

# Turning lectures into learning



Turning Technologies Learning Forum  
Youngstown State University  
Youngstown, OH, 16 March 2012



**Turning Technologies, LLC**  
turning ideas into solutions

# Turning lectures into learning



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Youngstown State University  
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**Turning Technologies, LLC**  
turning ideas into solutions

# Get your clickers ready!



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

# Get your clickers ready!



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# Get your clickers ready!



unique ID on back of clicker

# Get your clickers ready!

**I heard you speak about Peer Instruction:**

- 1. yesterday**
- 2. on YouTube**
- 3. some other place**
- 4. I heard you so many times, I could give your talk**
- 5. Peer Instruction?**

# How do we learn?

**Think of something you are good at — something that you know you do well.**

# How do we learn?

**Think of something you are good at — something that you know you do well.**

***How did you become good at this?***



# How do we learn?

**Became good at it by:**

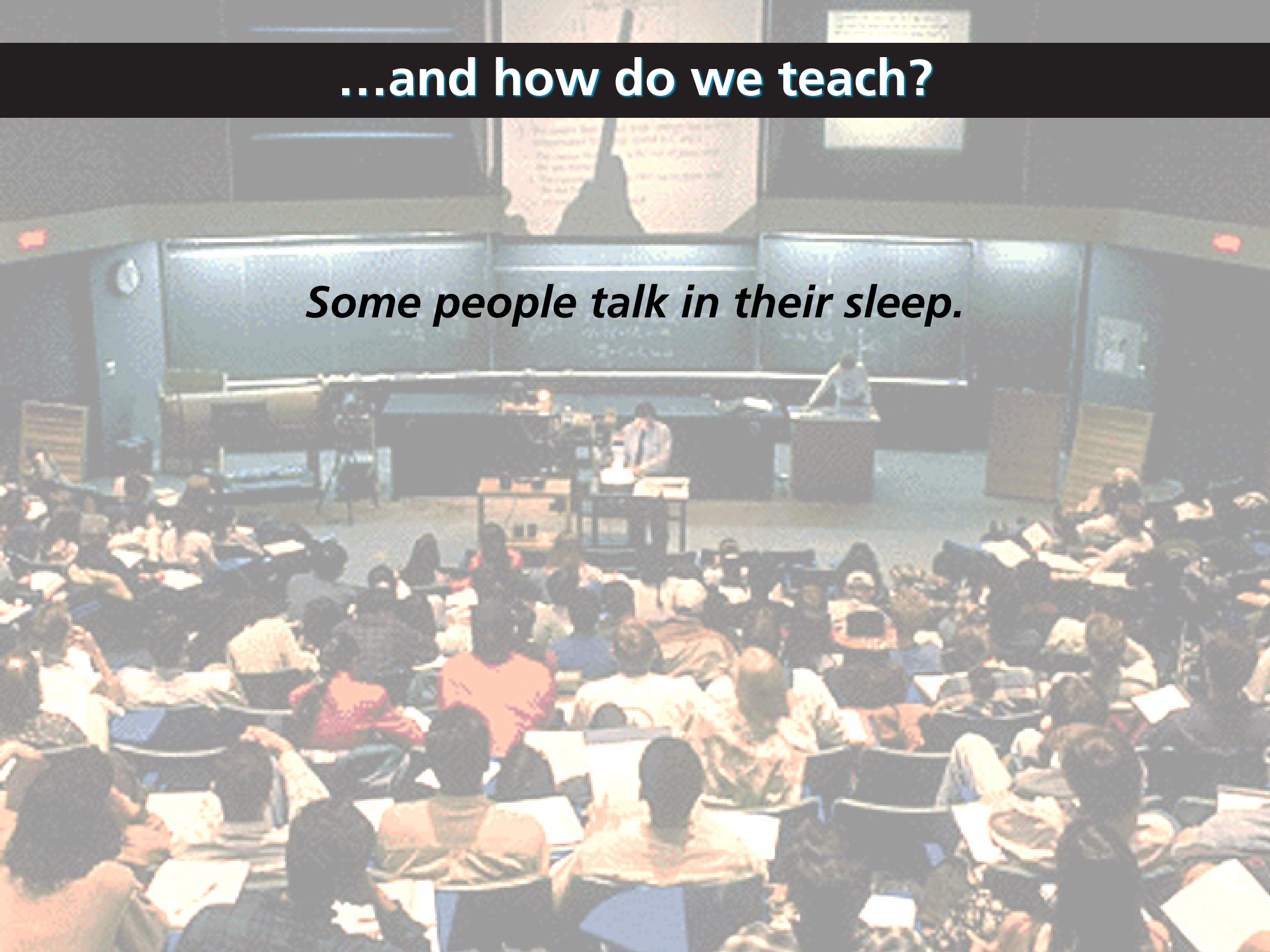
- 1. trial and error**
- 2. lectures**
- 3. practicing**
- 4. apprenticeship**
- 5. other**

...and how do we teach?



**...and how do we teach?**

*Some people talk in their sleep.*

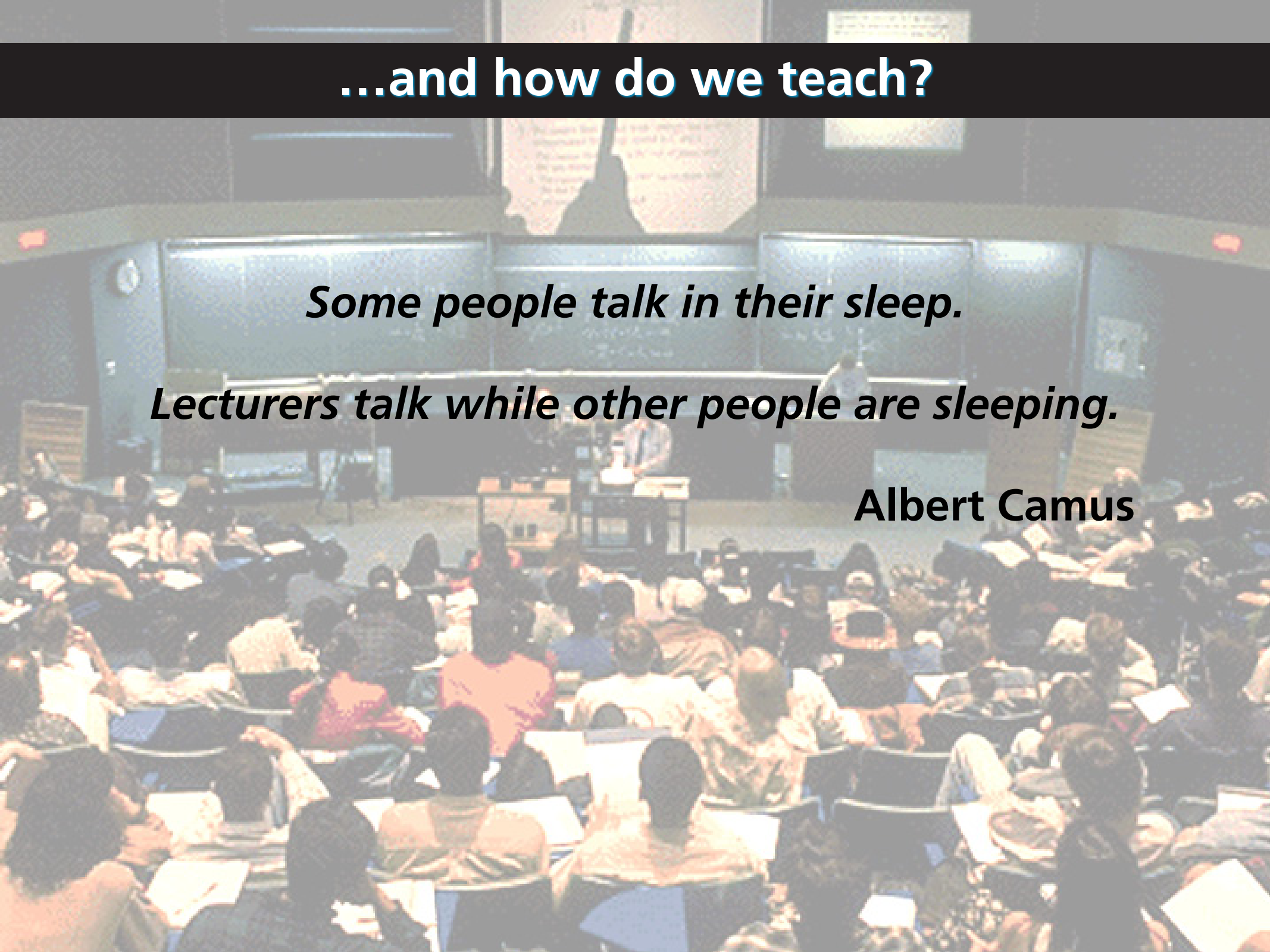


**...and how do we teach?**

*Some people talk in their sleep.*

*Lecturers talk while other people are sleeping.*

**Albert Camus**

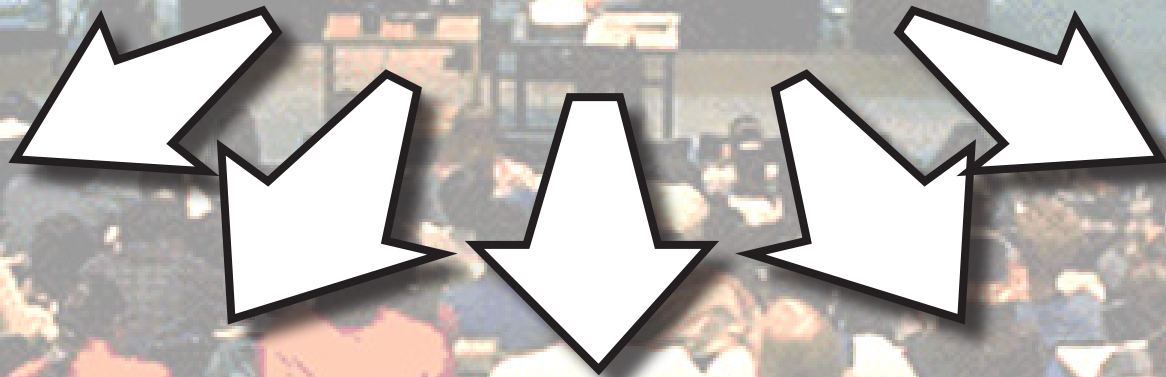


...and how do we teach?



**...and how do we teach?**

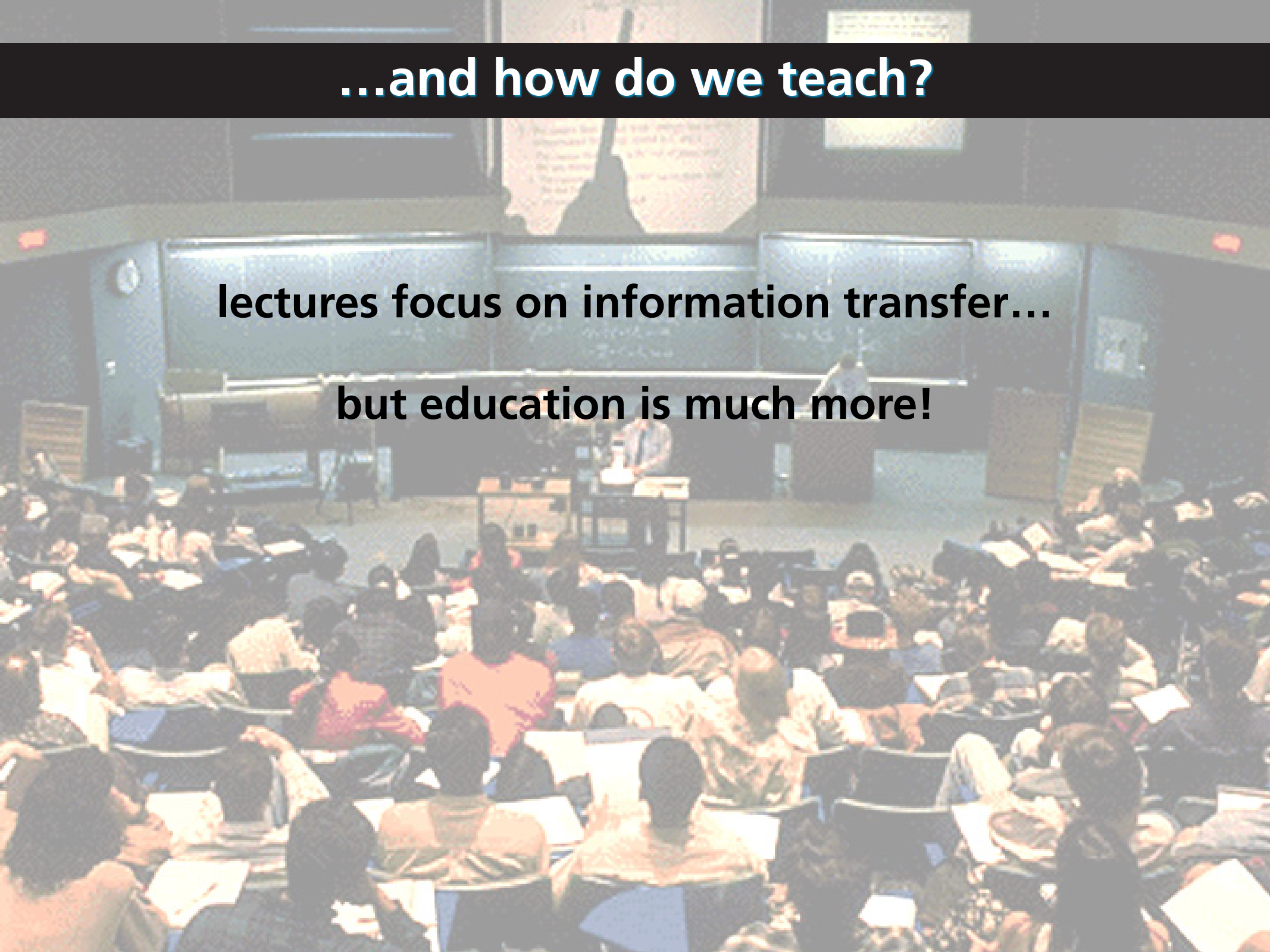
**lectures focus on information transfer...**



**...and how do we teach?**

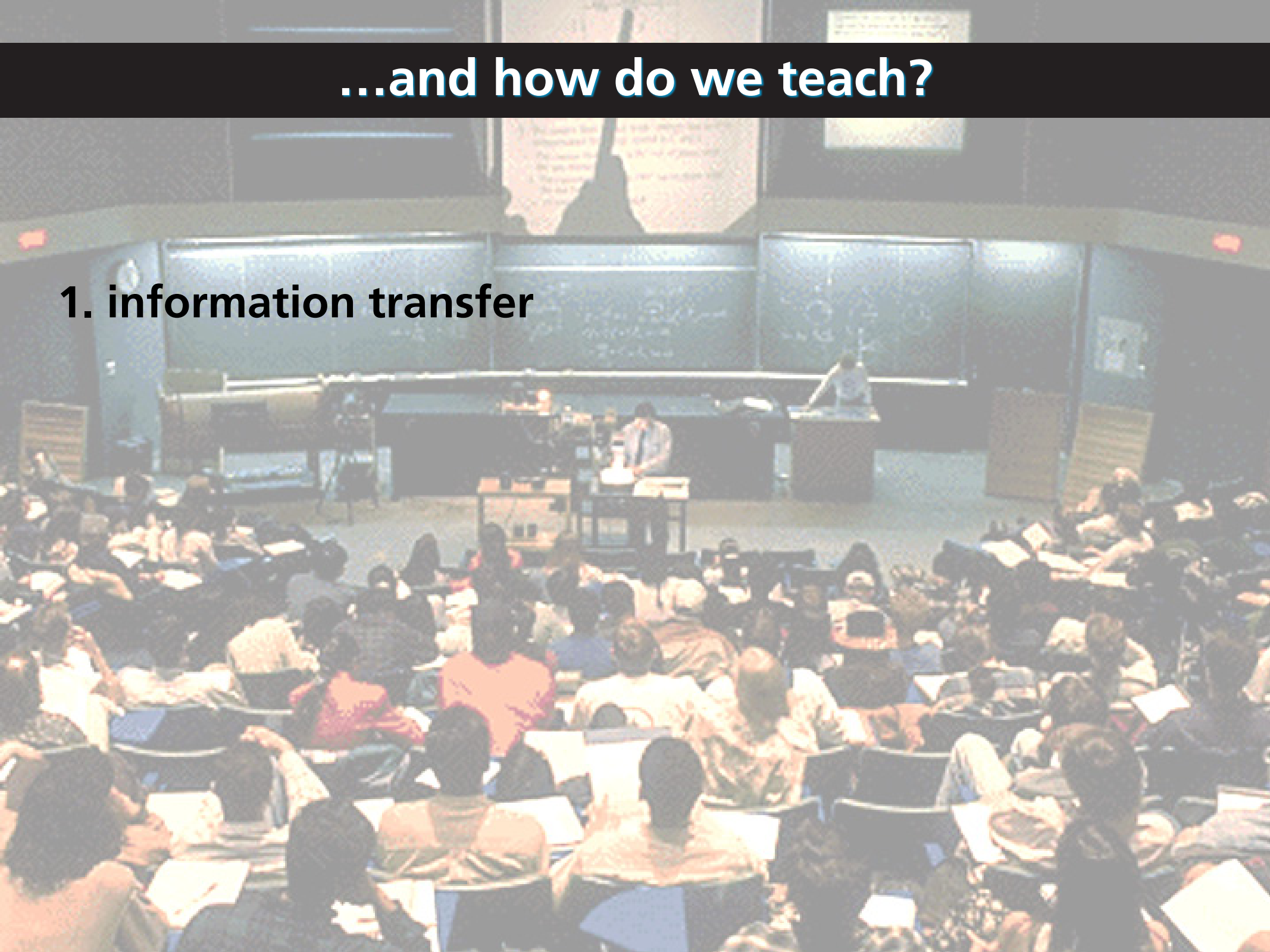
**lectures focus on information transfer...**

**but education is much more!**



**...and how do we teach?**

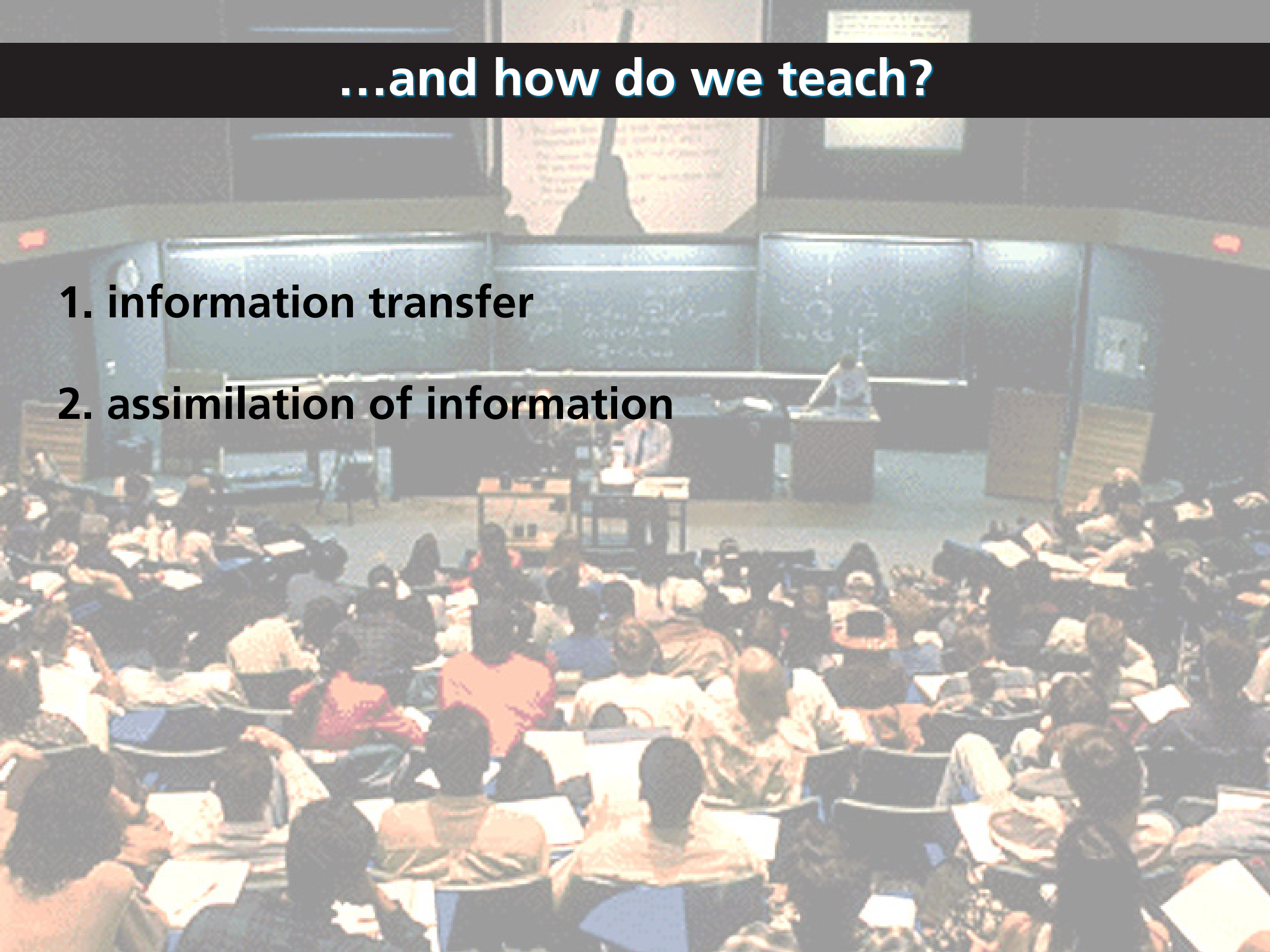
**1. information transfer**





# ...and how do we teach?

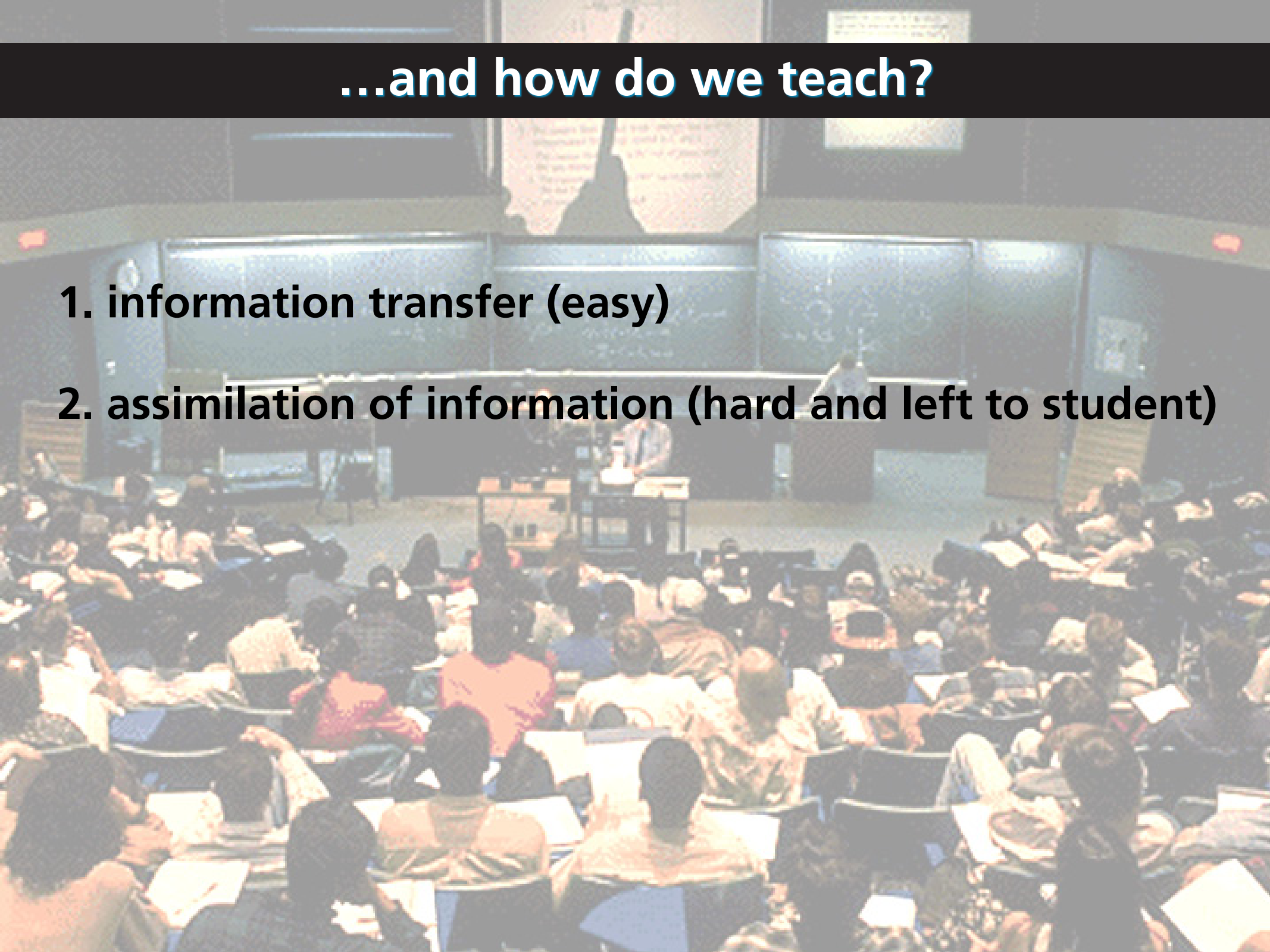
1. information transfer
2. assimilation of information



# ...and how do we teach?

1. information transfer (easy)

2. assimilation of information (hard and left to student)



# Outline



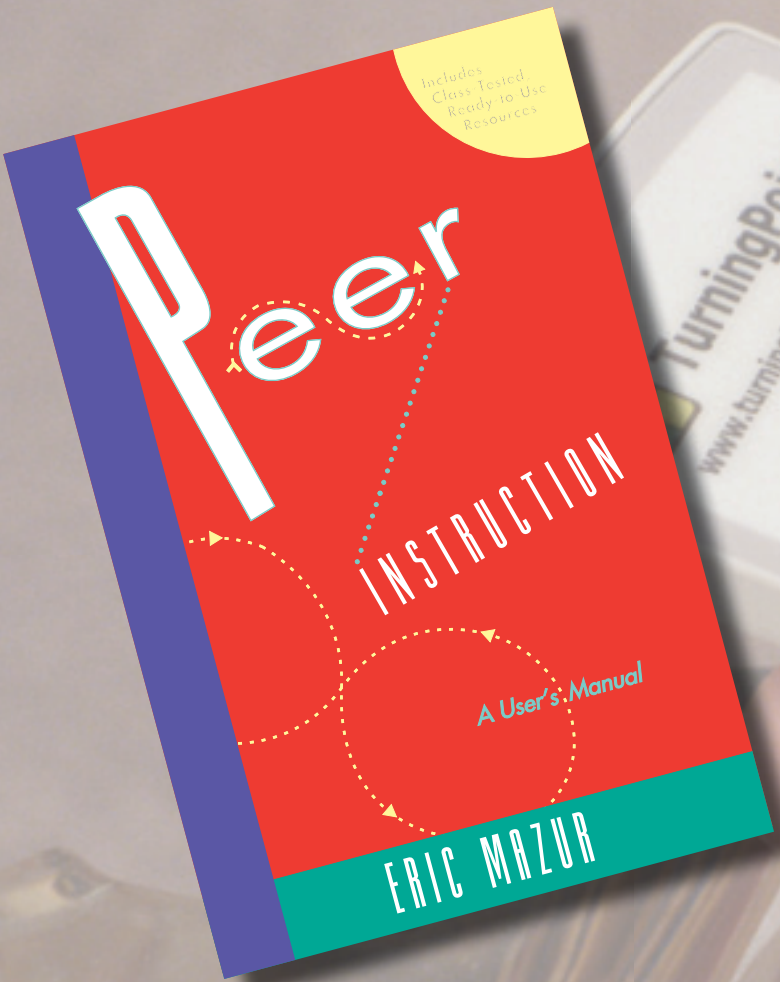
# Outline

- Peer Instruction
- Let's try it!
- Results

# Peer Instruction

move information transfer  
out of classroom

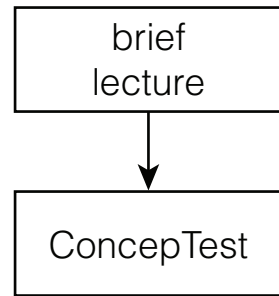
- assign reading
- teach by questioning



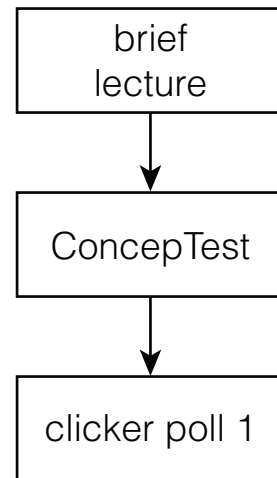
# Peer Instruction

brief  
lecture

# Peer Instruction

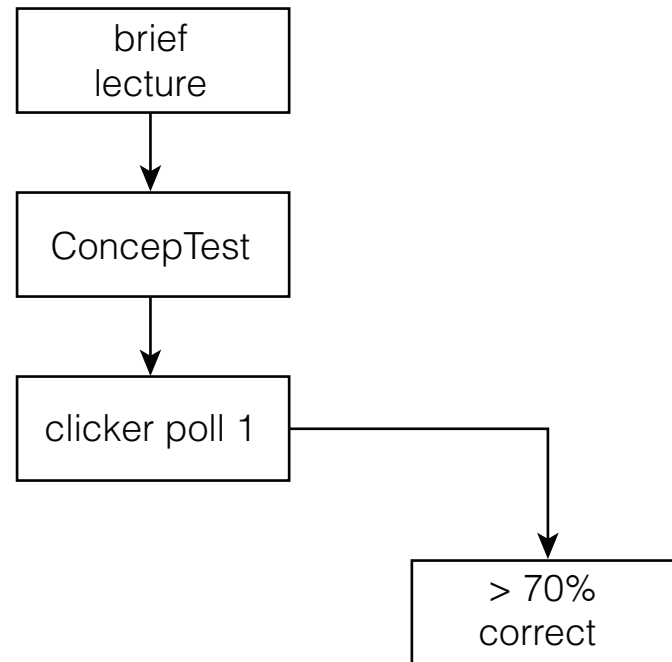


# Peer Instruction

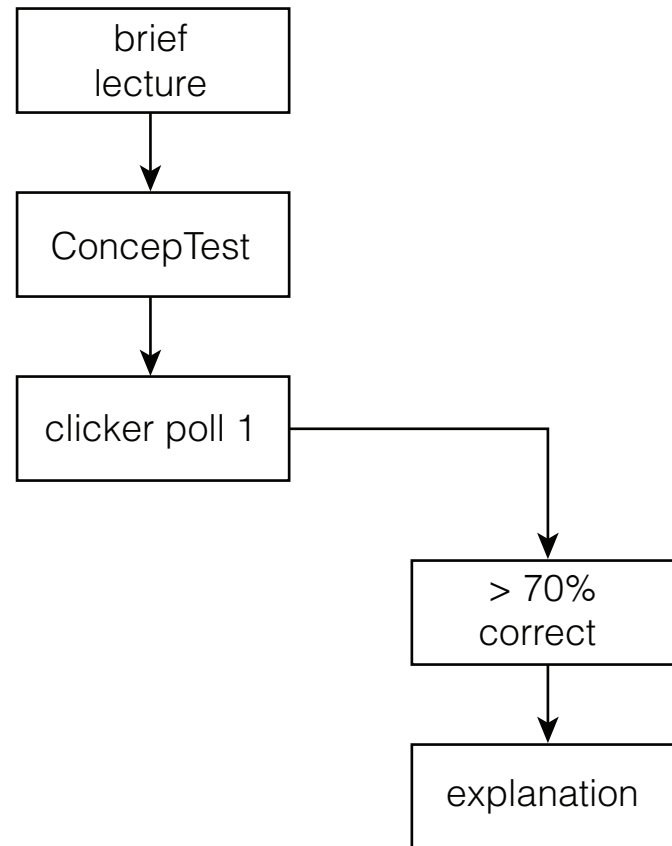




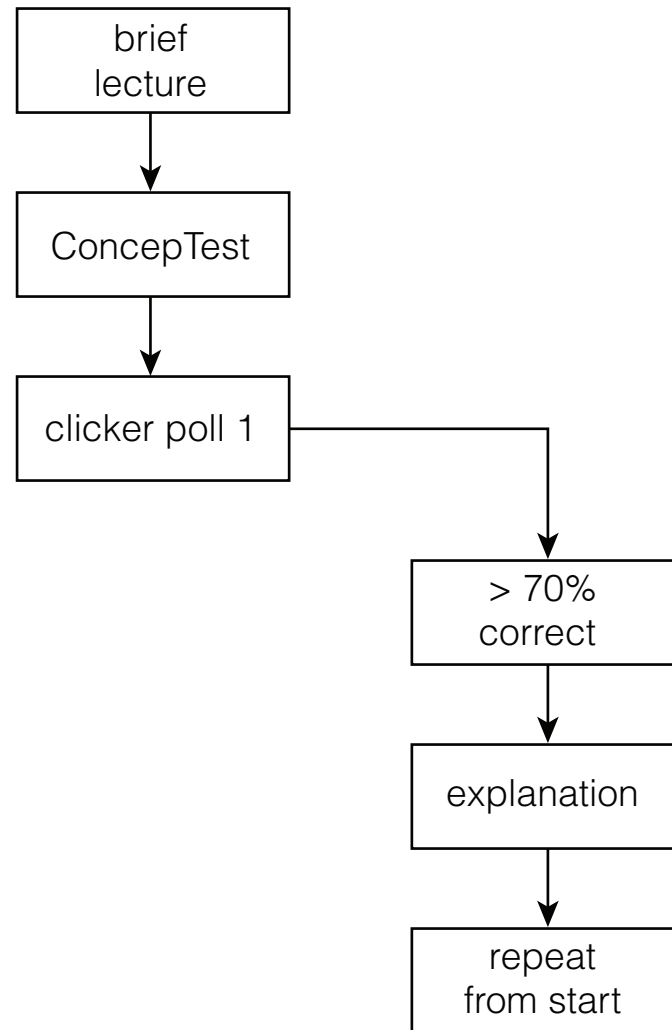
# Peer Instruction



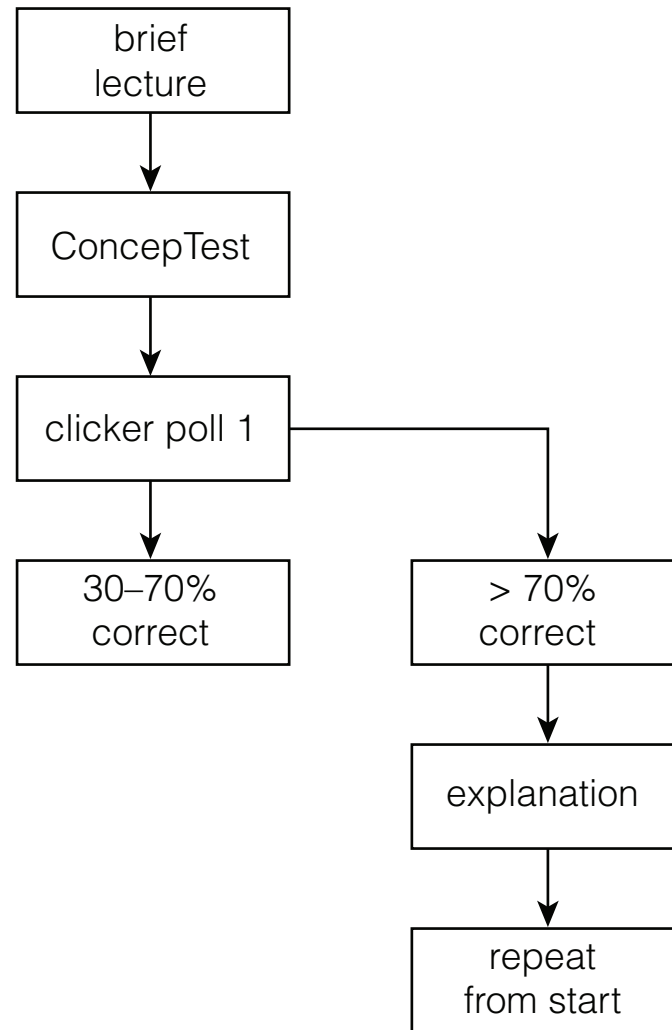
# Peer Instruction



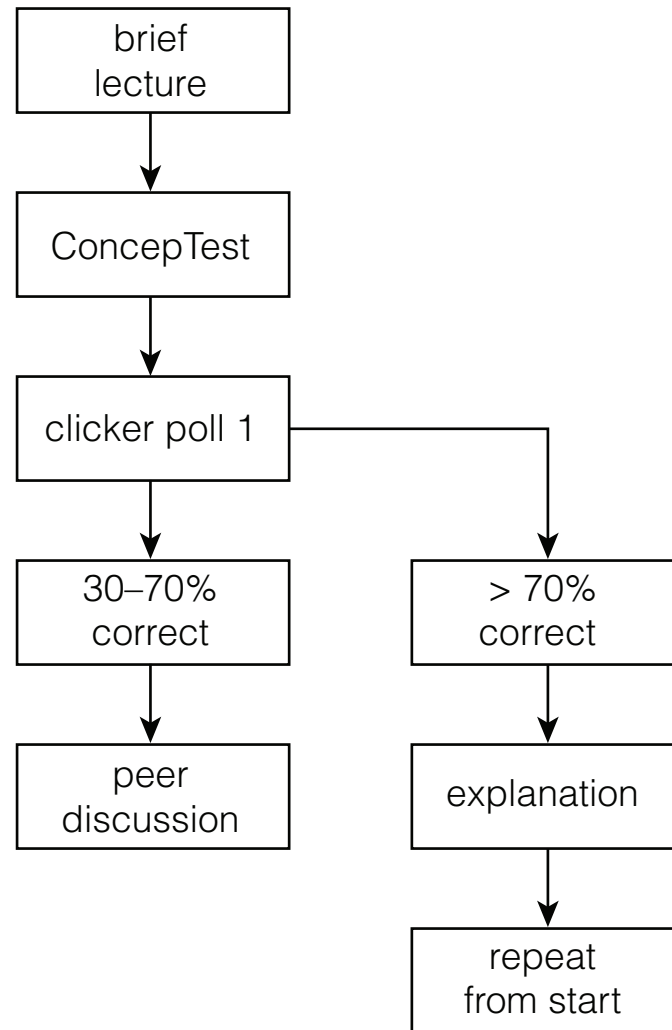
# Peer Instruction



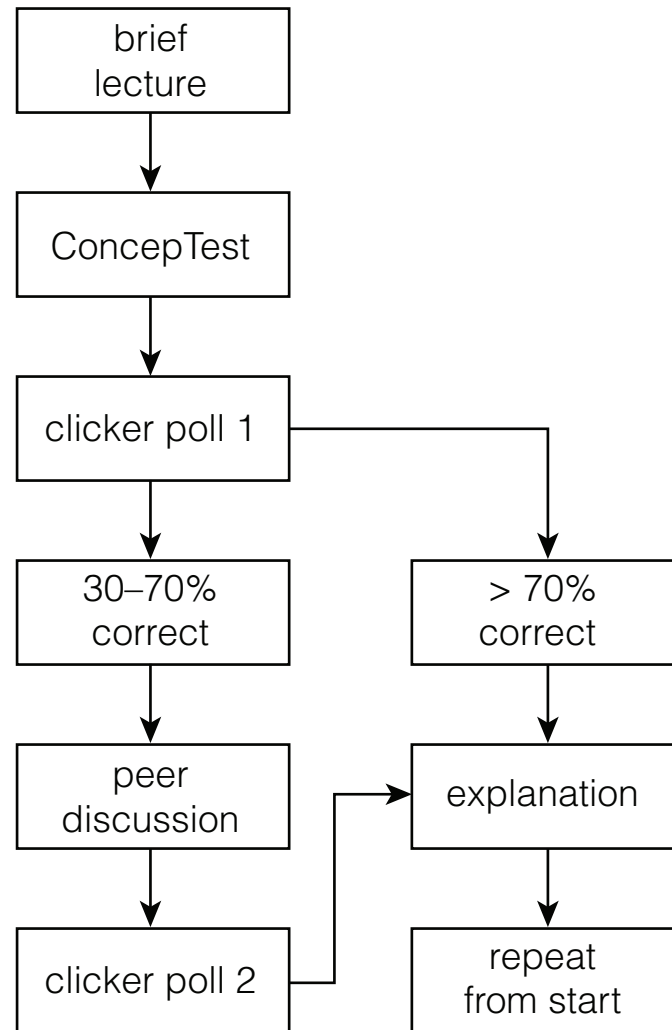
# Peer Instruction



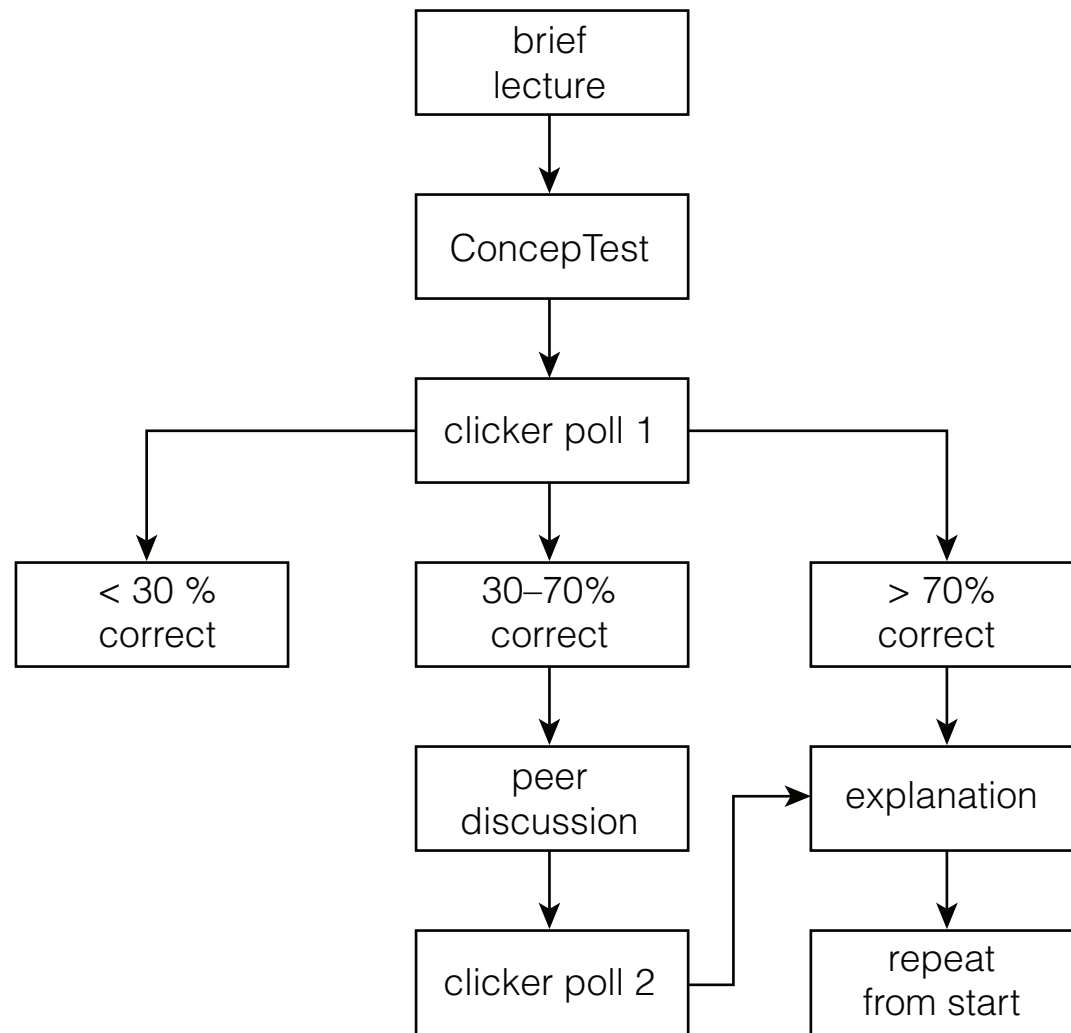
# Peer Instruction



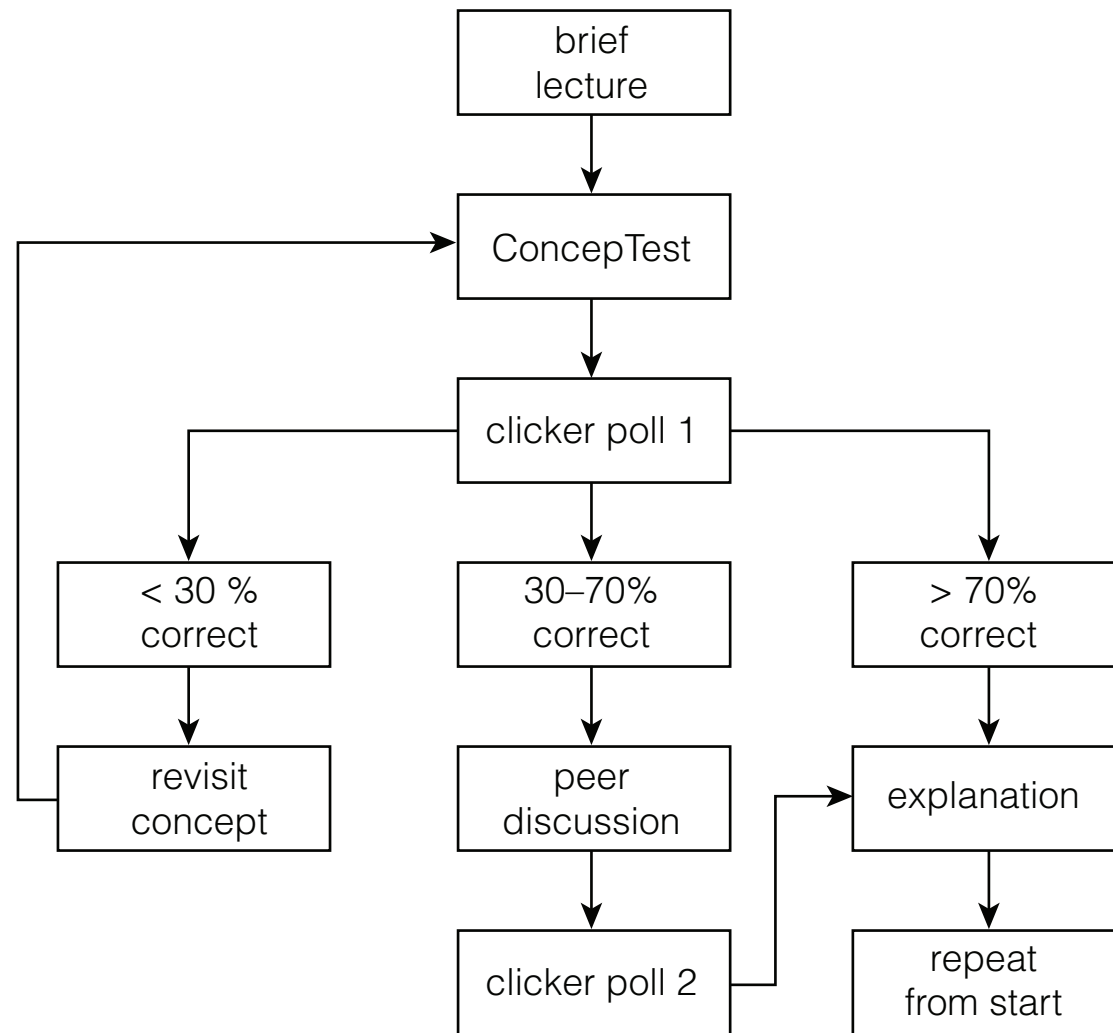
# Peer Instruction



# Peer Instruction

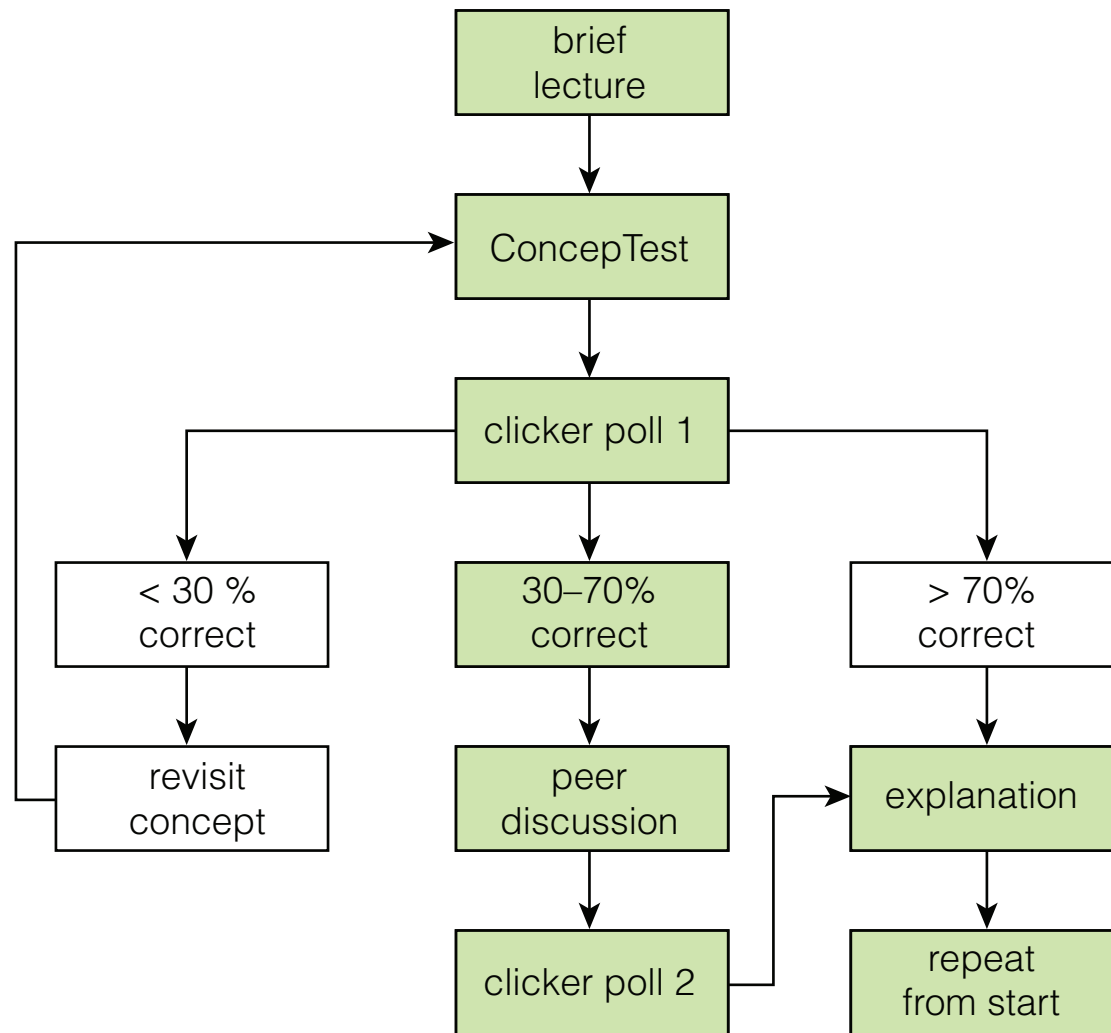


# Peer Instruction





# Peer Instruction



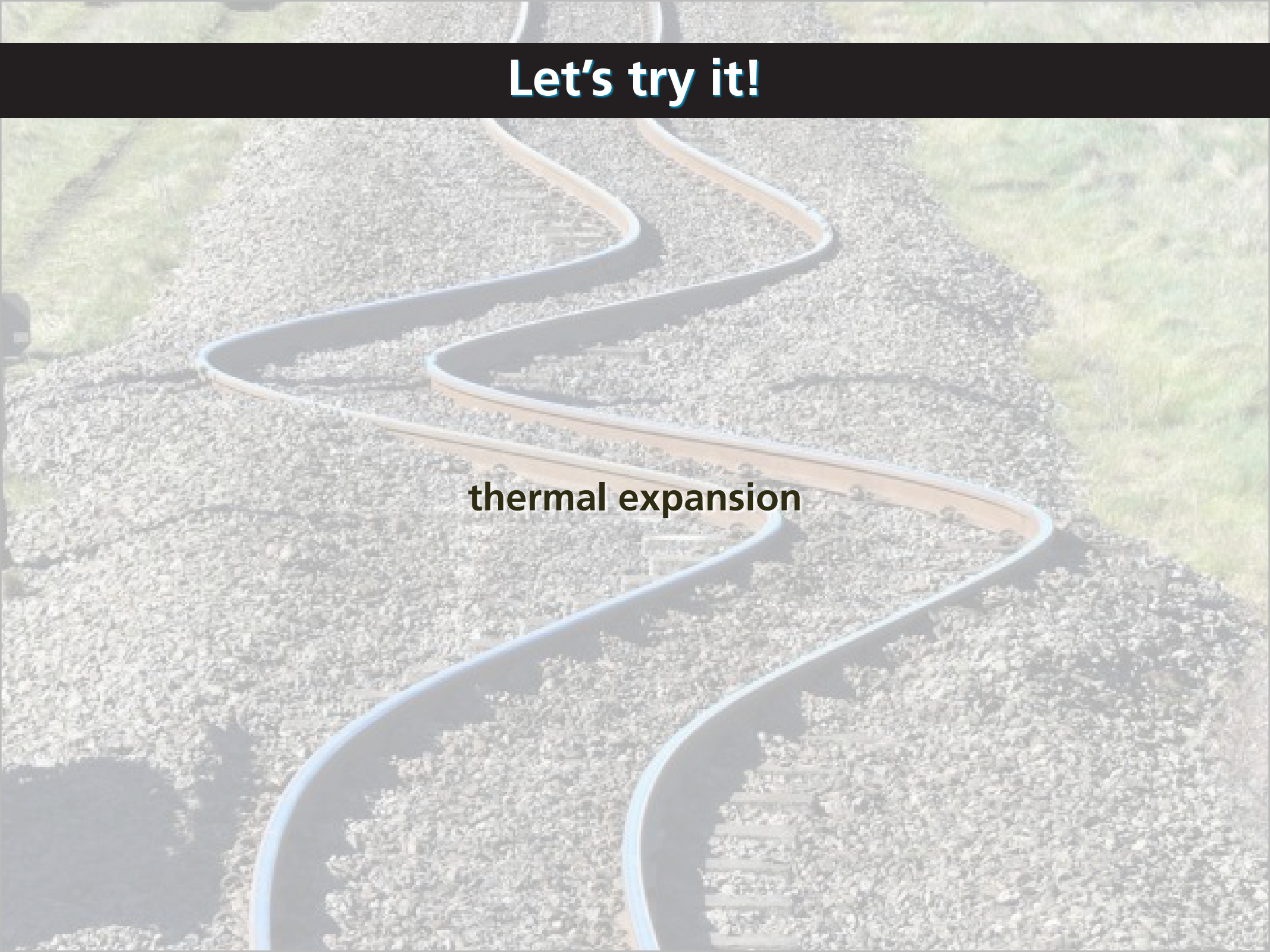


# Outline

- Peer Instruction
- Let's try it!
- Results

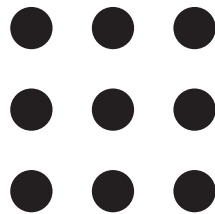
**Let's try it!**

**thermal expansion**



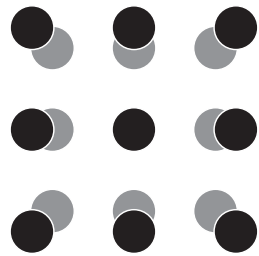
# Let's try it!

When metals heat up, they expand because all atoms get farther away from each other.



# Let's try it!


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# Let's try it!

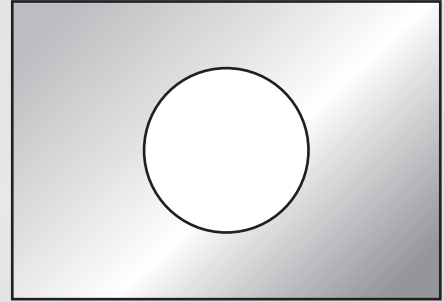
When metals heat up, they expand because all atoms get farther away from each other.

all of them!



# Let's try it!

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



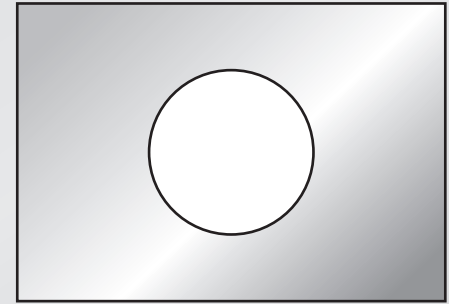


# Let's try it!

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 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.



**you got all fired up!**

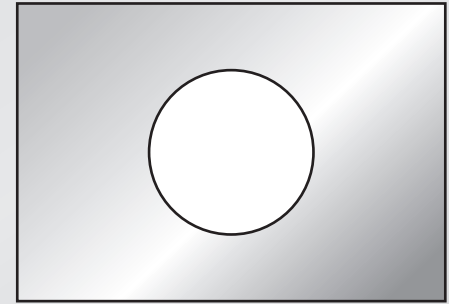


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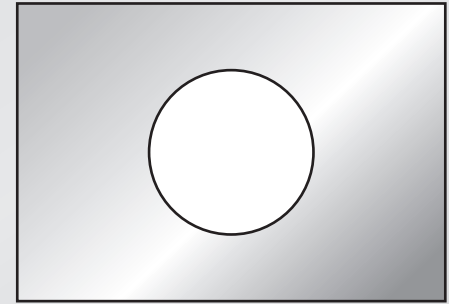


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Consider a rectangular metal plate with a circular hole in it.

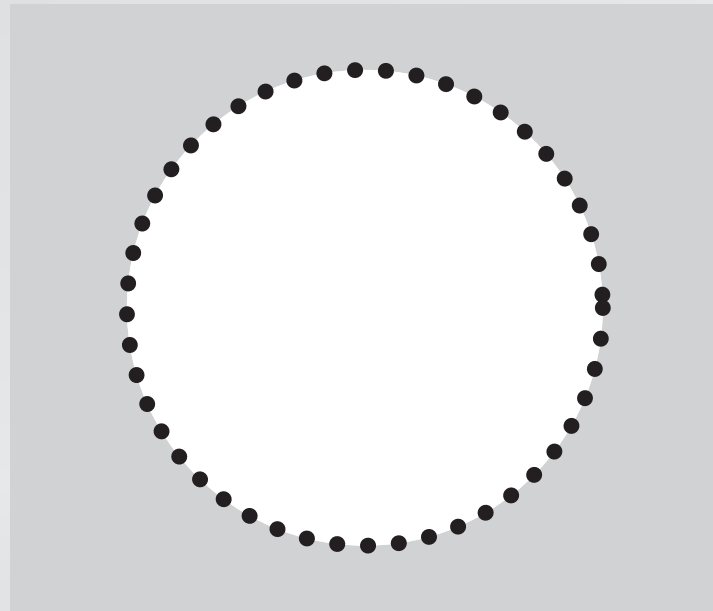
When the plate is uniformly heated, the diameter of the hole

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



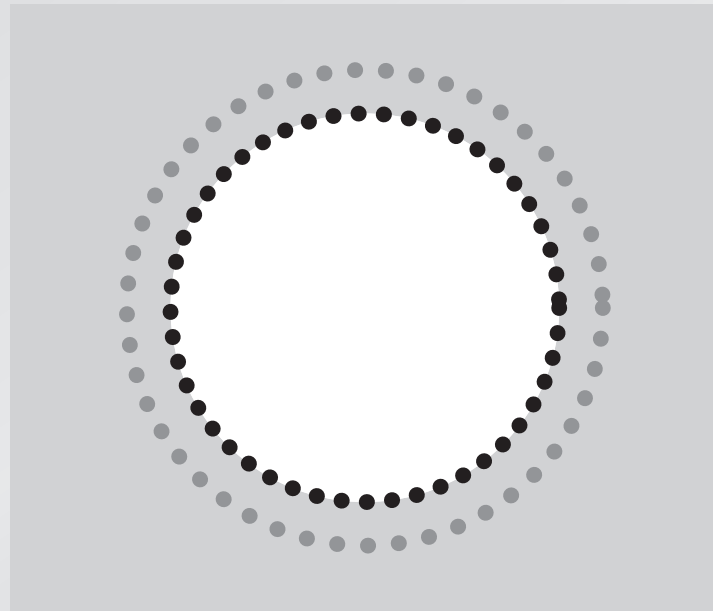
# Let's try it!

consider the atoms at the rim of the hole



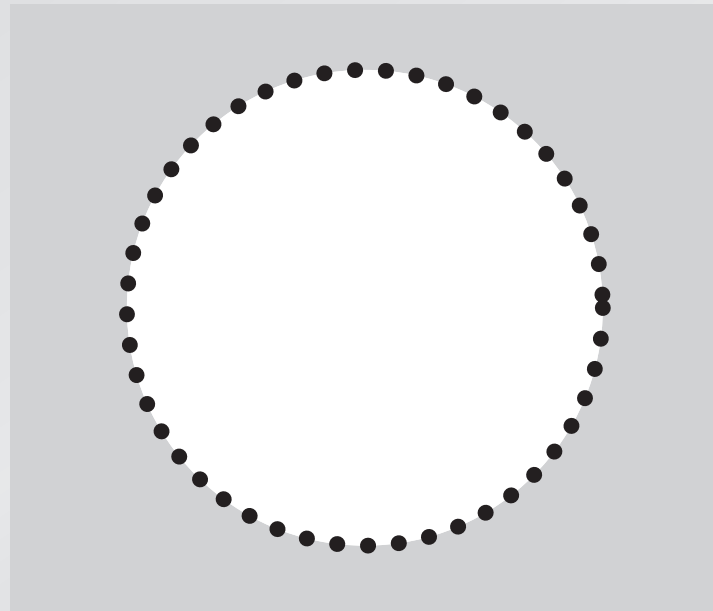
# Let's try it!

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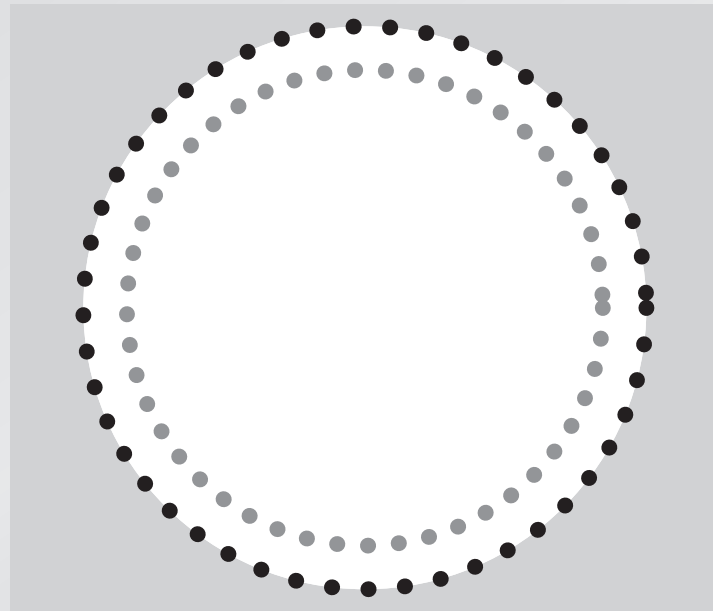
# Let's try it!

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

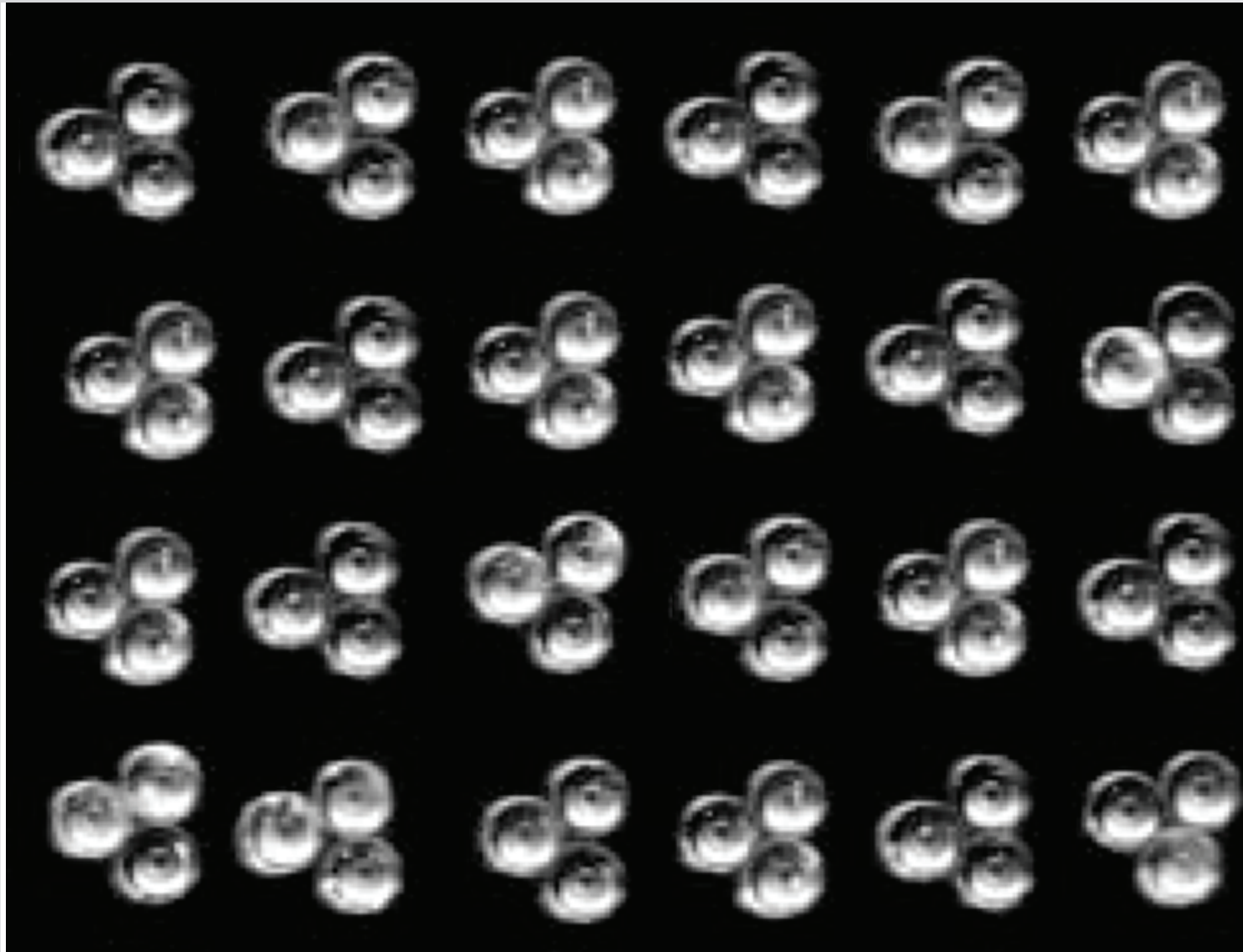
**you won't forget this**



# Let's try it!

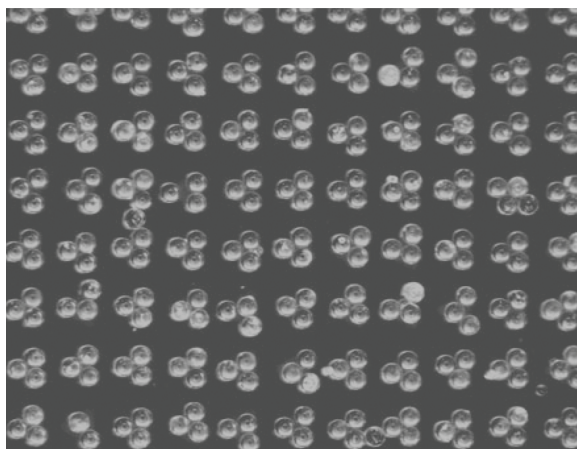
*“Does this method work only with questions  
that have a correct answer?”*

Let's try it!

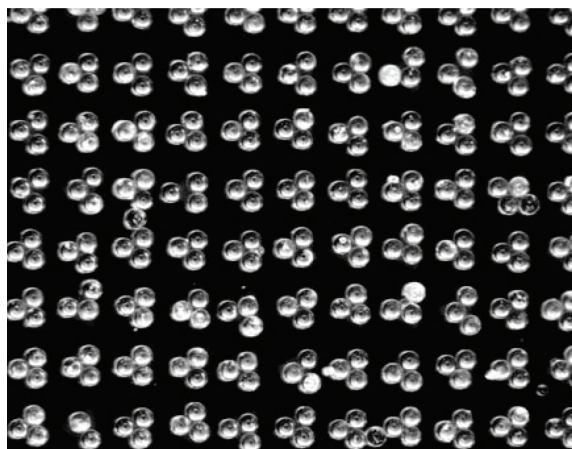


# Let's try it!

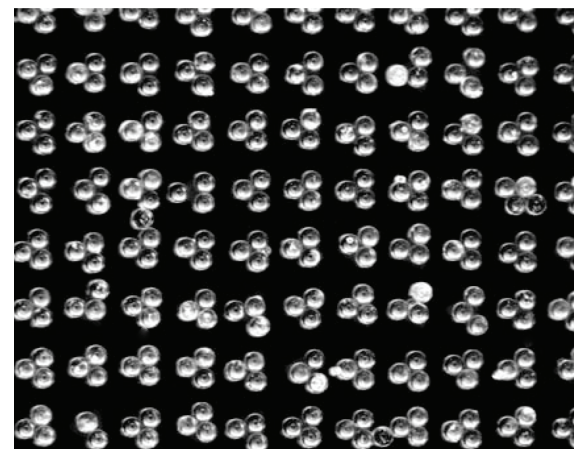
original



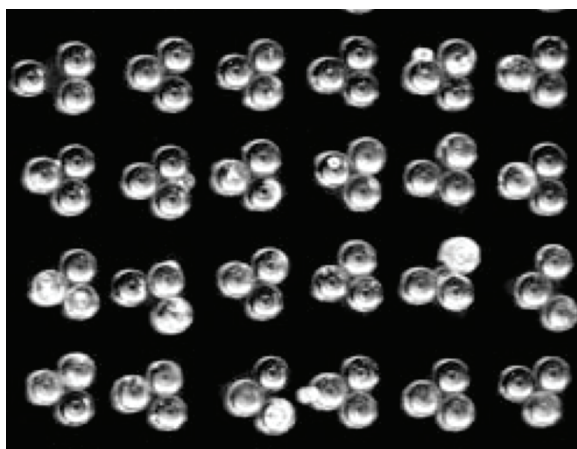
1. adjust contrast



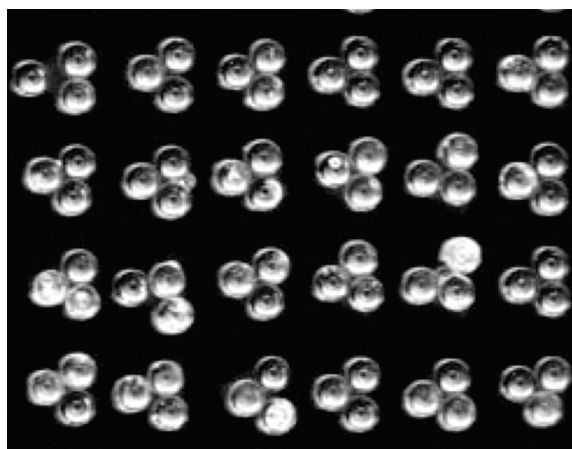
2. remove blemishes



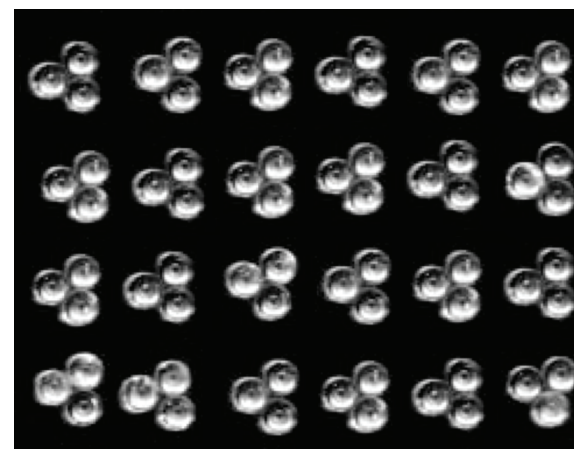
3. crop



4. remove outliers



5. reconstruct



# Consider this

**a couple of points worth noting:**

# Consider this

**a couple of points worth noting:**

- 1. you got engaged**

# Consider this

**a couple of points worth noting:**

- 1. you got engaged**
- 2. no "correct" answer**

# Consider this

a couple of points worth noting:

1. you got engaged
2. no "correct" answer
3. you got engaged



# Consider this

**a couple of points worth noting:**

- 1. you got engaged**
- 2. no "correct" answer**
- 3. you got engaged**
- 4. you don't need a correct answer!**

# Let's try it!

Which of the following airlines tries to save fuel by suggesting that its passengers use the bathroom before boarding?

1. Delta Airlines
2. Lufthansa
3. All Nippon Airways
4. British Midland Airways
5. Air France
6. JAL
7. Aboriginal Air Services
8. Aeroflot
9. Are you kidding me? None of the above.

# Let's try it!

Which of the following airlines tries to save fuel by suggesting that its passengers use the bathroom before boarding?

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- 3. All Nippon Airways**
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8. Aeroflot
9. Are you kidding me? None of the above.

# Let's try it!

**hole in plate**

**model**

**microscopy image**

**discussion**

**airline**

**fact**

# Let's try it!

hole in plate

model

microscopy image

discussion

airline

fact

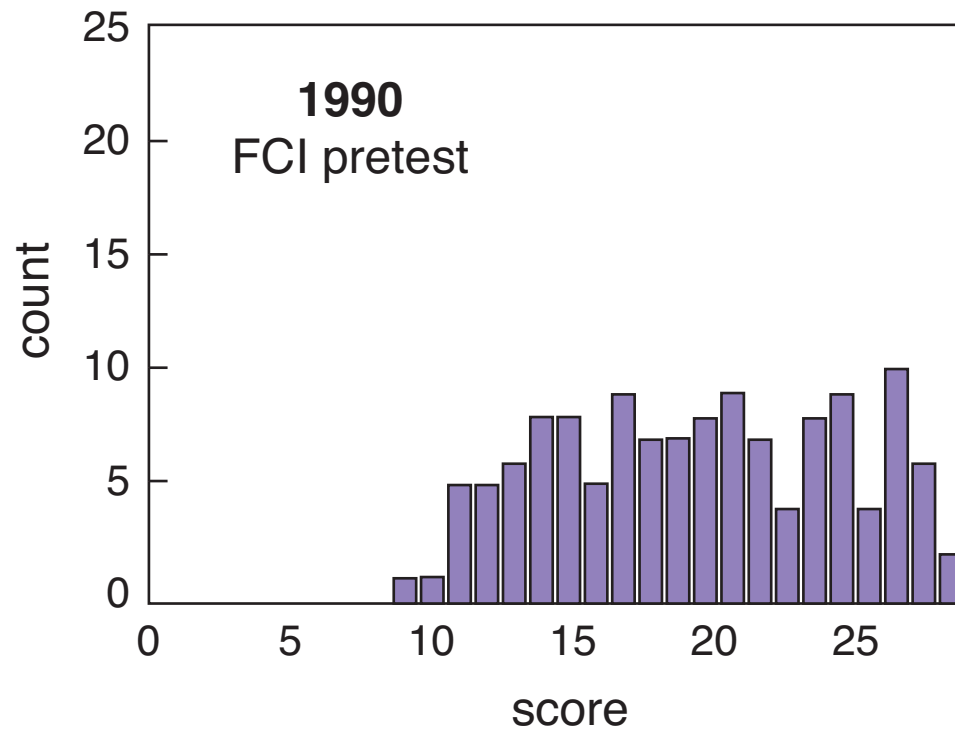
**need to test mental model!**

# Outline

- Peer Instruction
- Let's try it!
- Results

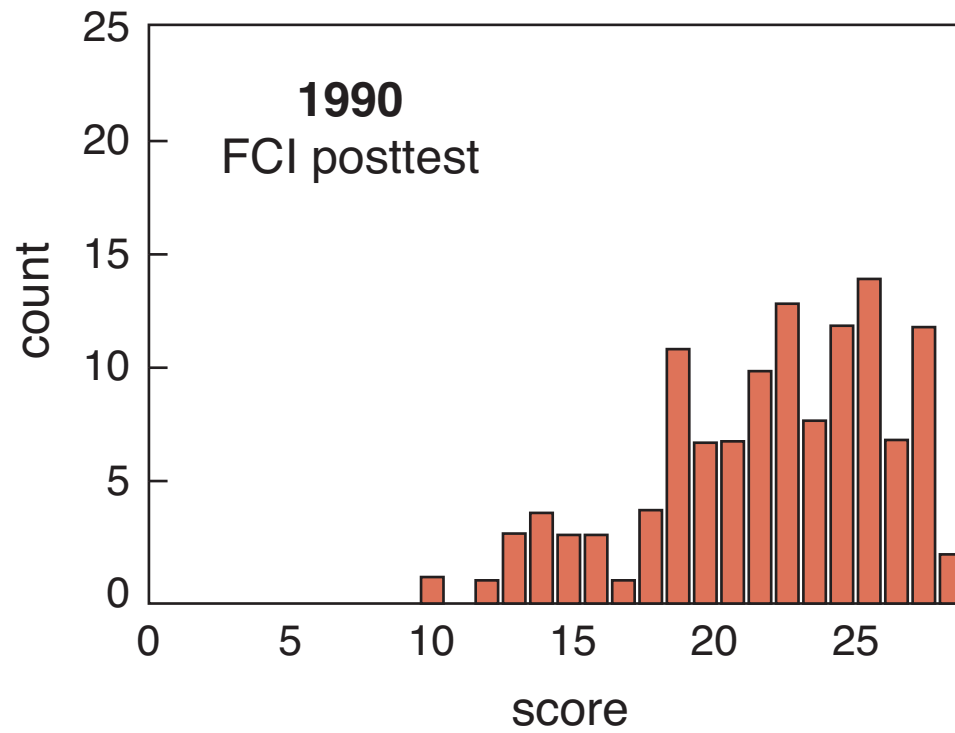
# Results

## traditional instruction



# Results

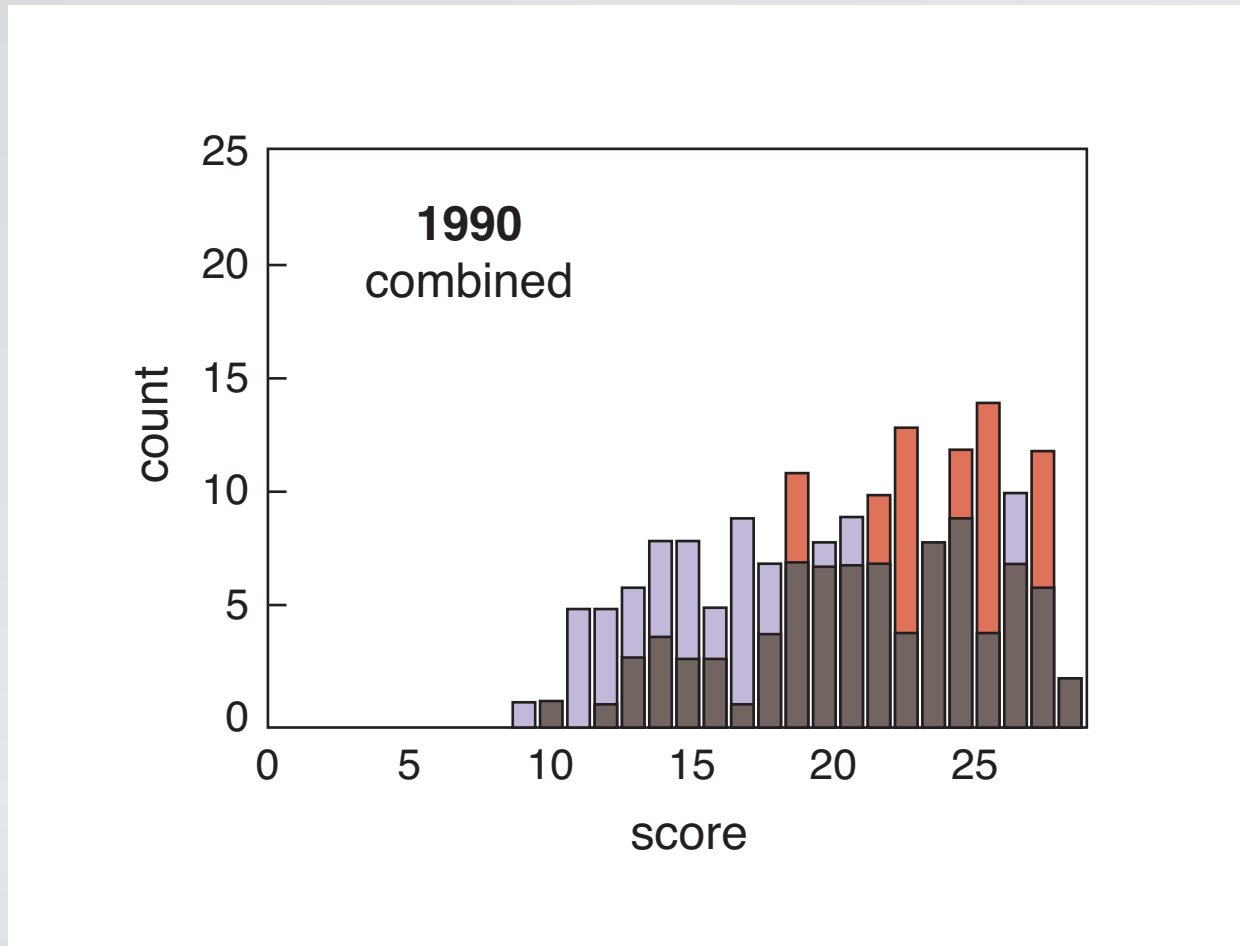
## traditional instruction





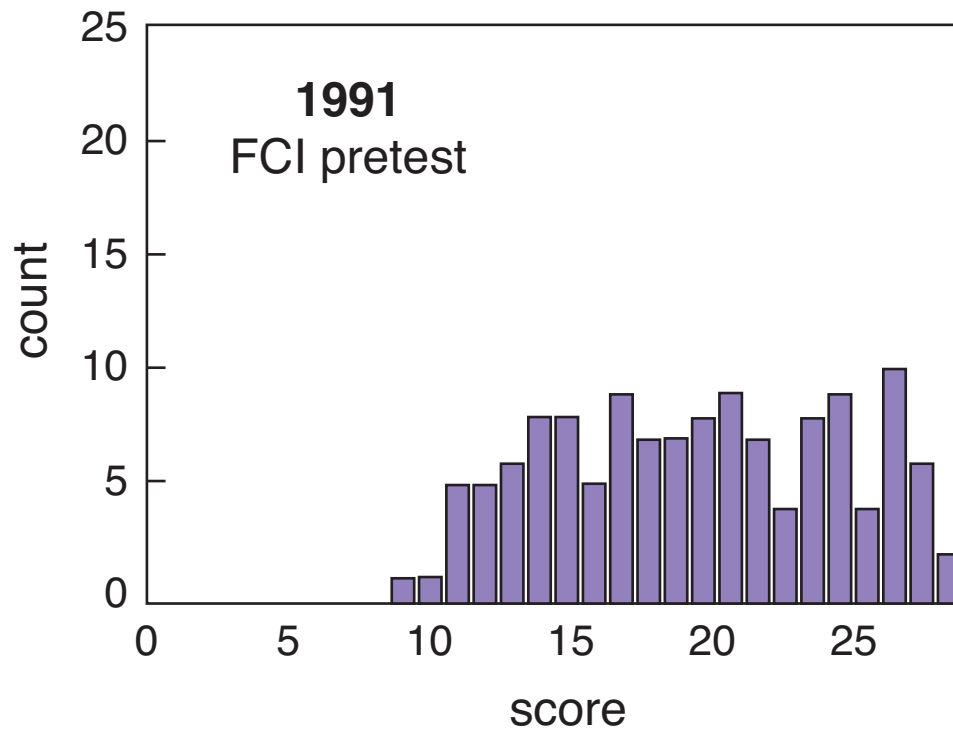
# Results

## traditional instruction



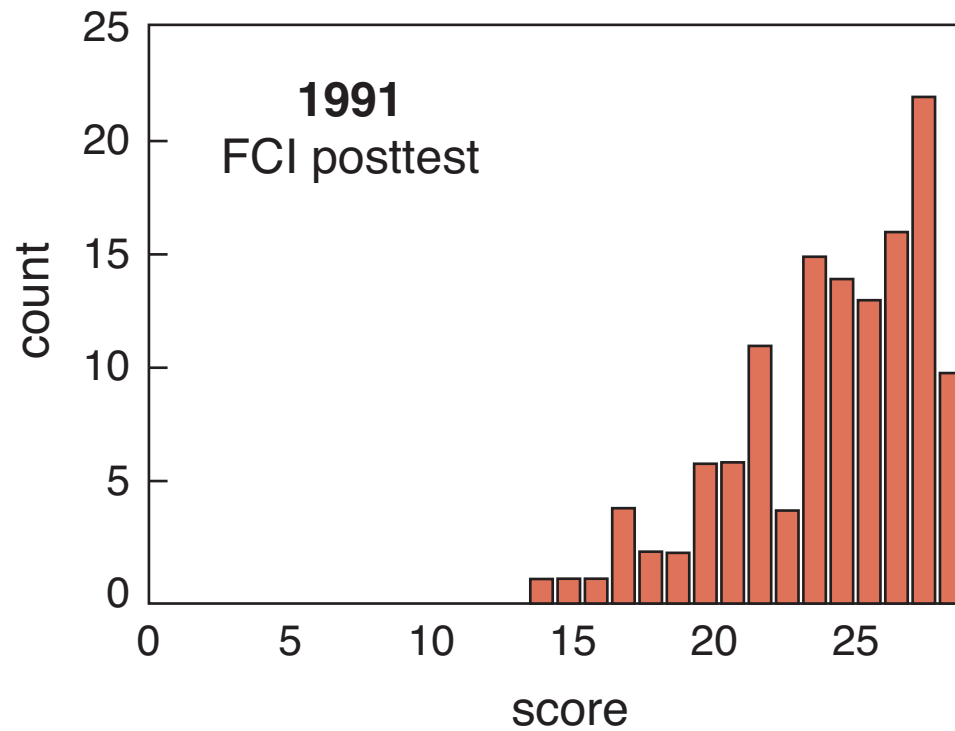
# Results

## first year of implementing PI



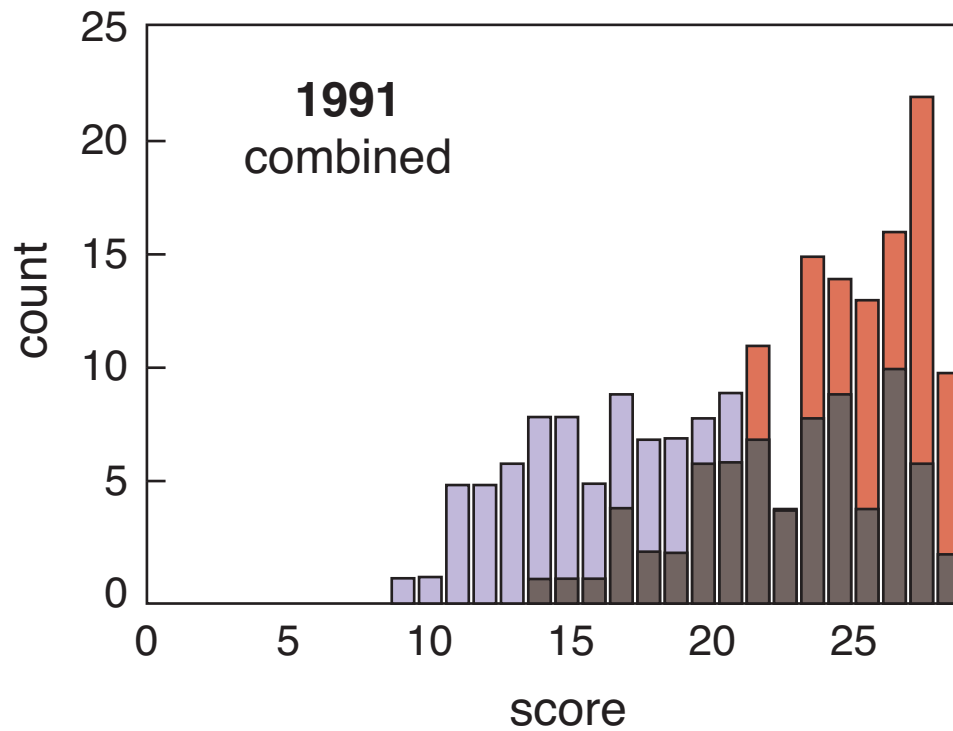
# Results

## first year of implementing PI



# Results

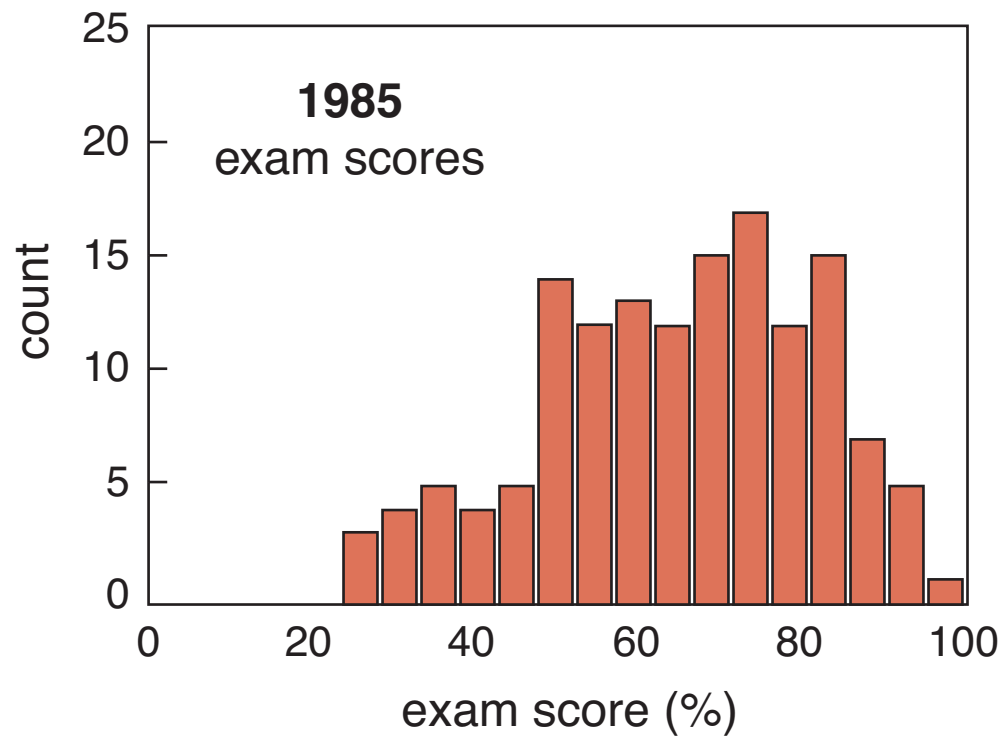
## first year of implementing PI



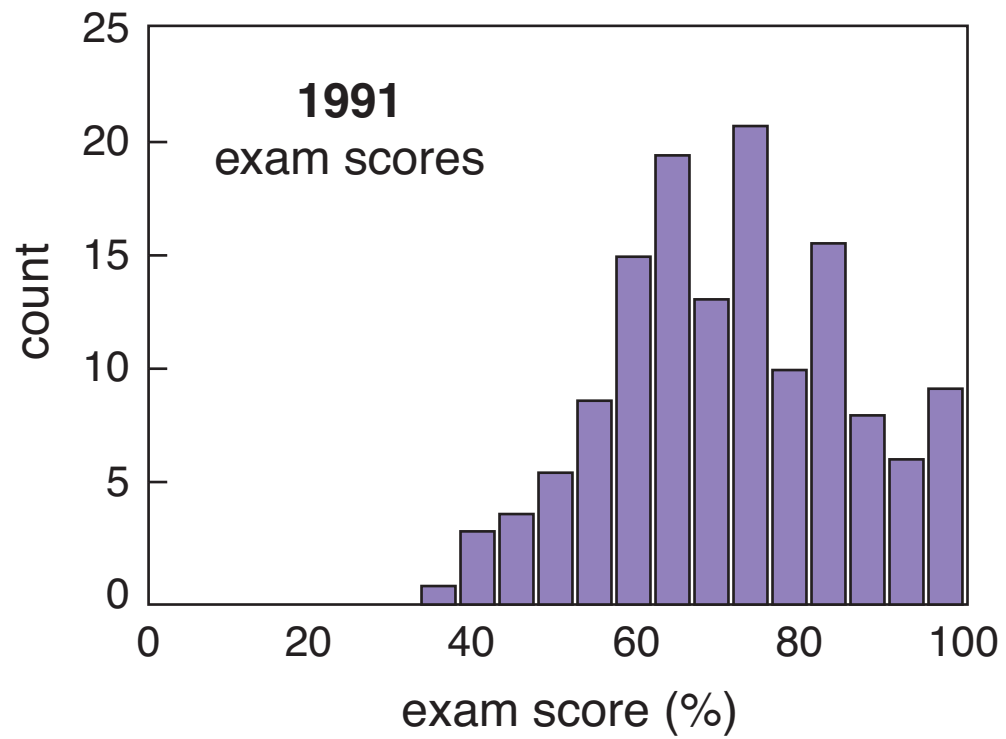
# Results

**what about problem solving?**

# Results

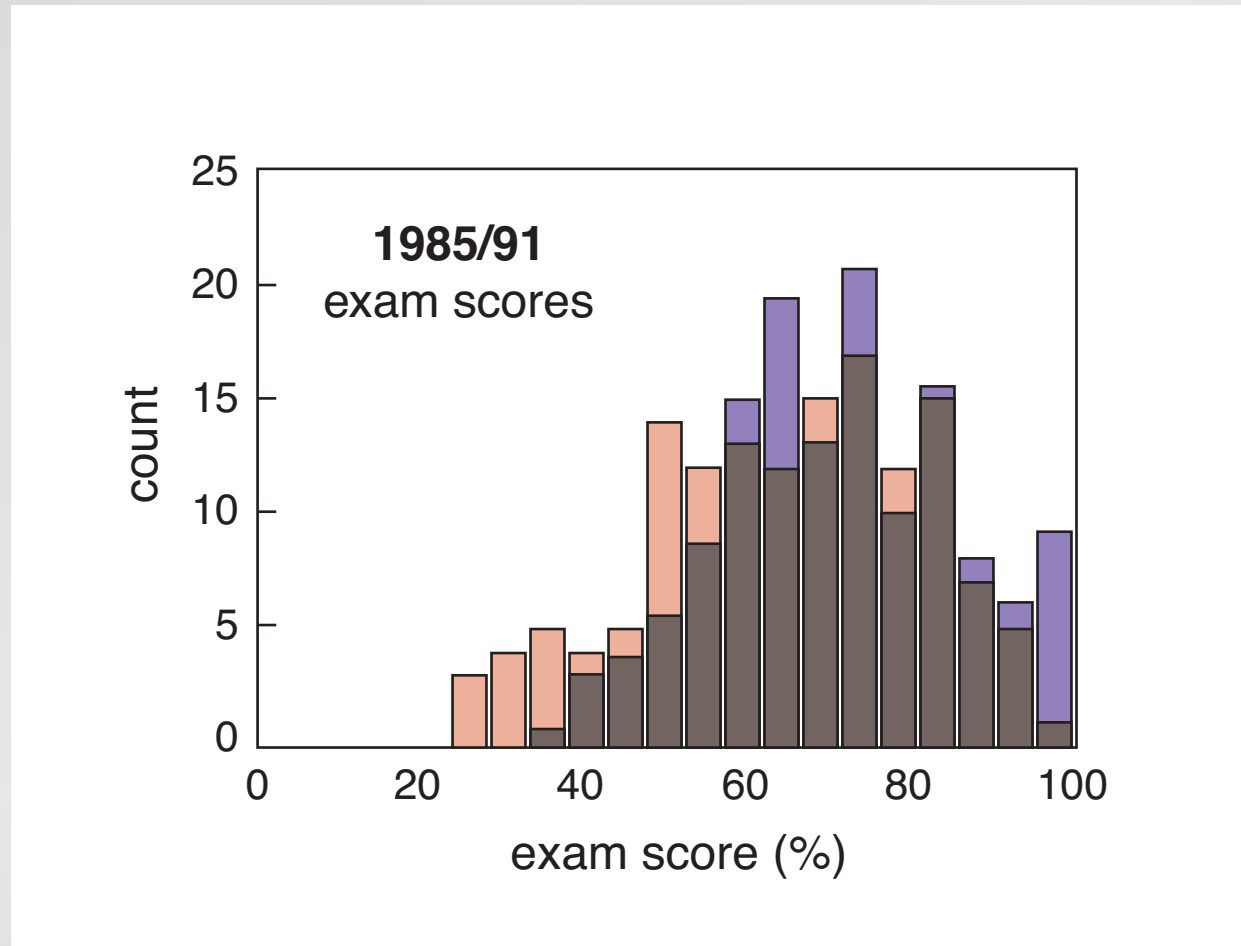


# Results



# Results

**better understanding leads to better problem solving**







# Conclusion

active engagement greatly improves learning gains



# Conclusion

active engagement greatly improves learning gains

technology facilitates active engagement



# Conclusion

**not just a polling tool, but an engagement tool!**





**Join now!**

**PeerInstruction.net**

## Research Funding:

**Pew Charitable Trust, Pearson/Prentice Hall, Davis Foundation, Engineering Information Foundation, Derek Bok Center for Teaching and Learning, National Science Foundation**

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