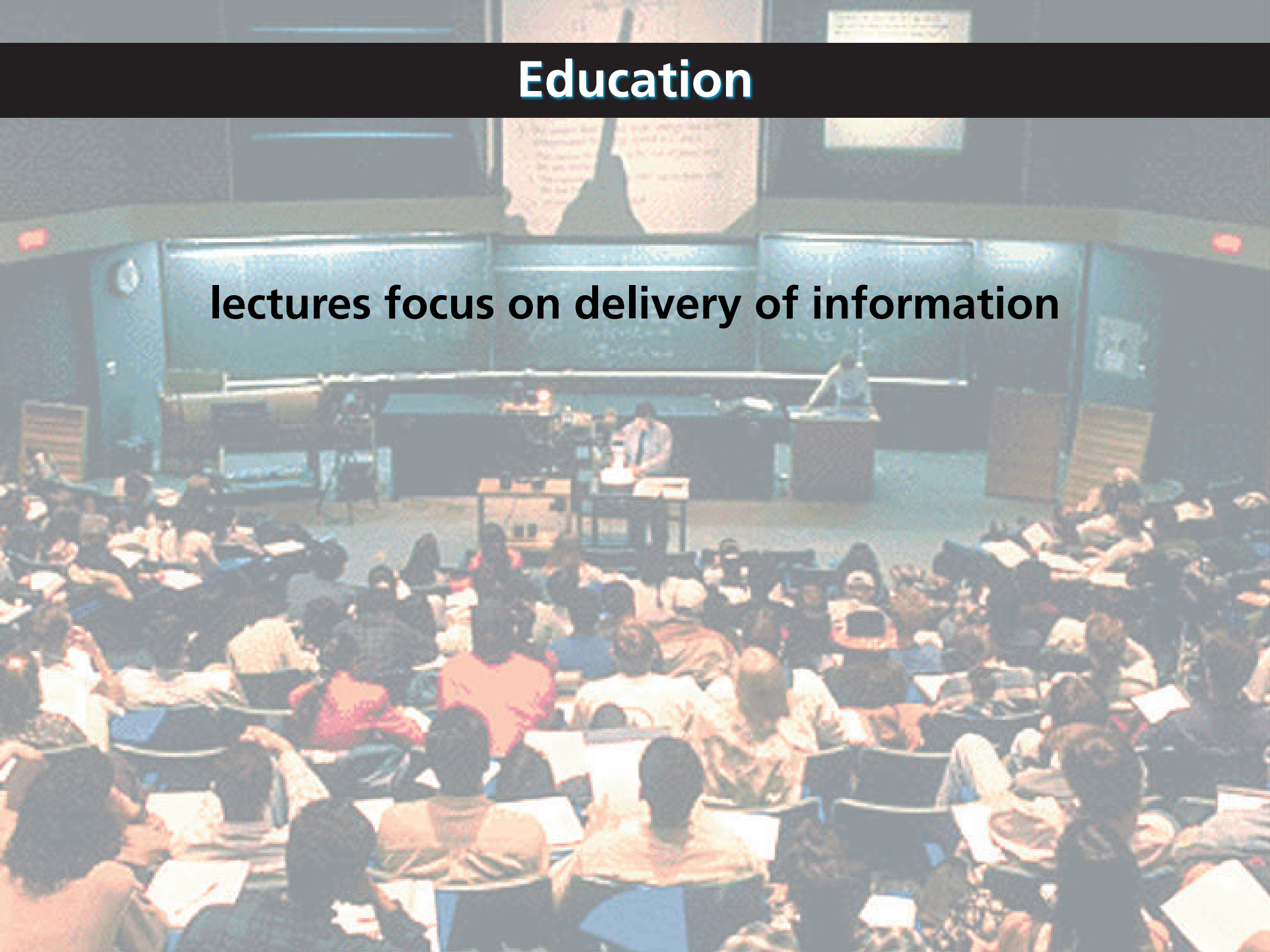
- Education
- Peer Instruction
- Results

# Education



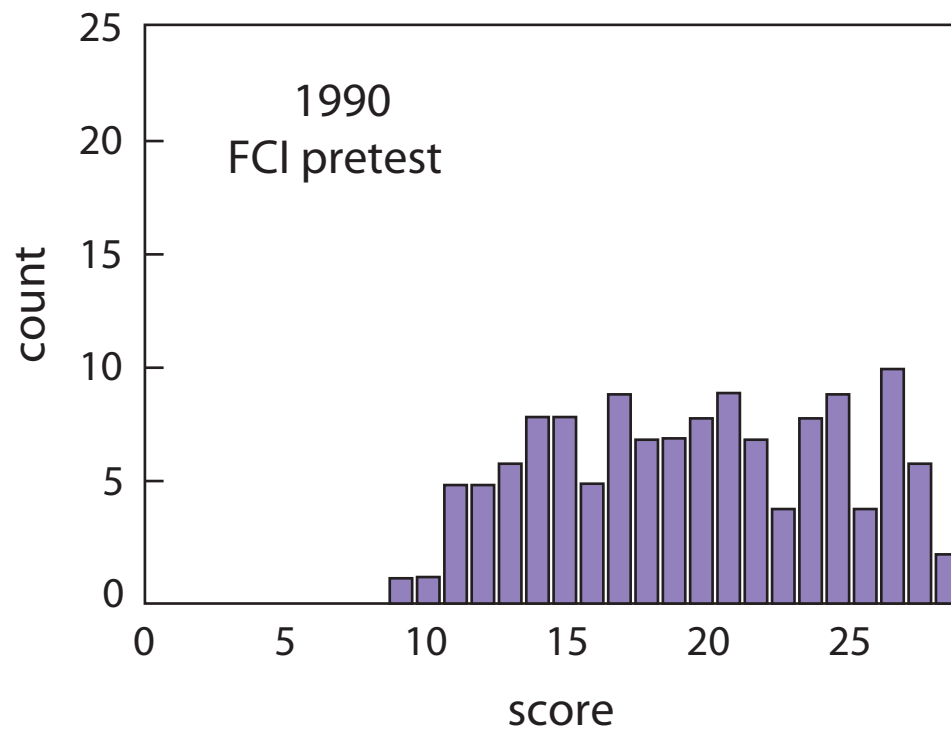
# Education

lectures focus on delivery of information



# Education

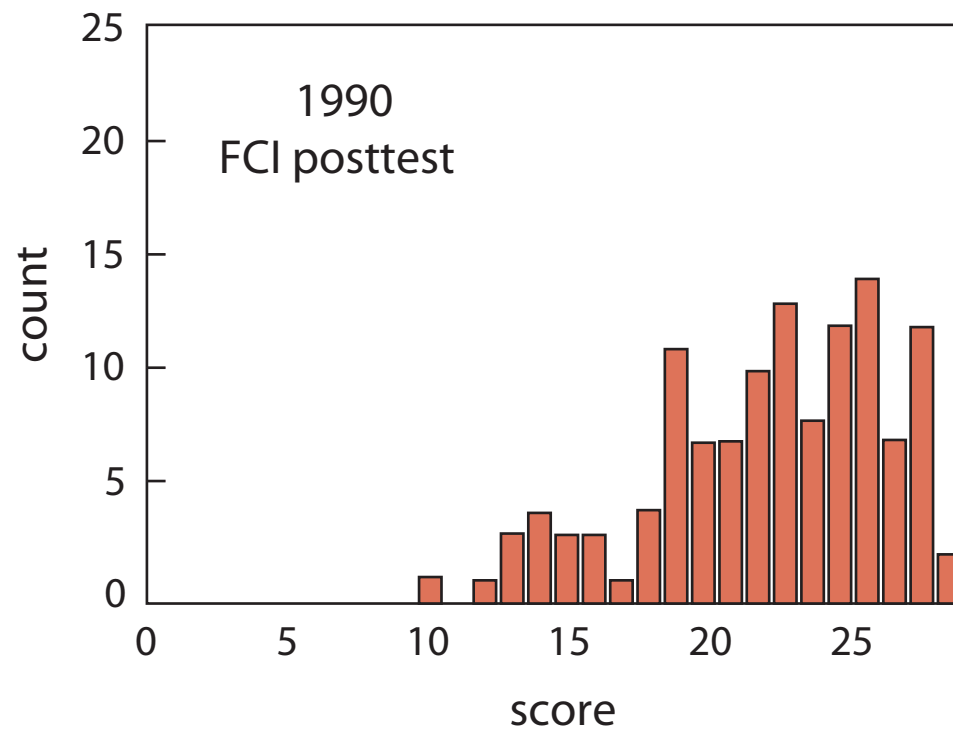
education is not just information transfer





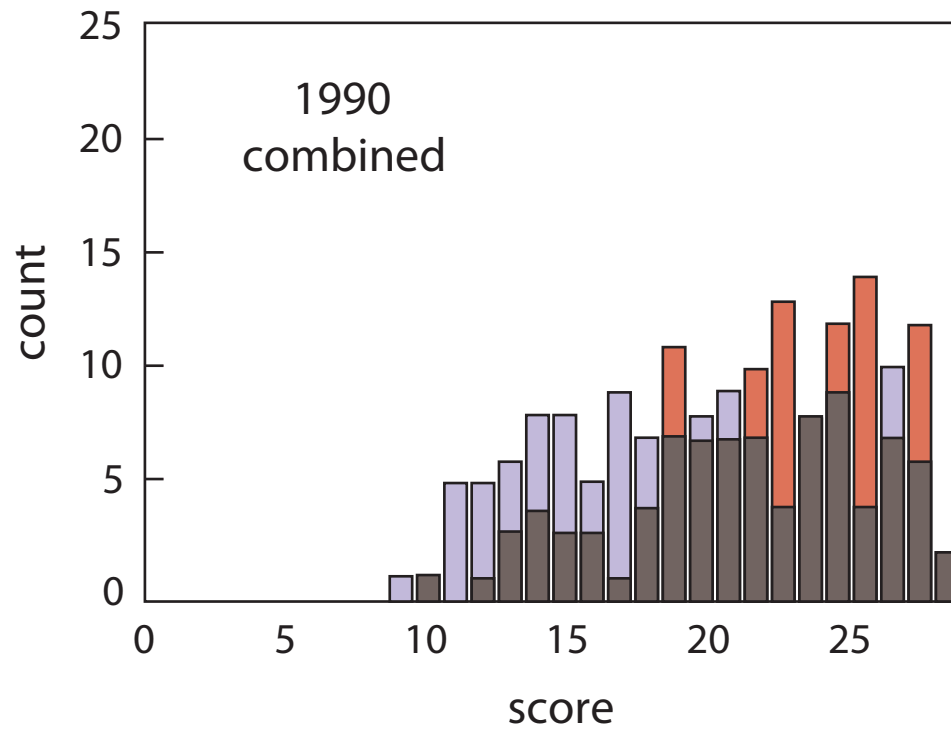
# Education

education is not just information transfer

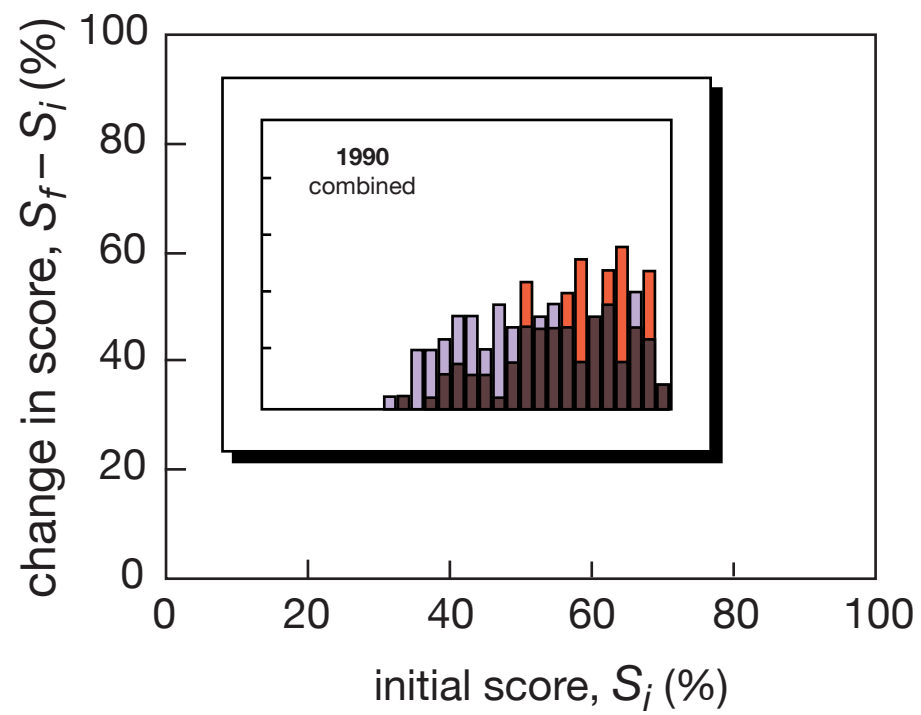


# Education

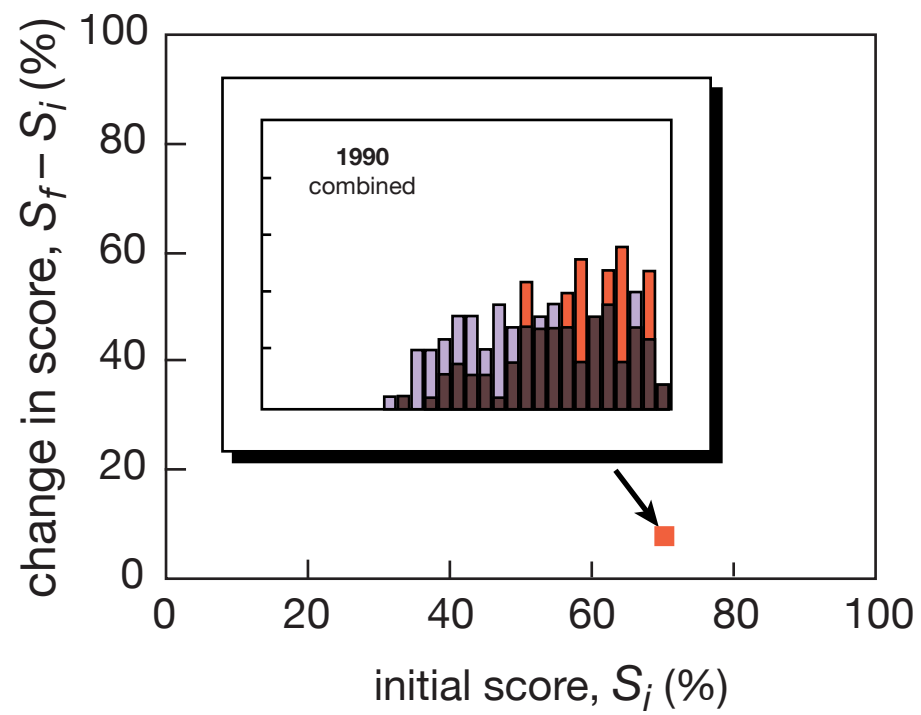
education is not just information transfer



# Education

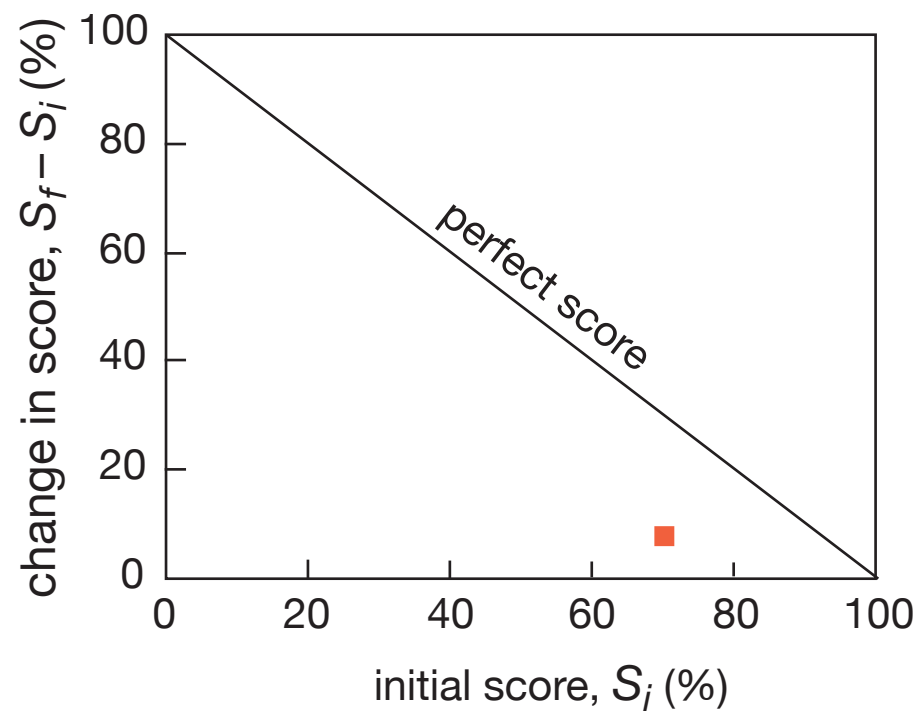


# Education

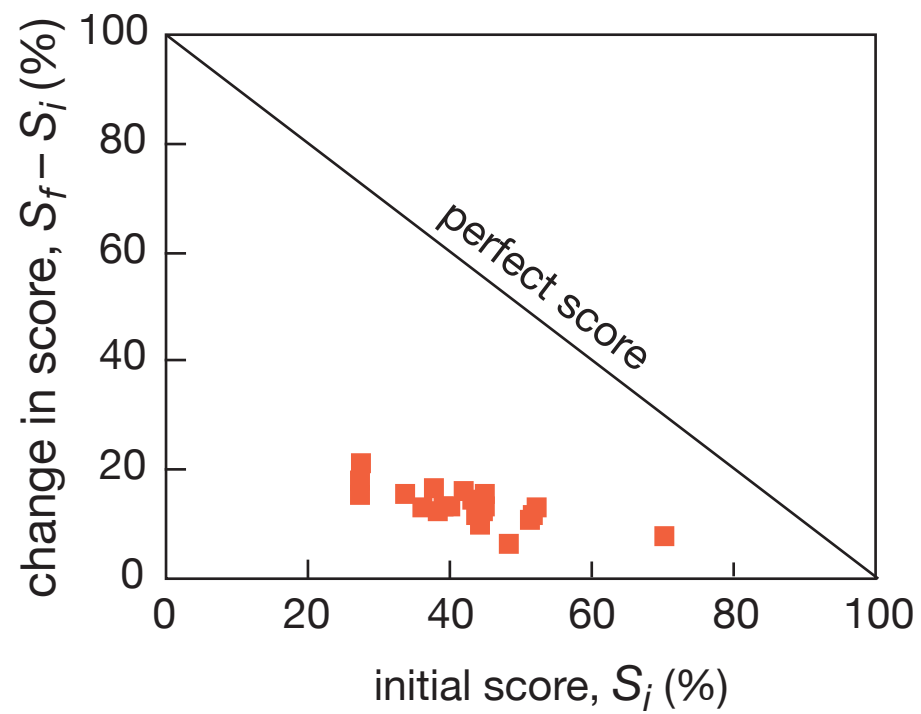




# Education



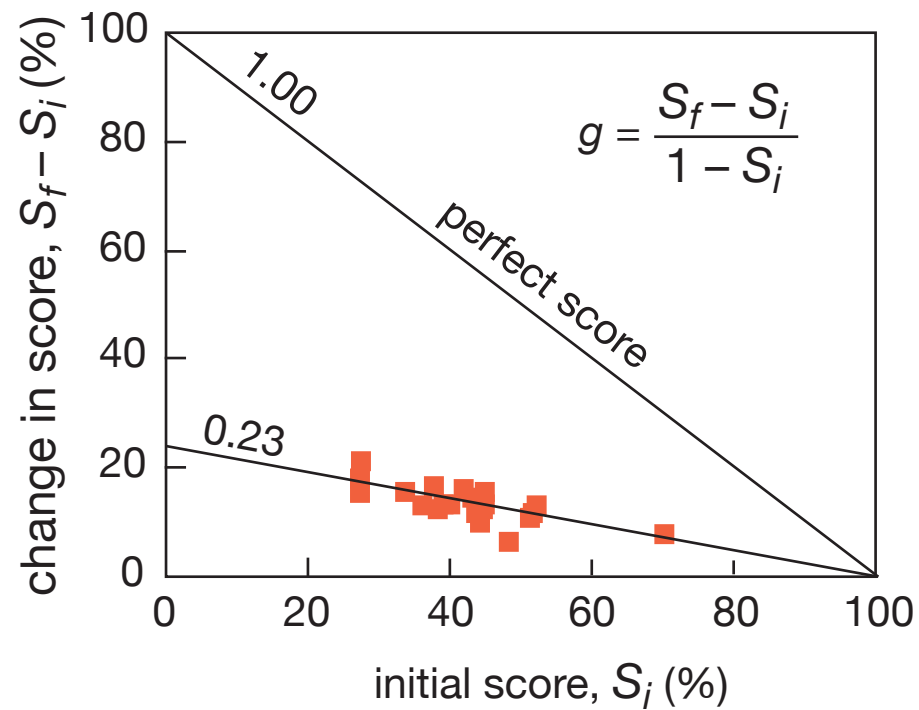
# Education



R.R. Hake, *Am. J. Phys.* 66, 64 (1998)

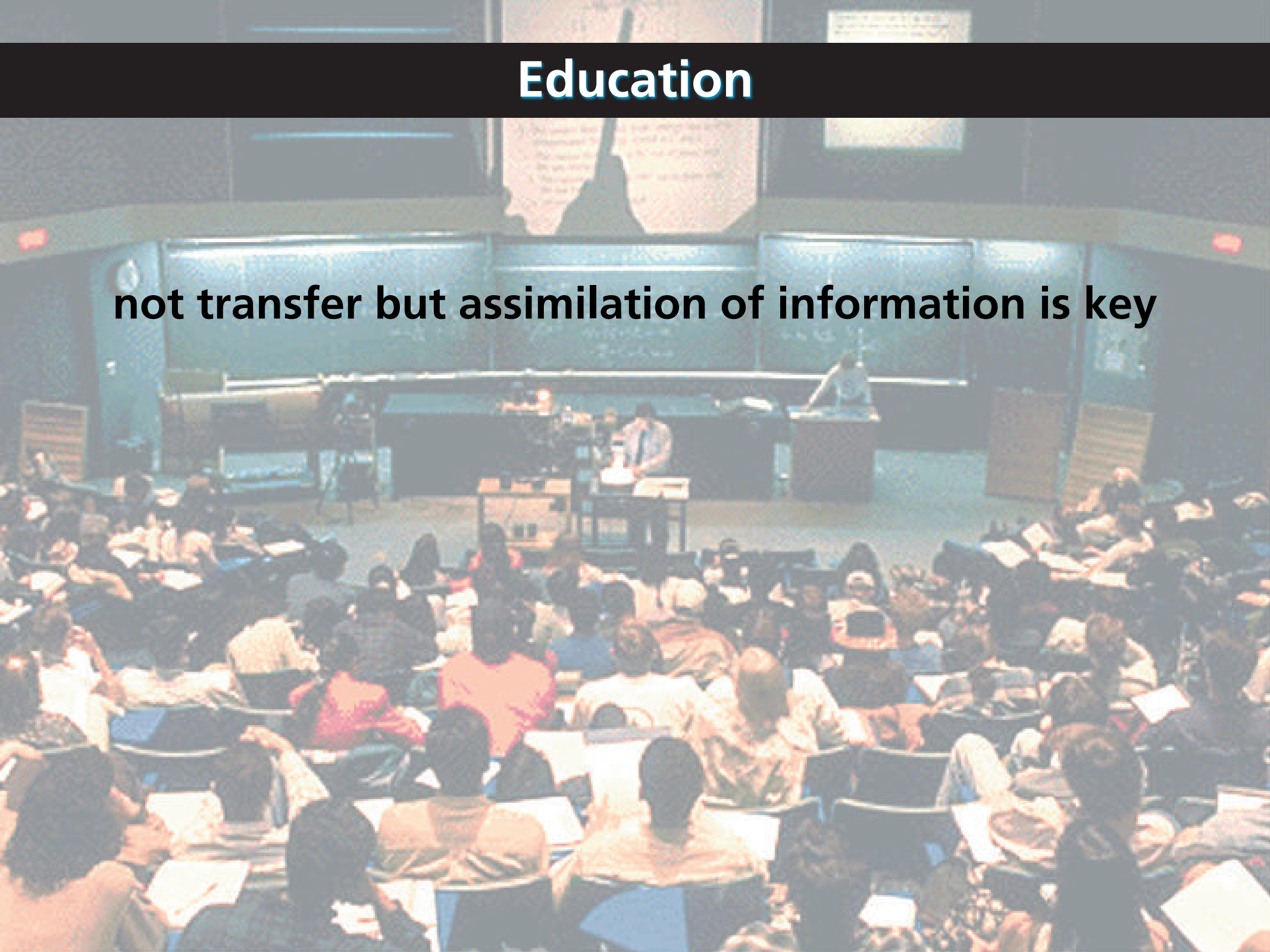
# Education

only one quarter of maximum gain realized



# Education

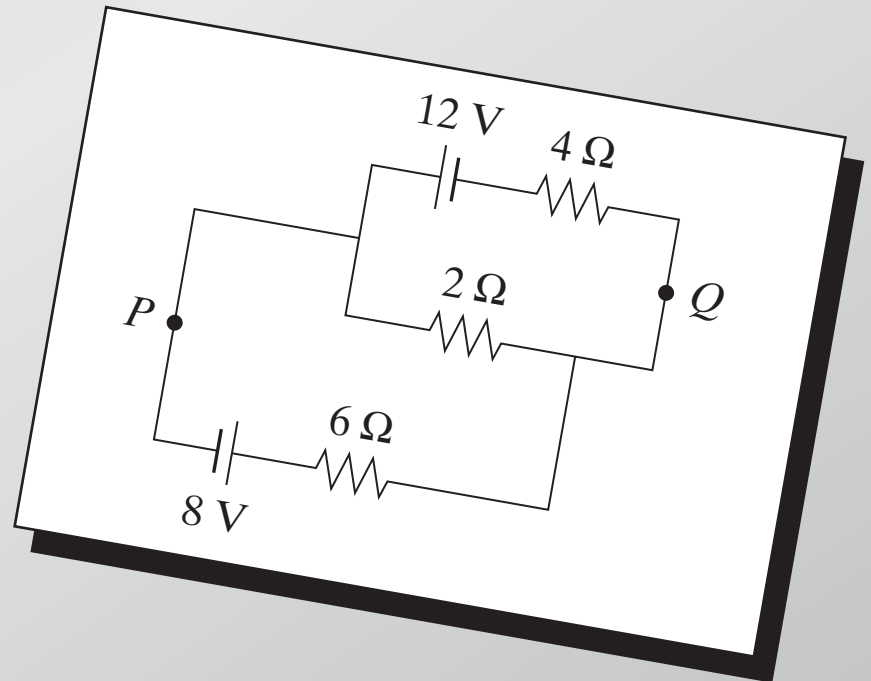
**not transfer but assimilation of information is key**





# Education

conventional problems misleading



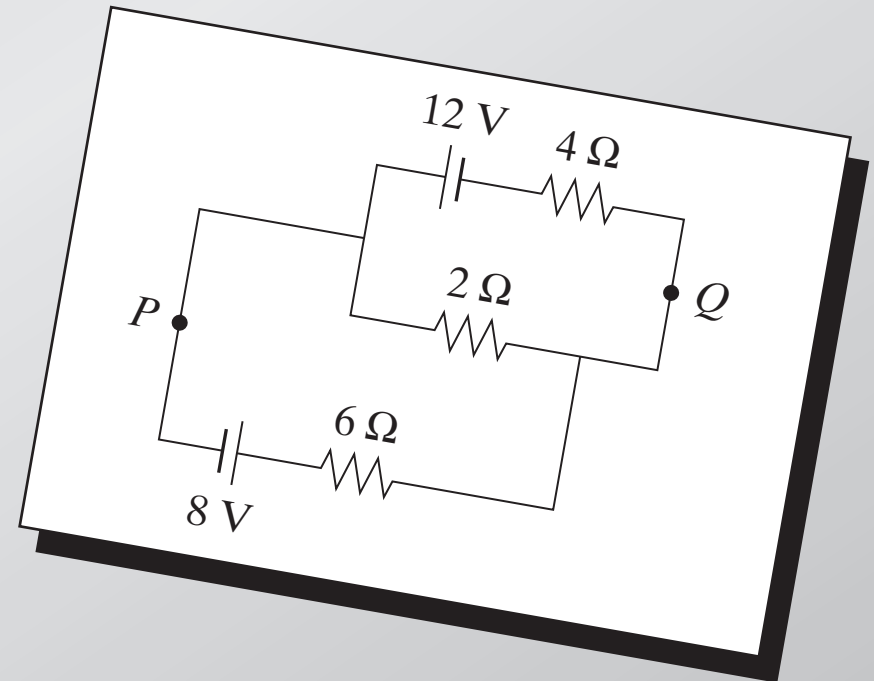
# Education

conventional problems misleading

Calculate:

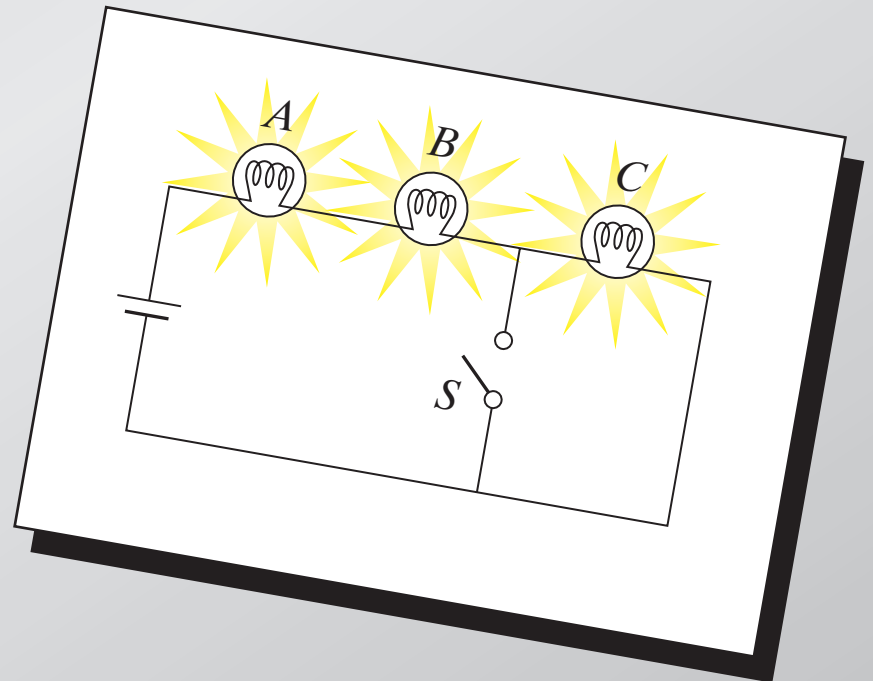
(a) current in 2- $\Omega$  resistor

(b) potential difference  
between  $P$  and  $Q$



# Education

are the basic principles understood?

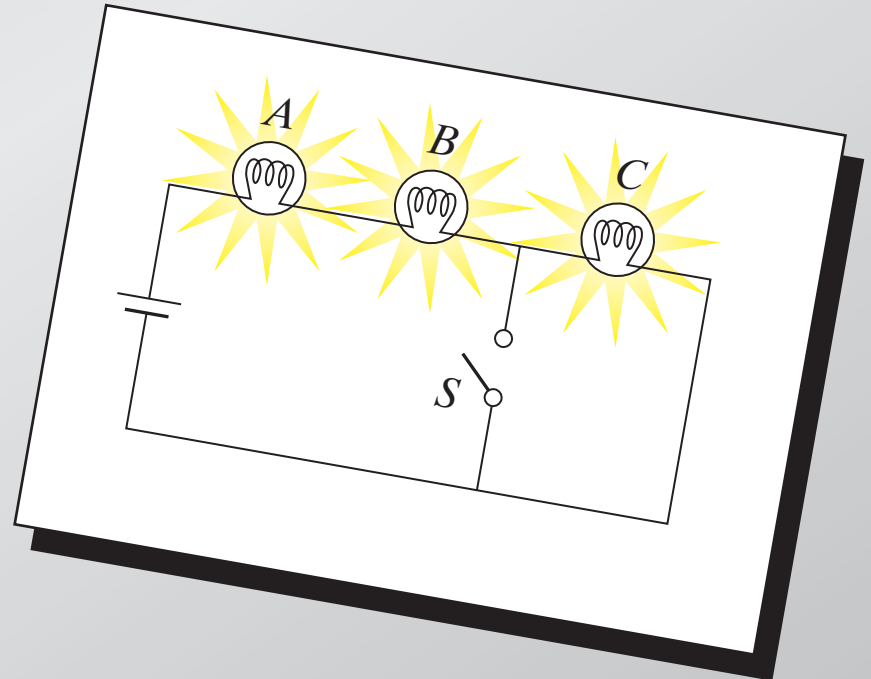


# Education

are the basic principles understood?

When  $S$  is closed, what happens to:

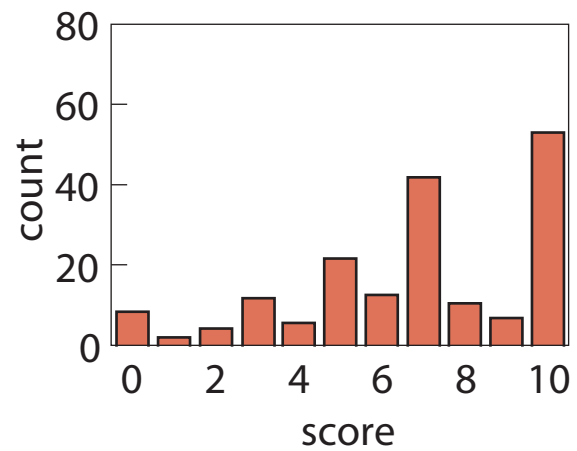
- (a) intensities of  $A$  and  $B$ ?
- (b) intensity of  $C$ ?
- (c) current through battery?
- (d) potential difference across  
 $A$ ,  $B$ , and  $C$ ?
- (e) the total power dissipated?



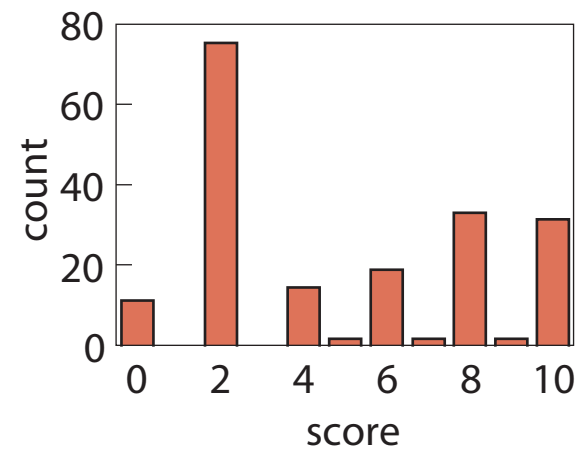


# Education

**conventional**

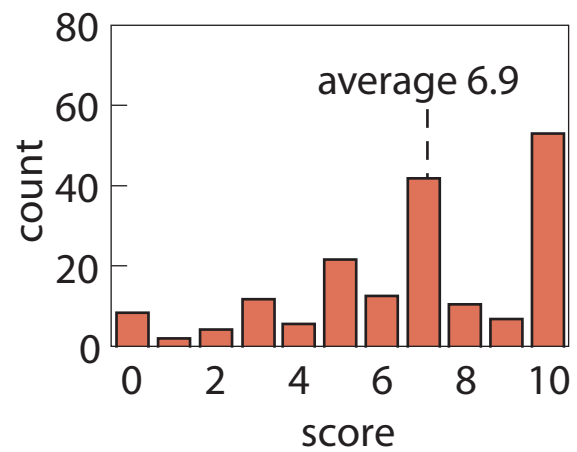


**conceptual**

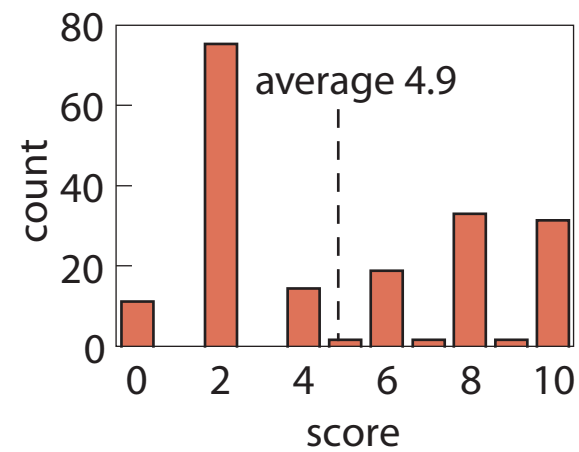


# Education

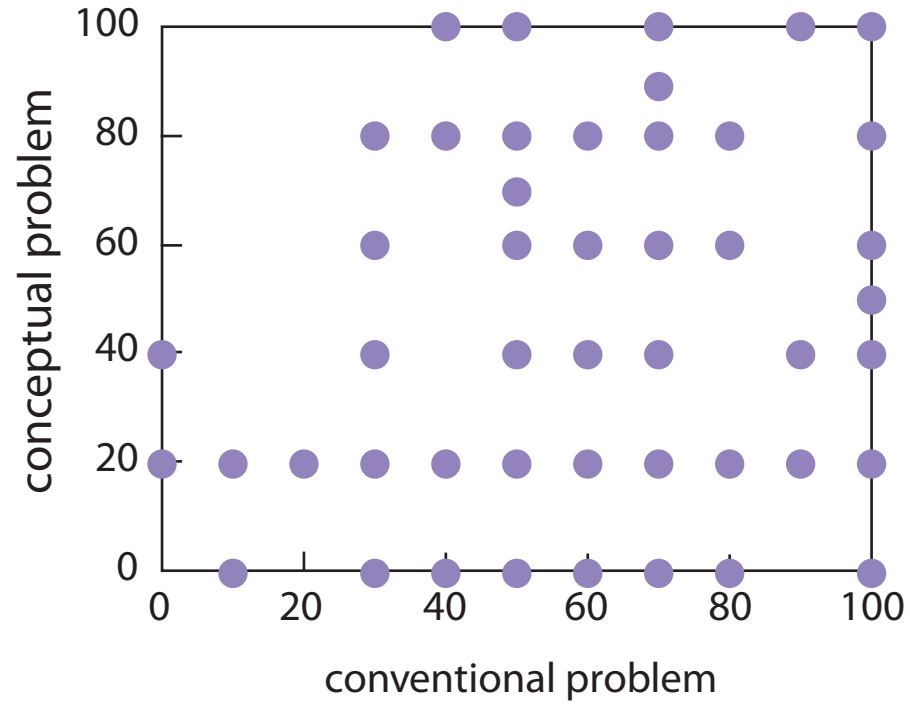
**conventional**



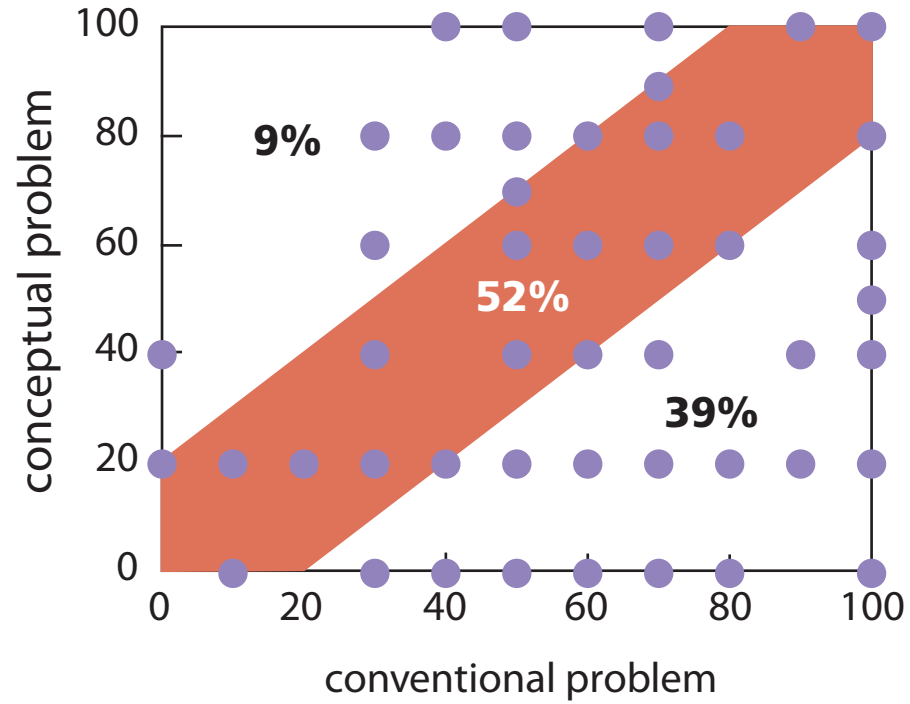
**conceptual**



# Education



# Education





So what should we do?



# Peer Instruction

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

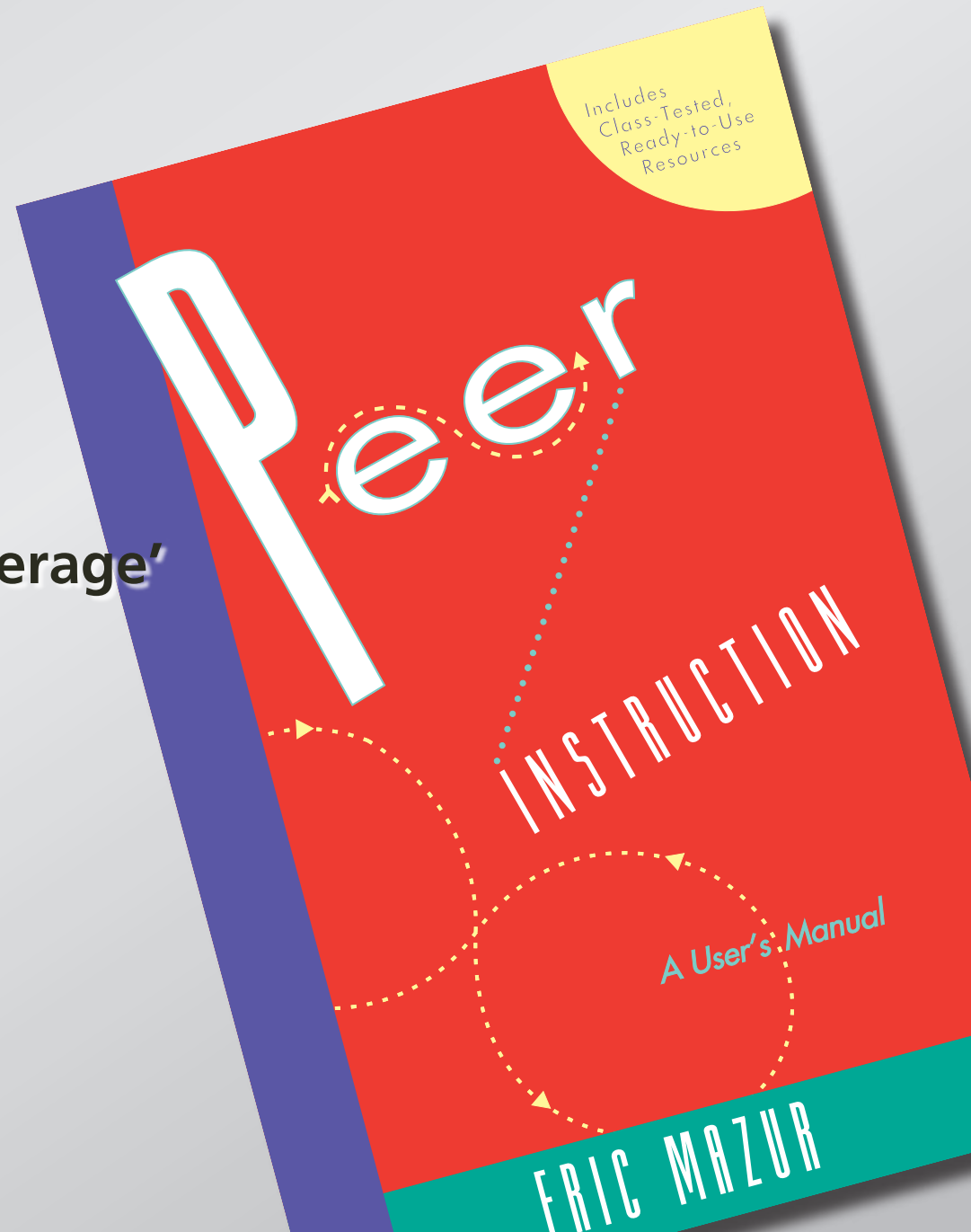
# Peer Instruction

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

# Peer Instruction

## Main features:

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



# Peer Instruction

**ConcepTest:**

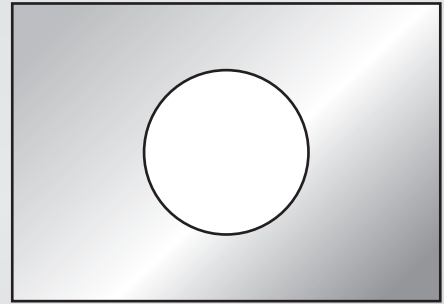
- 1. Question**
- 2. Thinking**
- 3. Individual answer**
- 4. Peer discussion**
- 5. Revised/Group answer**
- 6. Explanation**





# Let's try it!

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

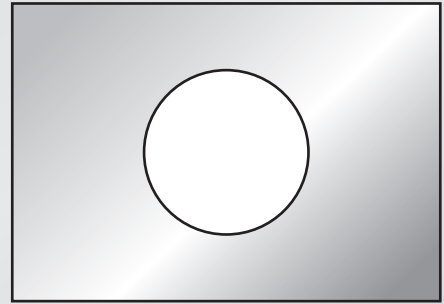


# Let's try it!

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

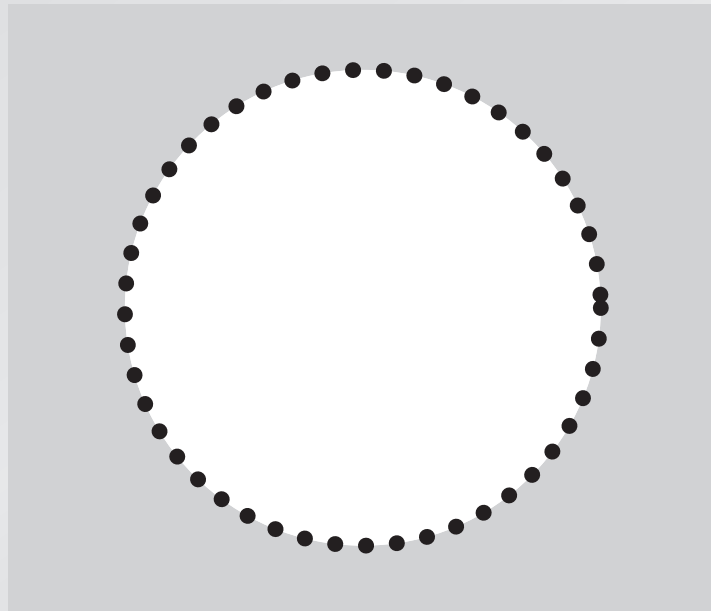
When the plate is uniformly heated, the diameter of the hole

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



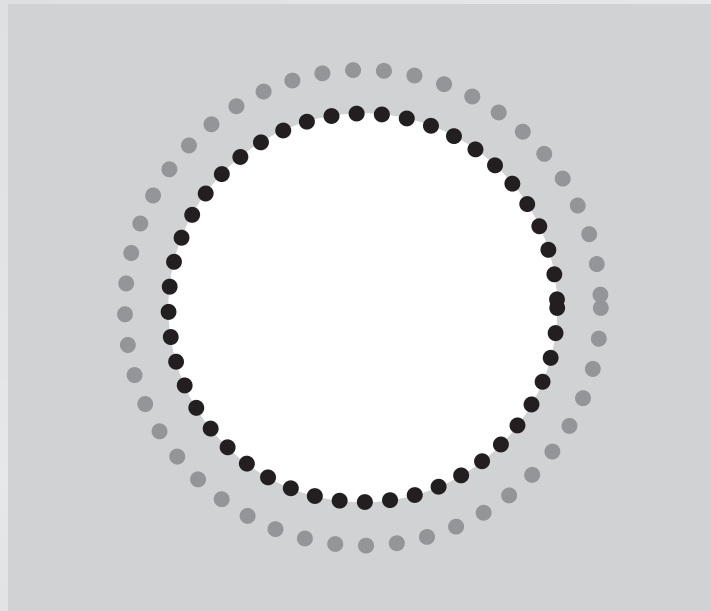
# Let's try it!

consider the atoms at the rim of the hole



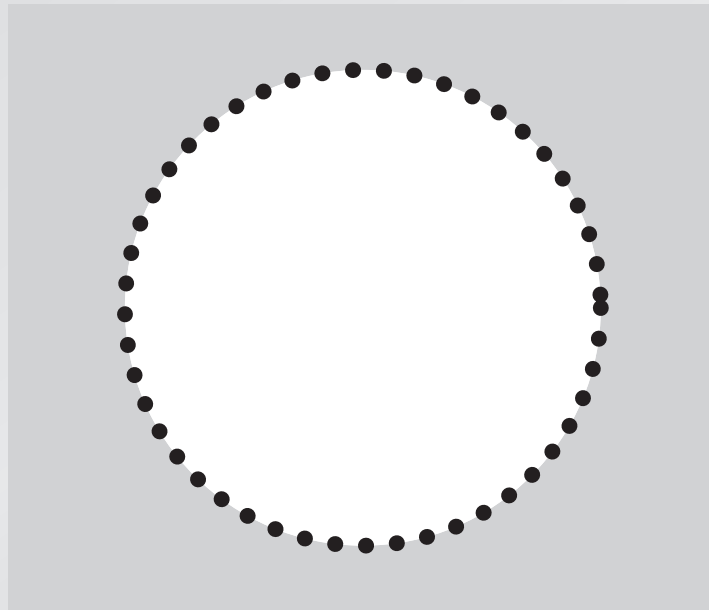
# Let's try it!

consider the atoms at the rim of the hole



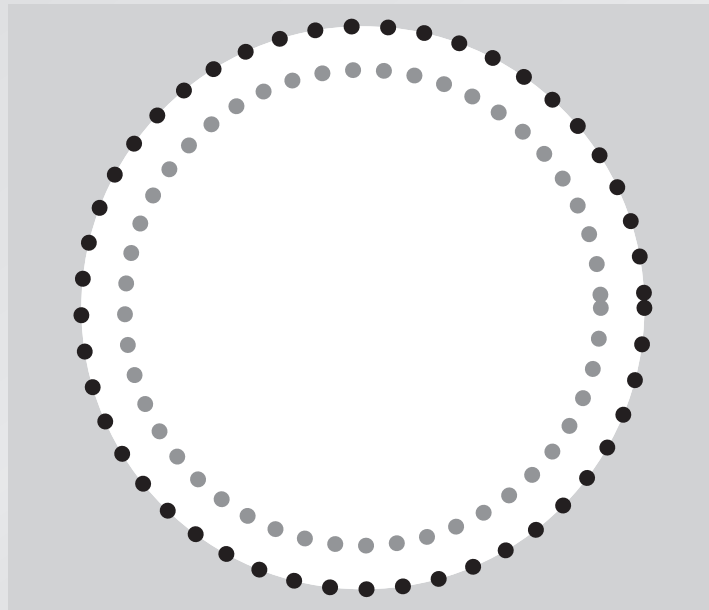
# Let's try it!

consider the atoms at the rim of the hole



# Let's try it!

consider the atoms at the rim of the hole





# Let's try it!

Imagine a rope that fits snugly along the equator.



# Let's try it!

Imagine a rope that fits snugly along the equator.

Suppose the rope is cut and 1 m of rope is inserted between the cut ends. If the rope were to maintain a circular shape, how far off the surface of the Earth would it float?



1. the width of a few atoms
2. the width of a few hairs
3. the height of a curb
4. exactly 1 m
5. more than 1 m

# Let's try it!

circumference at equator:

$$2\pi R_E$$

# Let's try it!

circumference at equator:

$$2\pi R_E$$

new circumference:

$$2\pi R_E + 1 \text{ m}$$

# Let's try it!

circumference at equator:

$$2\pi R_E$$

new circumference:

$$2\pi R_E + 1 \text{ m}$$

radius of circle with new circumference:

$$2\pi R = 2\pi R_E + 1 \text{ m}, \quad \text{and so} \quad R = R_E + \frac{1 \text{ m}}{2\pi}.$$

# Let's try it!

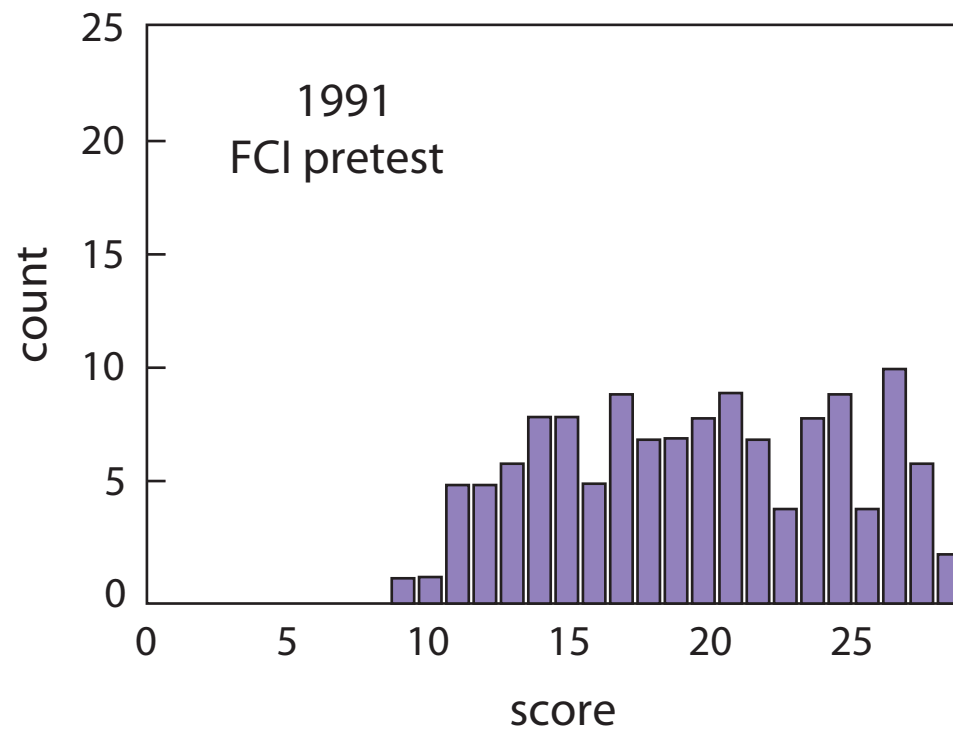
*It's easy to fire up the audience!*

# Results

is it any good?

# Results

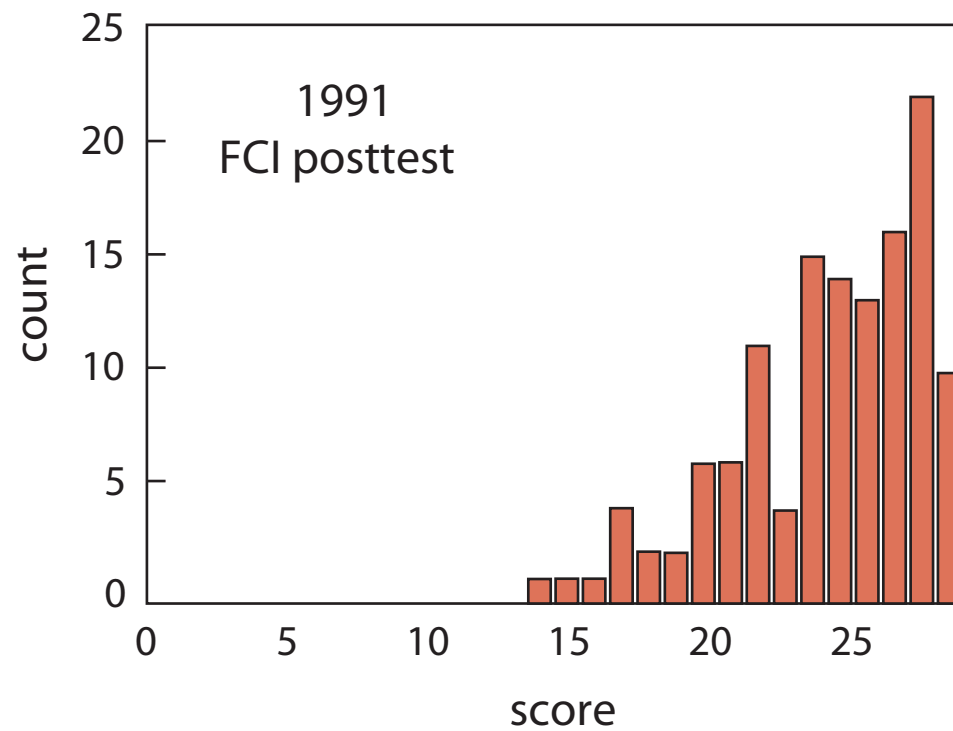
first year of implementing PI





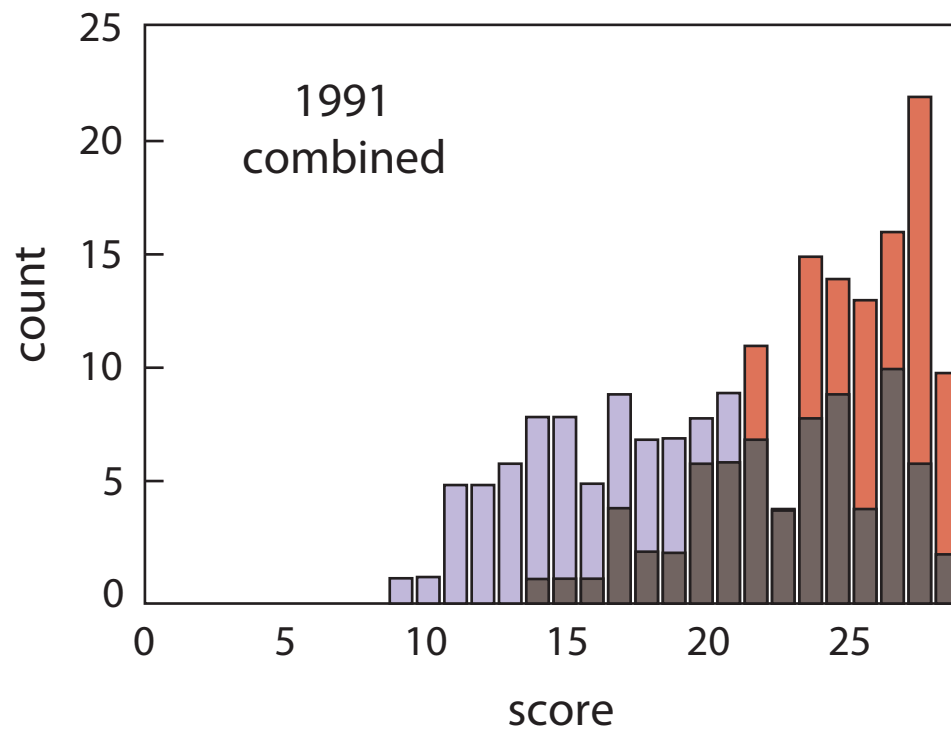
# Results

first year of implementing PI

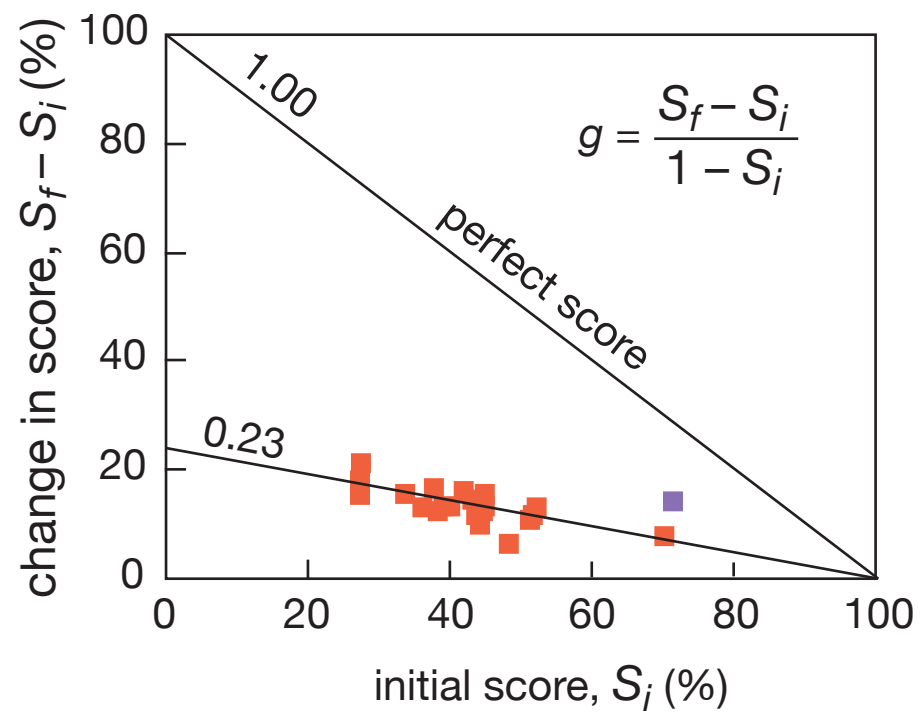


# Results

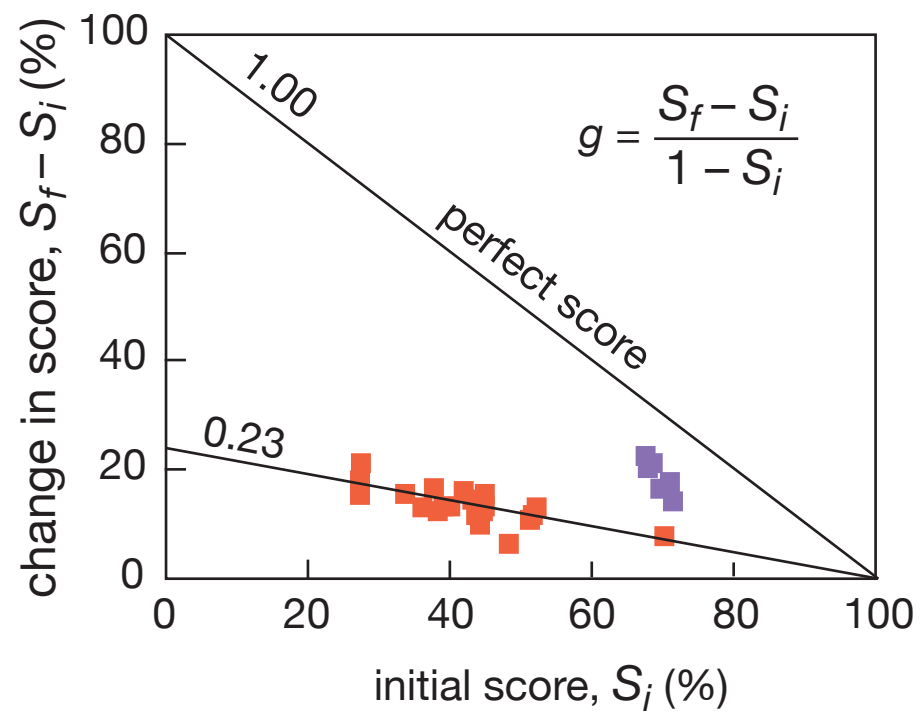
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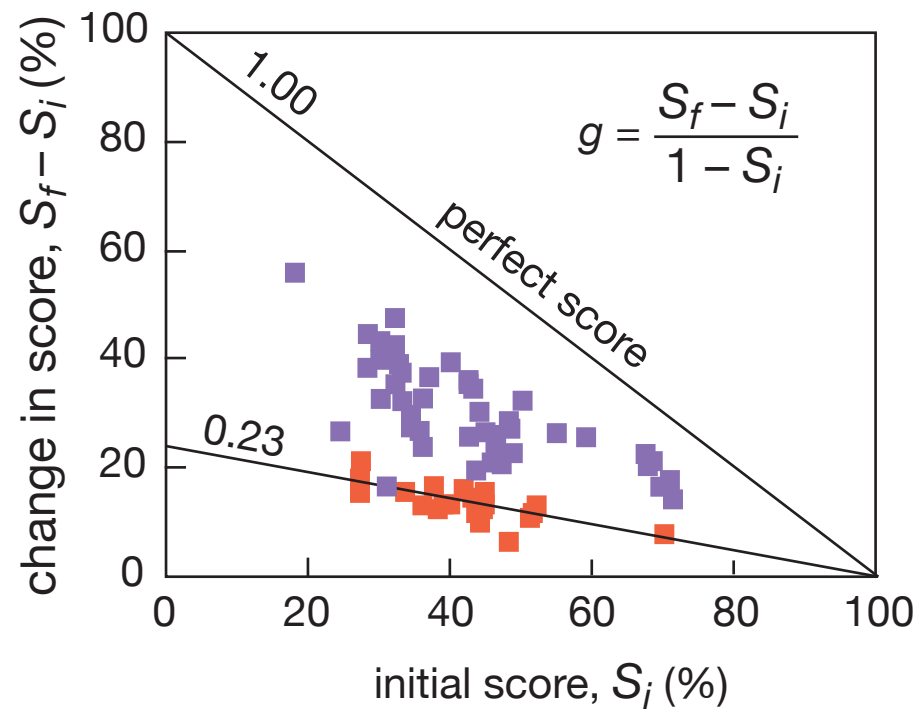
# Results



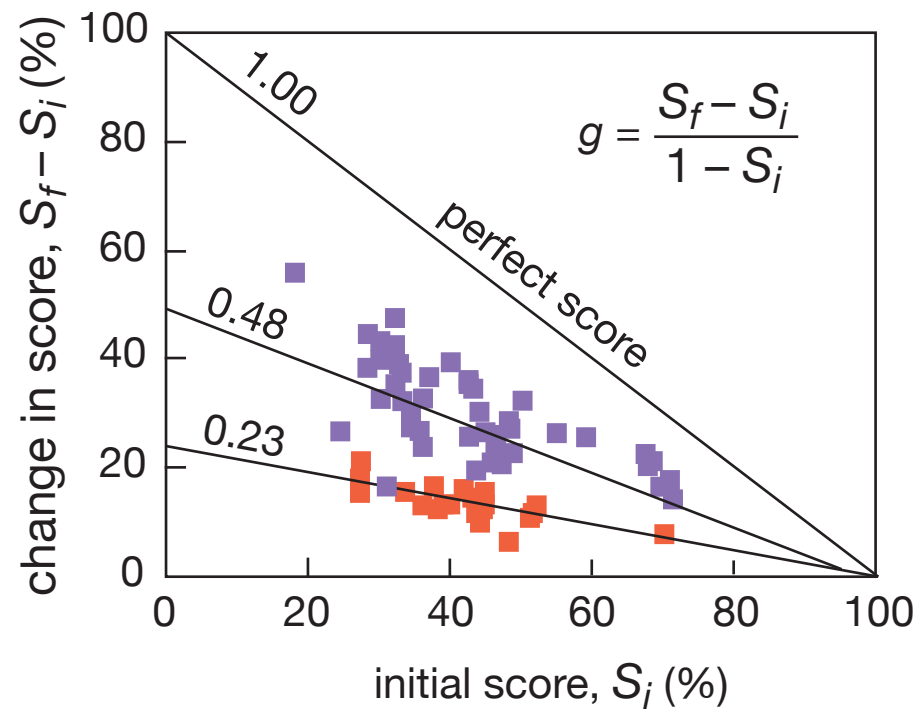
# Results



# Results



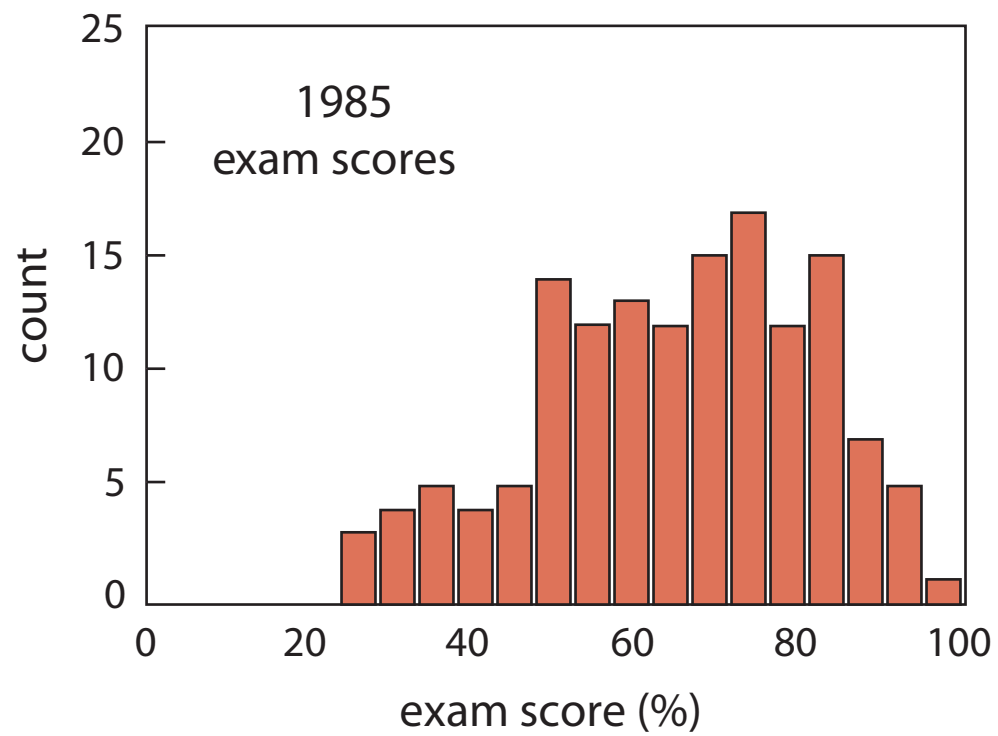
# Results



# Results

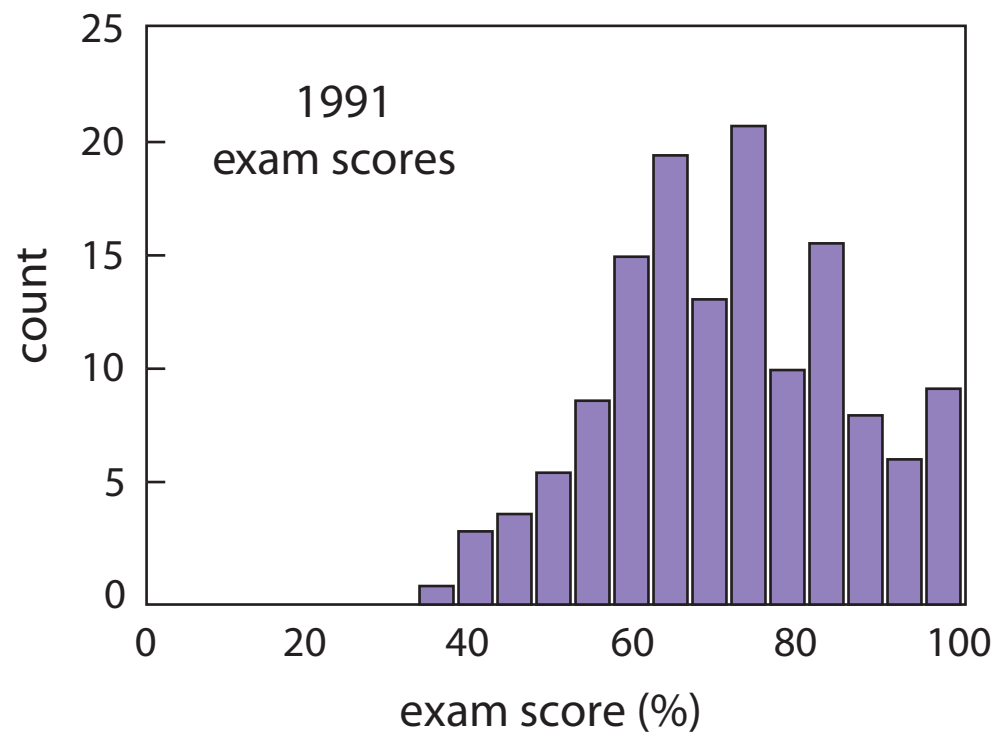
**what about problem solving?**

# Results

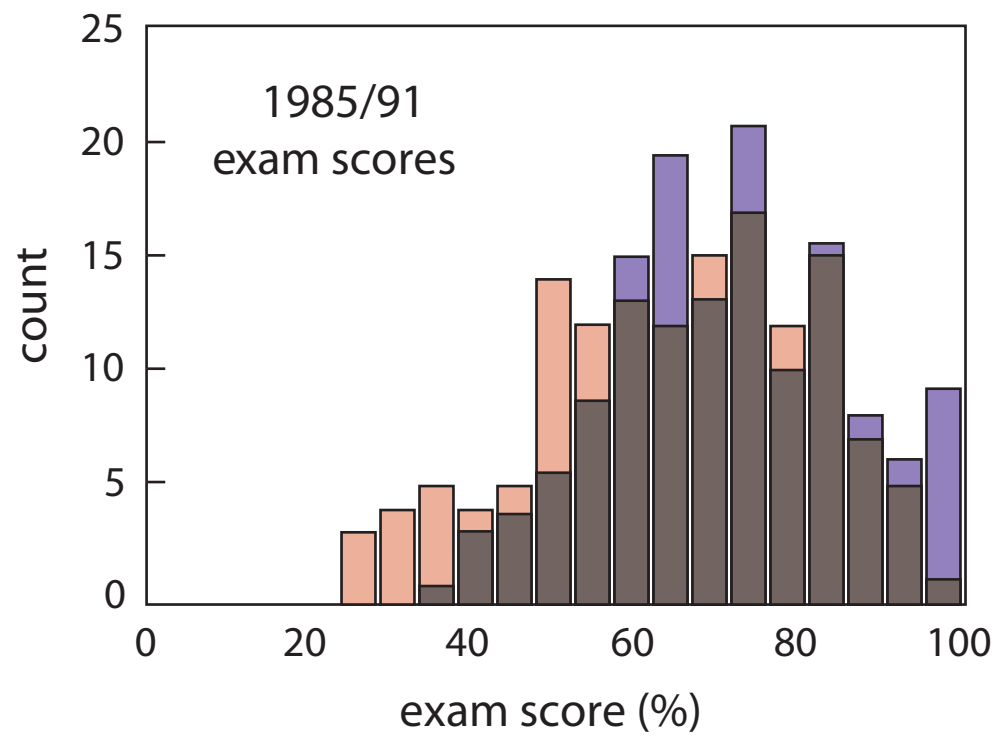




# Results



# 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!)**



**Funding:**

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