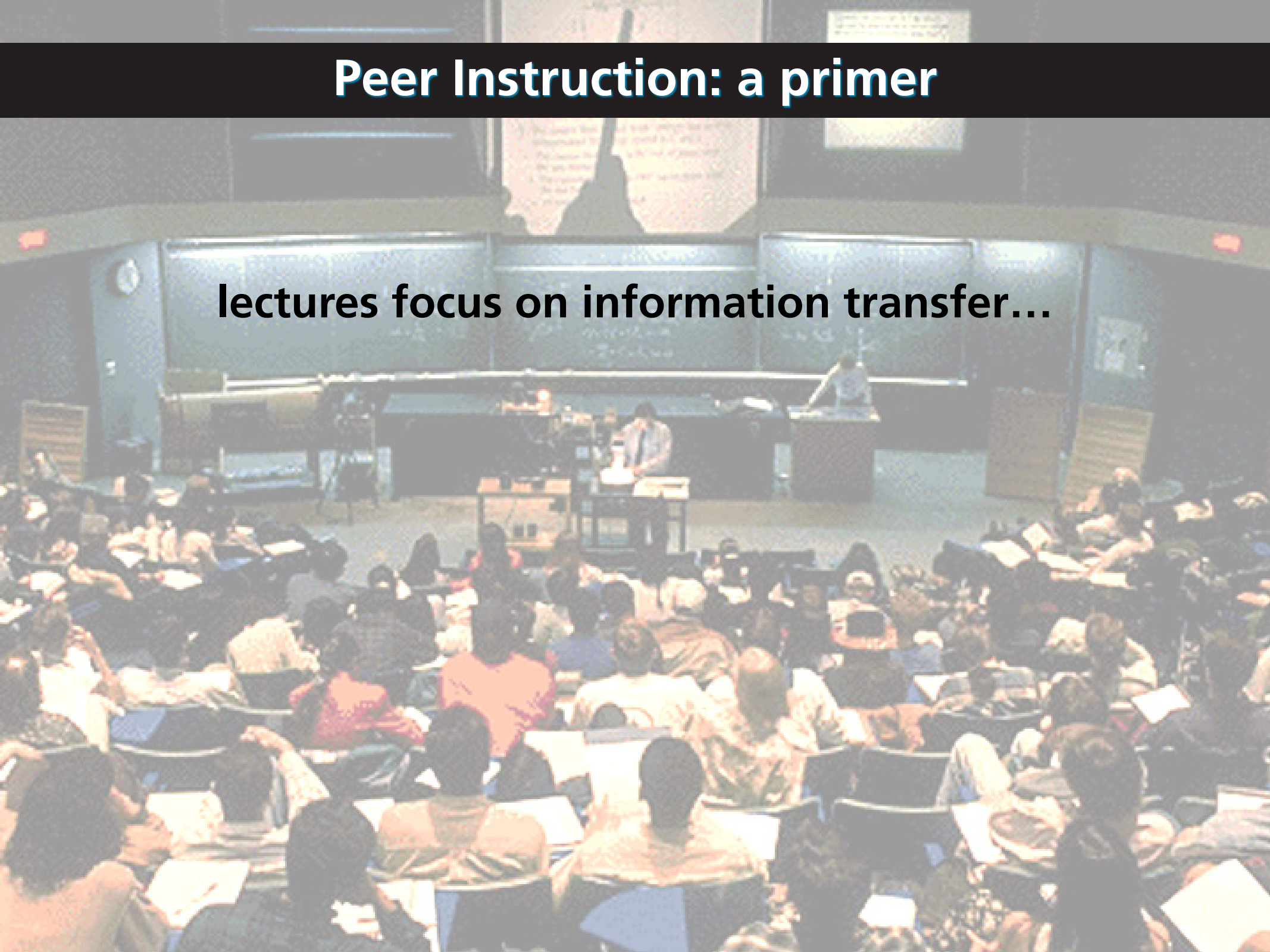
Peer Instruction: Practical Details

Physics and Astronomy New Faculty Workshop
College Park, MD, 23 June 2014

Peer Instruction: Practical Details

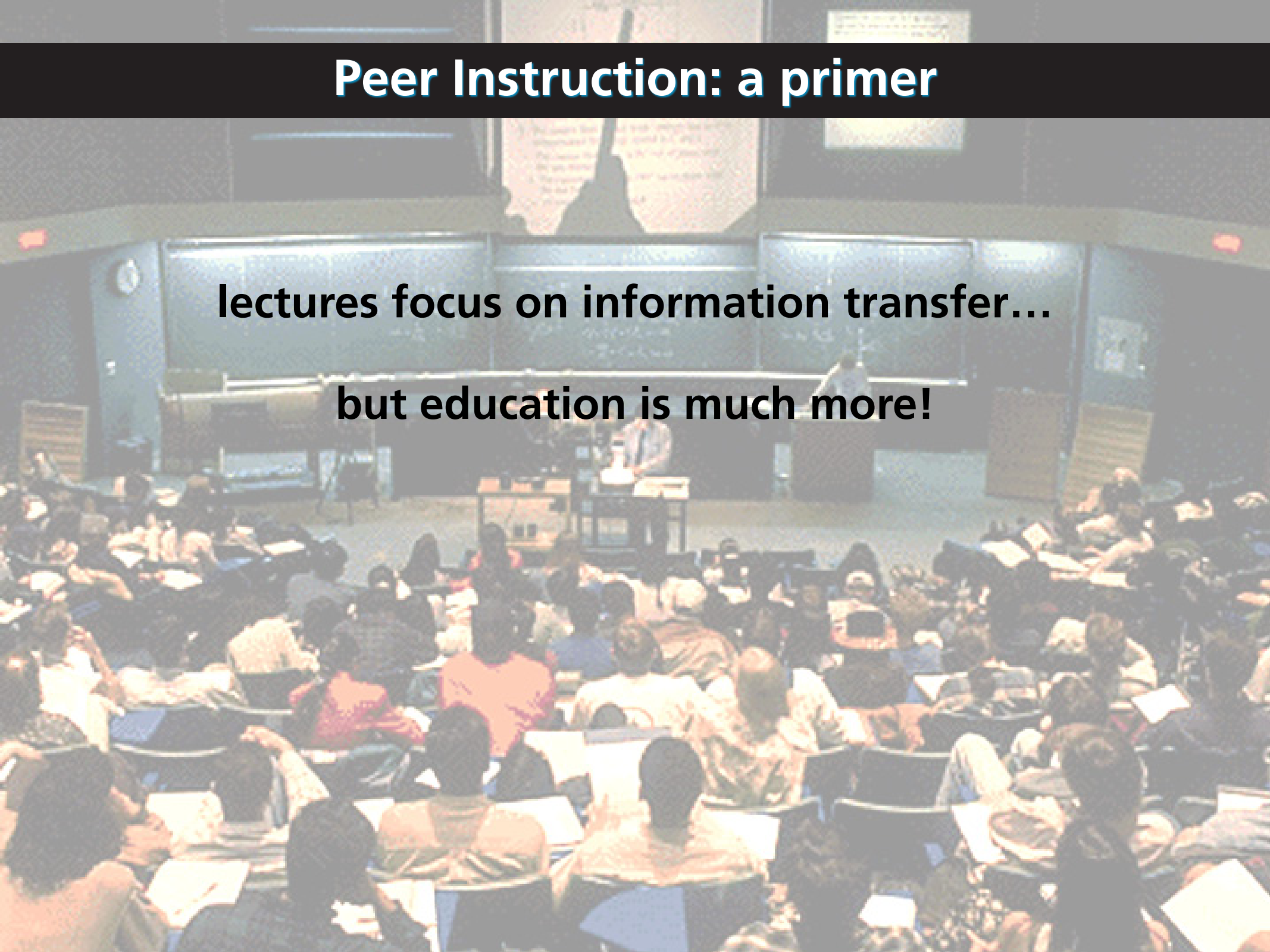
Physics and Astronomy New Faculty Workshop
College Park, MD, 23 June 2014

Peer Instruction: a primer



lectures focus on information transfer…

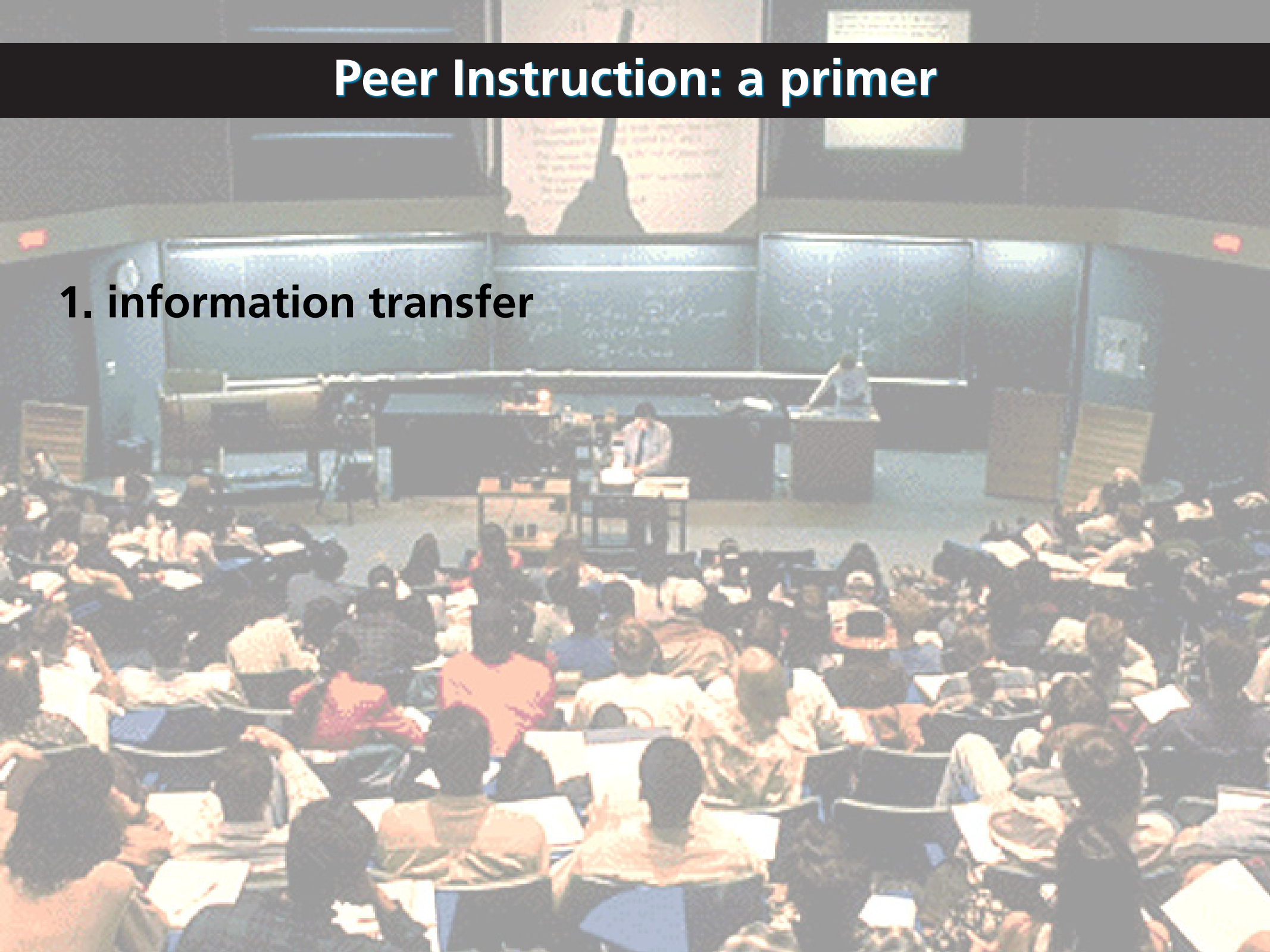
Peer Instruction: a primer



lectures focus on information transfer…

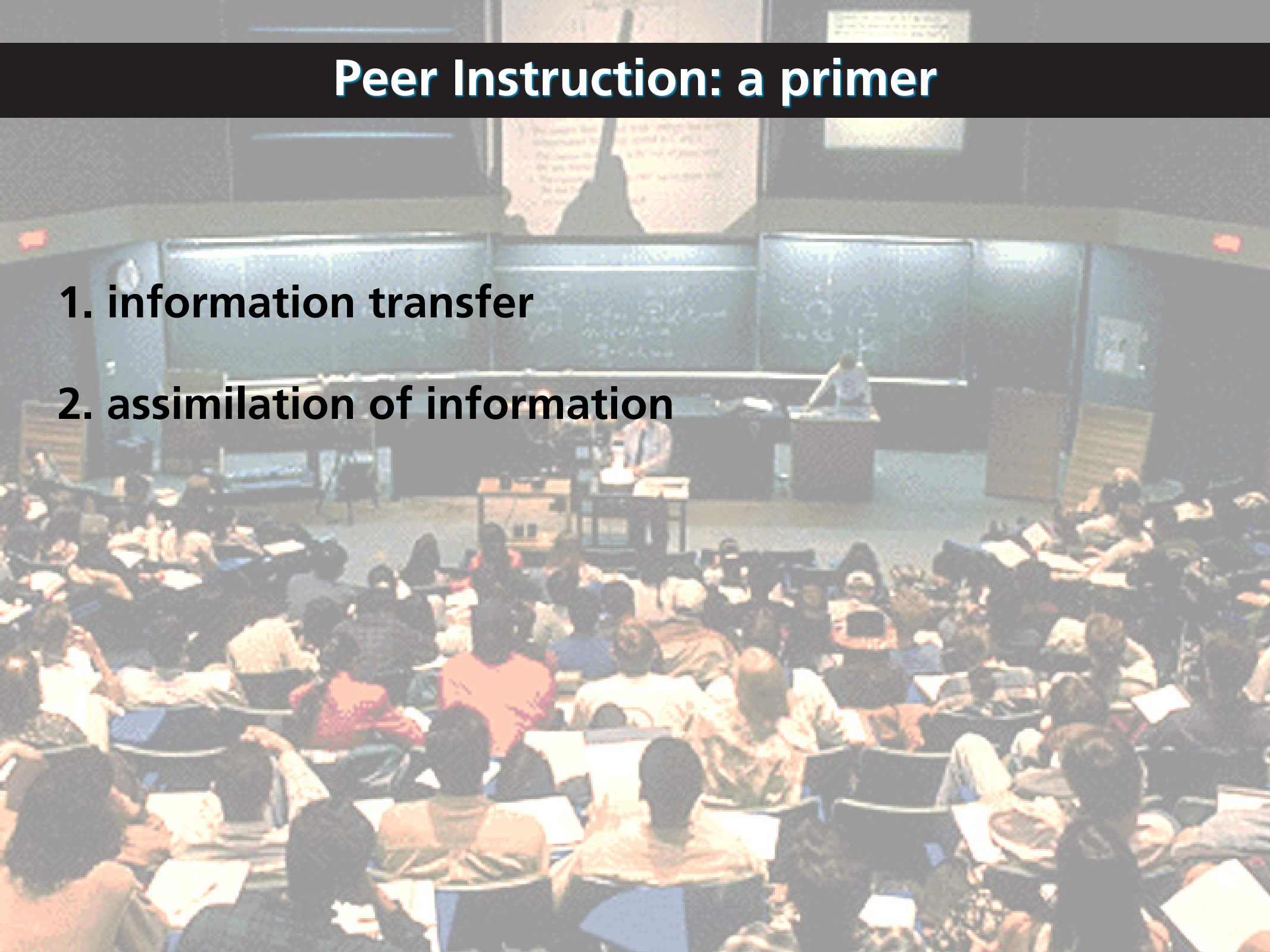
but education is much more!

Peer Instruction: a primer



1. information transfer

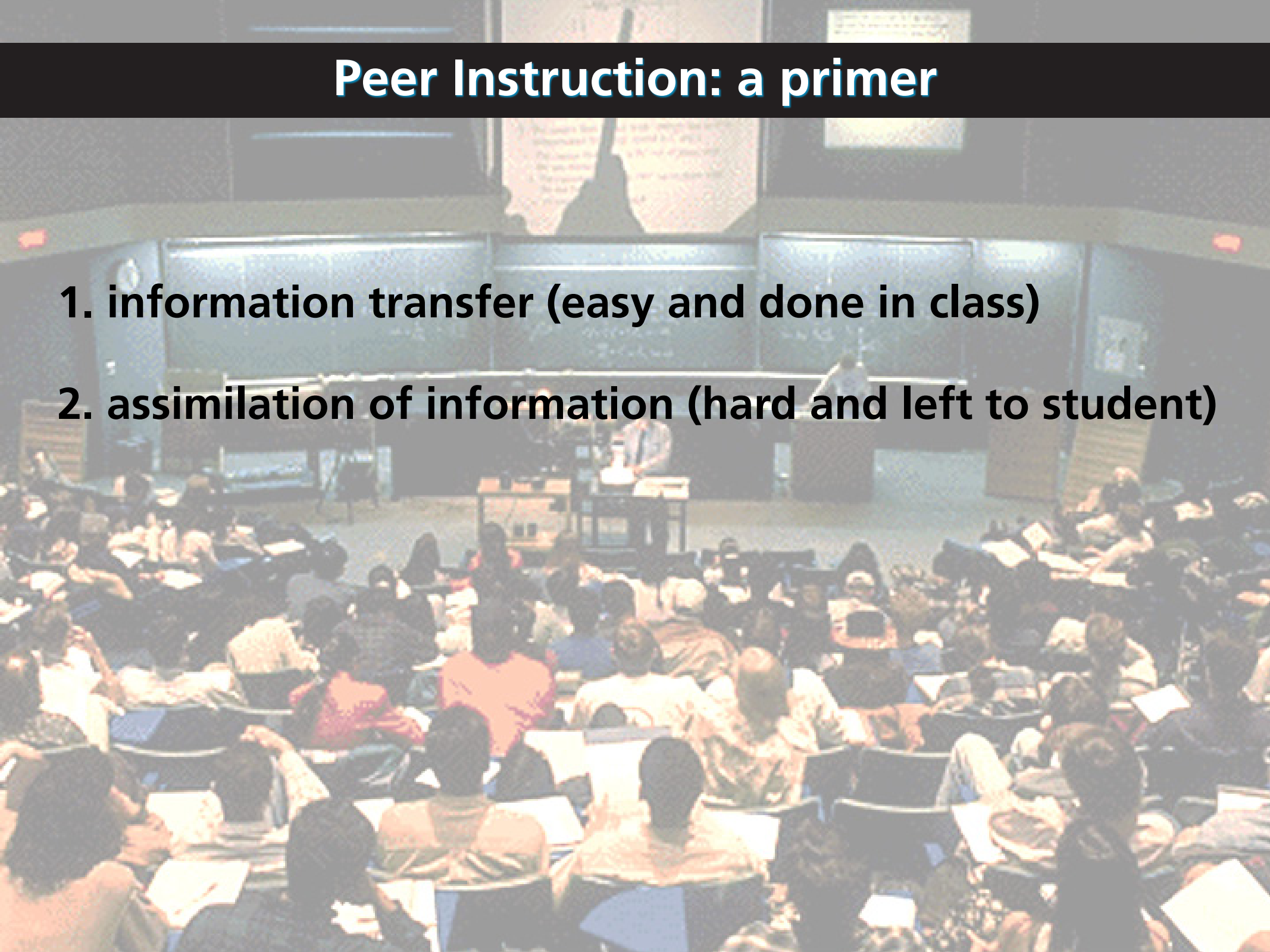
Peer Instruction: a primer



1. information transfer

2. assimilation of information

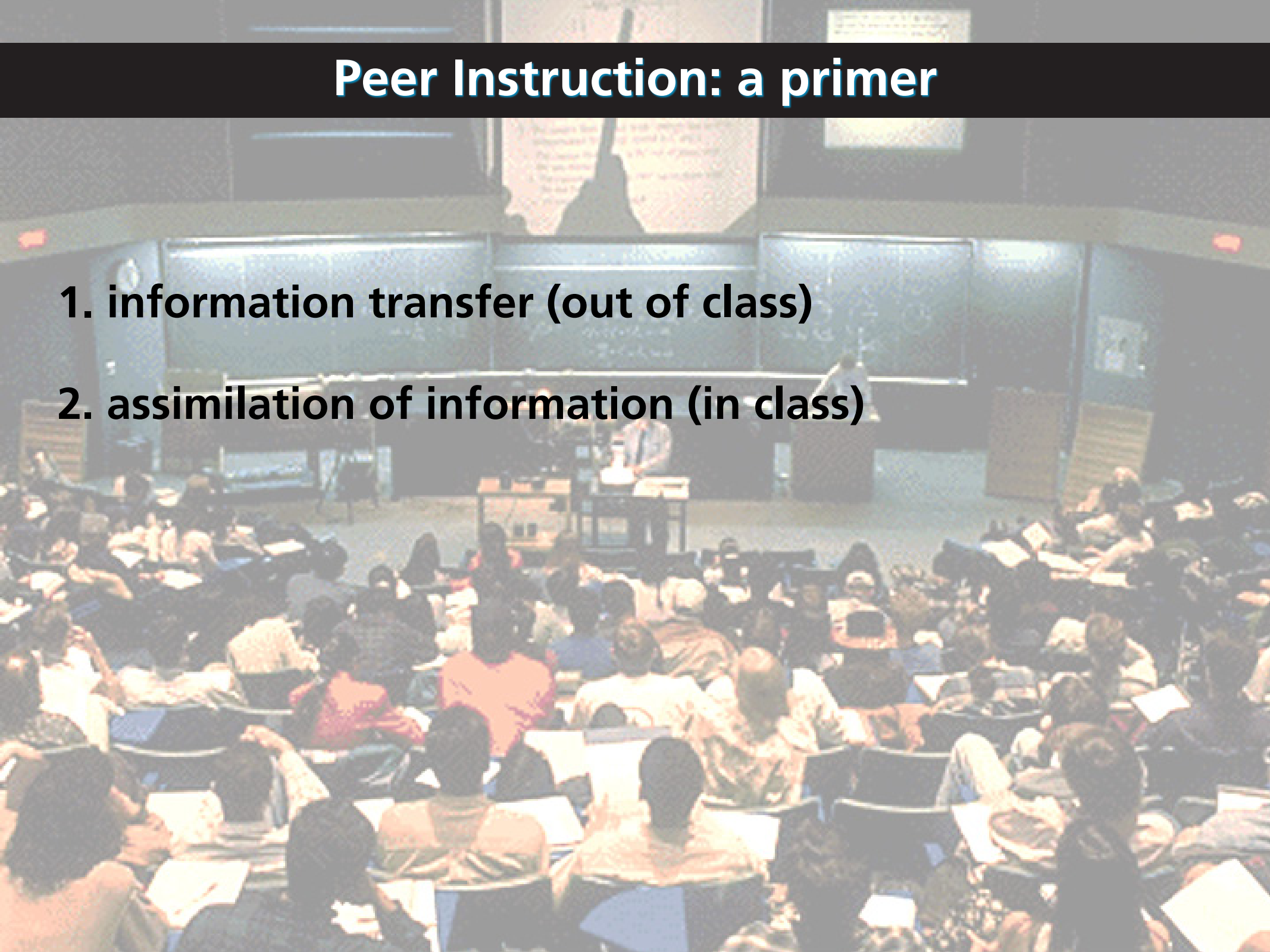
Peer Instruction: a primer



1. information transfer (easy and done in class)

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

Peer Instruction: a primer



1. information transfer (out of class)

2. assimilation of information (in class)

Peer Instruction: a primer

use JiTT before class and PI in class!

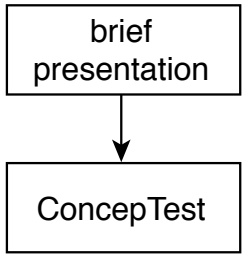
Frequently Asked Questions

“How much time to spend on each PI step?”

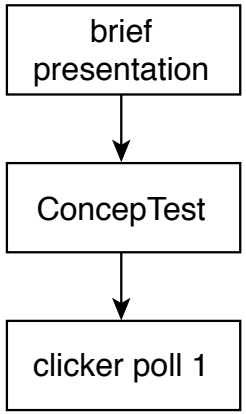
Peer Instruction: a primer

brief
presentation

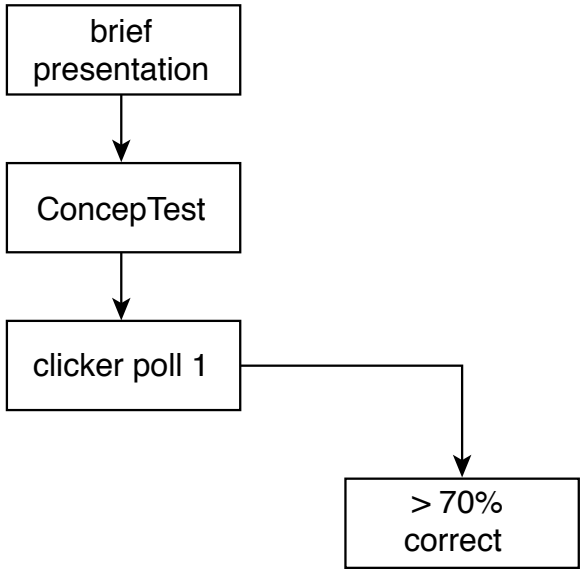
Peer Instruction: a primer



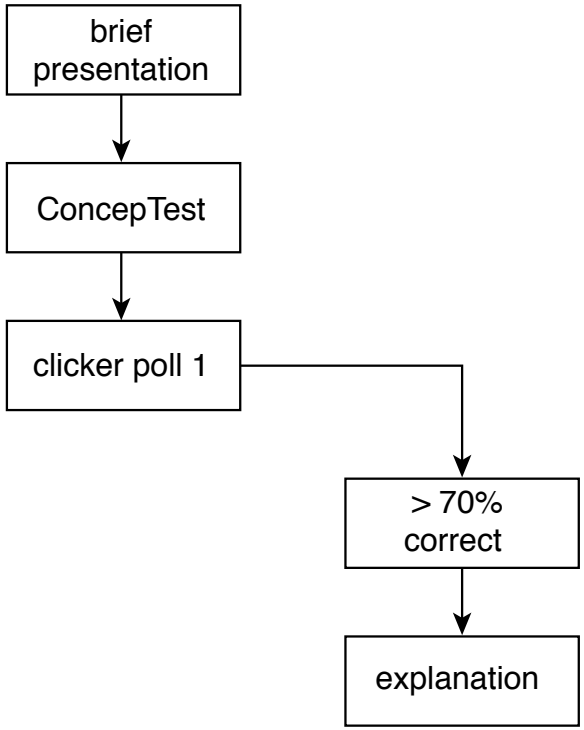
Peer Instruction: a primer



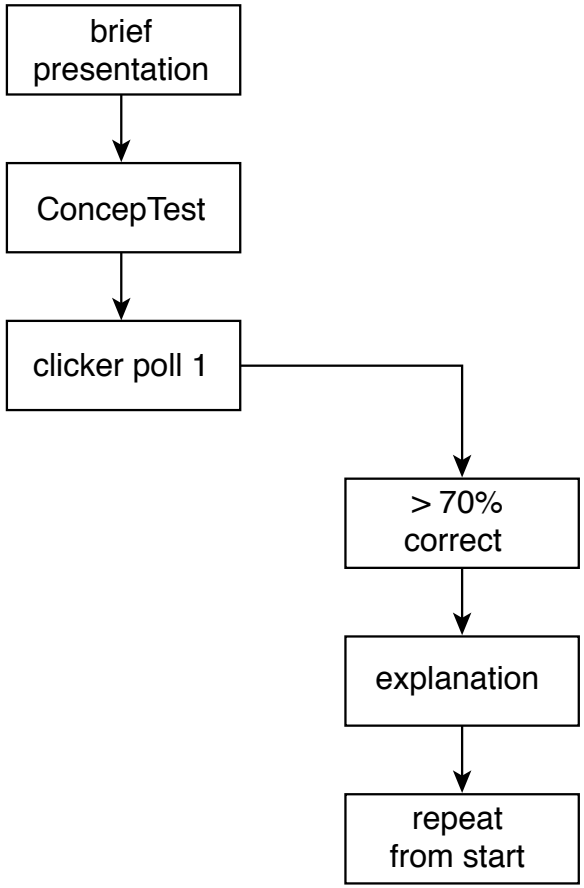
Peer Instruction: a primer



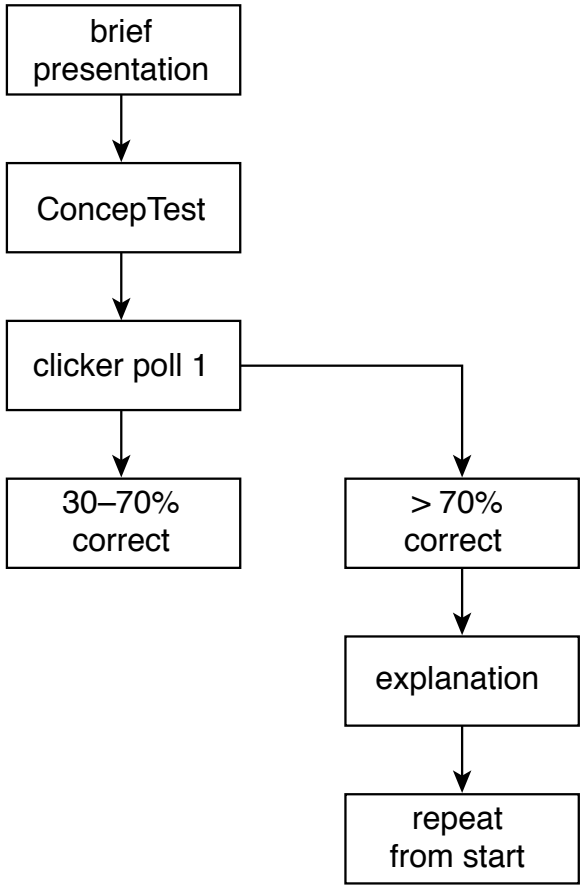
Peer Instruction: a primer



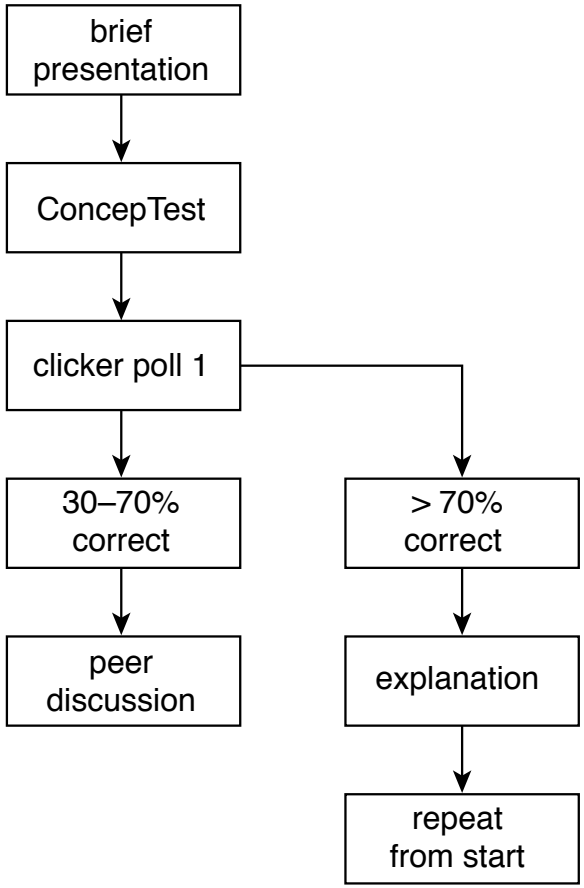
Peer Instruction: a primer



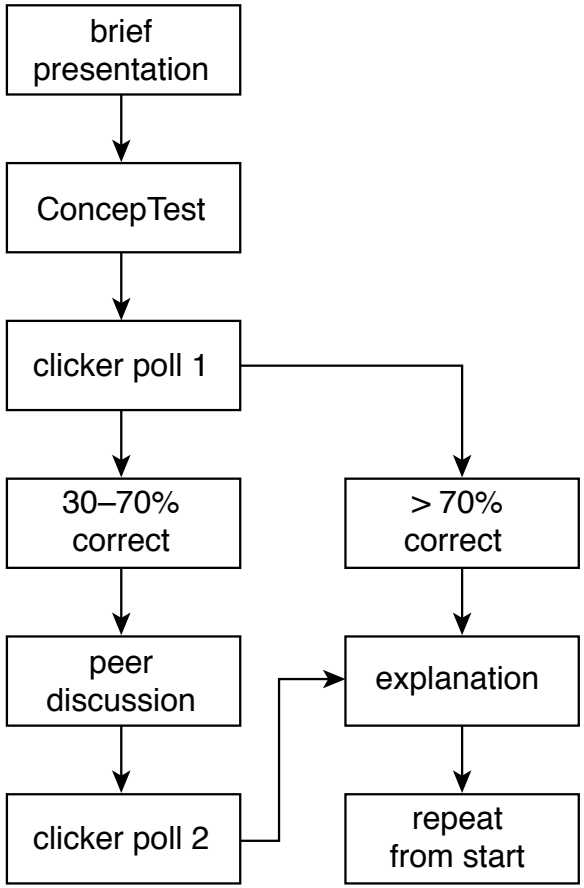
Peer Instruction: a primer



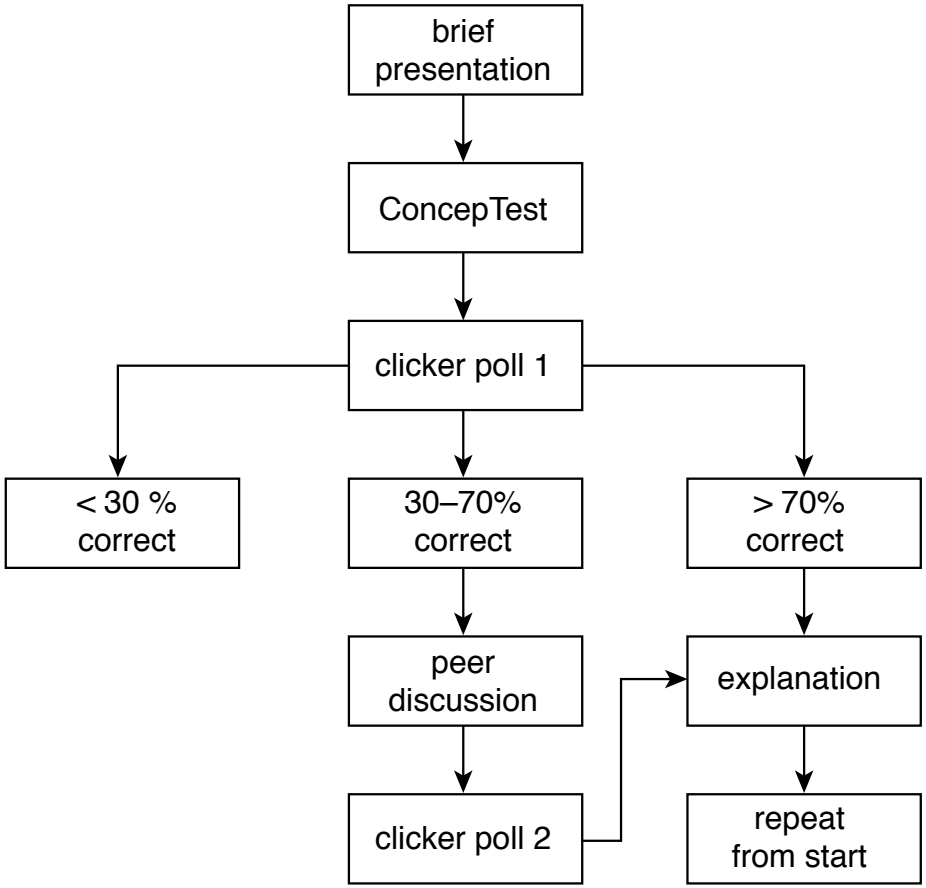
Peer Instruction: a primer



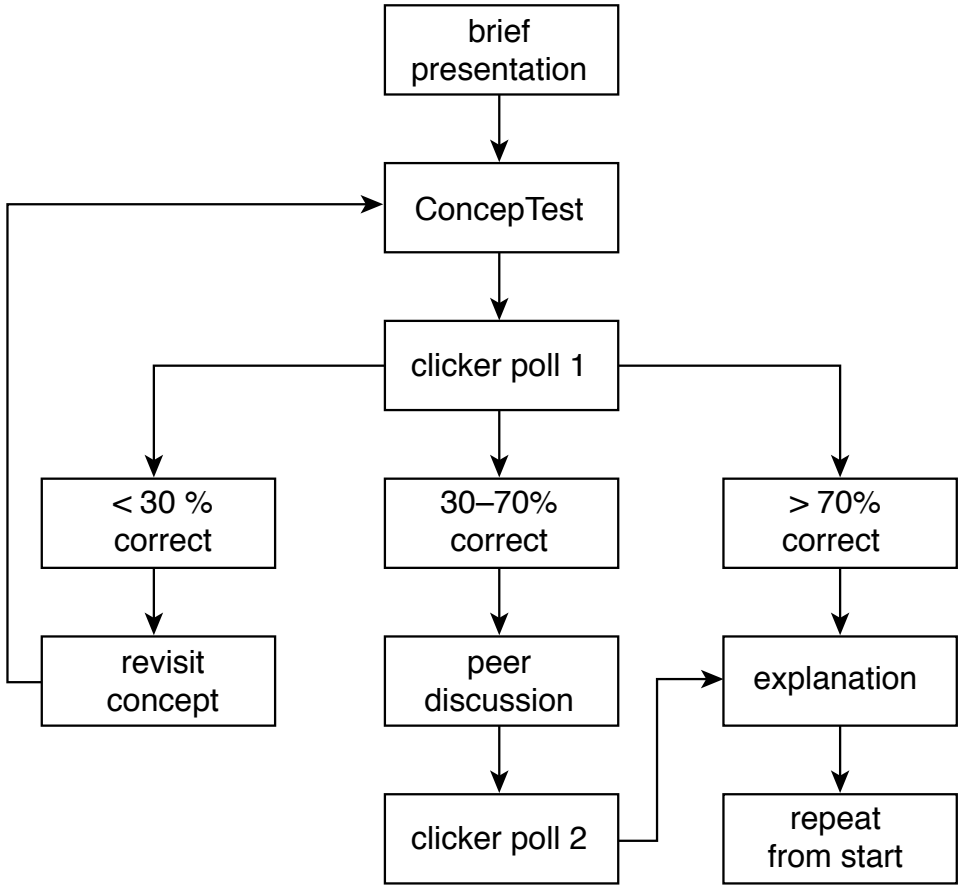
Peer Instruction: a primer



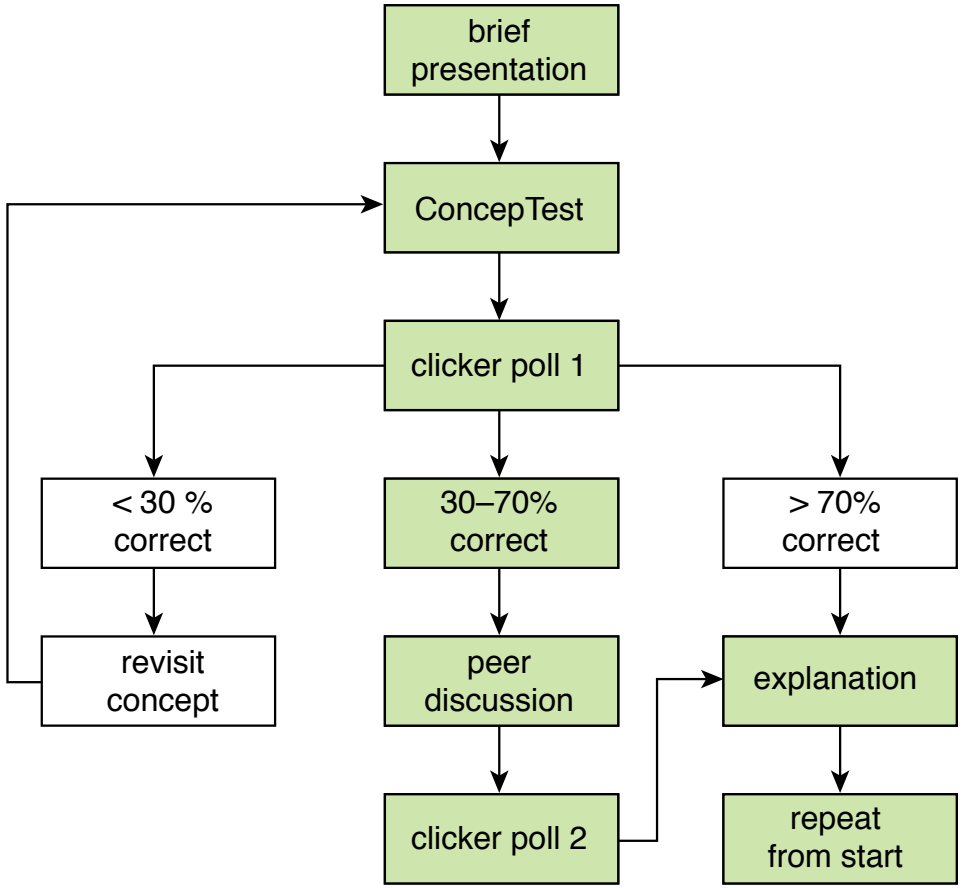
Peer Instruction: a primer



Peer Instruction: a primer

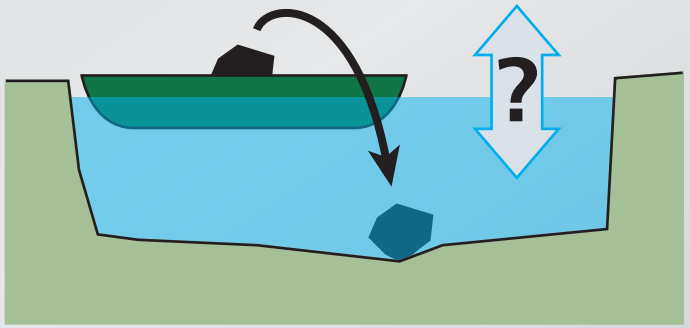


Peer Instruction: a primer



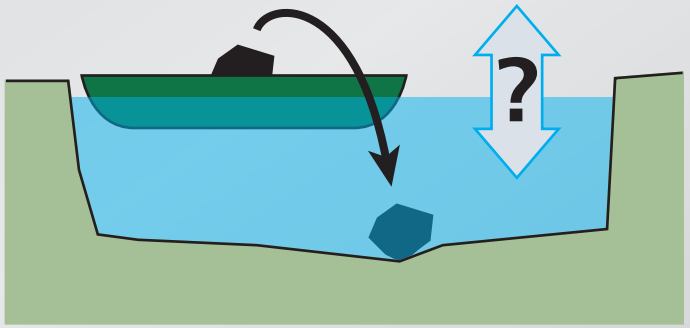
Let's try it!

A boat carrying a large boulder is floating on a small pond. The boulder is thrown overboard and sinks to the bottom of the pond.



Let's try it!

A boat carrying a large boulder is floating on a small pond. The boulder is thrown overboard and sinks to the bottom of the pond.



After the boulder sinks to the bottom of the pond, the level of the water in the pond is

1. higher than
2. the same as
3. lower than

it was when the boulder was in the boat.

Let's try it!

A boat carrying a large boulder is floating on a small pond. The boulder is thrown overboard and sinks to the bottom of the pond.

After the boulder sinks to the bottom of the pond, the level of the water in the pond is

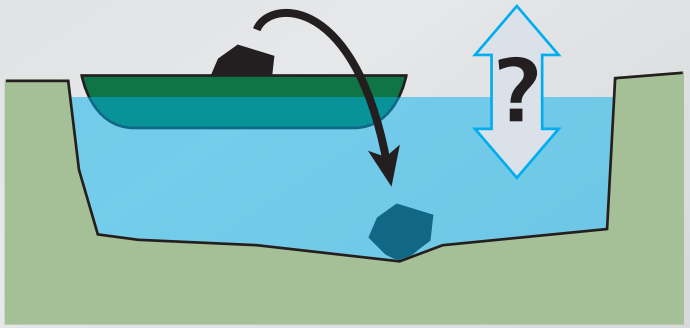
1. higher than
2. the same as
3. lower than

it was when the boulder was in the boat.

you got all fired up!

Let's try it!

A boat carrying a large boulder is floating on a small pond. The boulder is thrown overboard and sinks to the bottom of the pond.



After the boulder sinks to the bottom of the pond, the level of the water in the pond is

1. higher than
2. the same as
3. lower than

it was when the boulder was in the boat.

Let's try it!

A boat carrying a large boulder is floating on a small pond. The boulder is thro
bottor

Before I tell you the answer, let's analyze what happened.

After t el of
the wa

1. high
2. the
3. low

it was when the boulder was in the boat.

Let's try it!

A boat carrying a large boulder is floating on a small pond. The boulder is thro
bottor

Before I tell you the answer, let's analyze what happened. You…

After t el of
the wa

1. high
2. the
3. low

it was when the boulder was in the boat.

Let's try it!

A boat carrying a large boulder is floating on a small pond. The boulder is thro
bottor

After t el of
the wa

1. high
2. the
3. low

it was when the boulder was in the boat.

Before I tell you the answer, let's analyze what happened. You…

1. made a commitment

Let's try it!

A boat carrying a large boulder is floating on a small pond. The boulder is thro
bottor

After t el of
the wa

1. high
2. the
3. low

it was when the boulder was in the boat.

Before I tell you the answer, let's analyze what happened. You…

1. made a commitment
2. externalized your answer

Let's try it!

A boat carrying a large boulder is floating on a small pond. The boulder is thro
bottor

After t
the wa

el of

1. high
2. the
3. low

it was when the boulder was in the boat.

Before I tell you the answer, let's analyze what happened. You…

1. made a commitment
2. externalized your answer
3. moved from the answer/fact to reasoning

Let's try it!

A boat carrying a large boulder is floating on a small pond. The boulder is thro
bottor

After t el of
the wa

1. high
2. the
3. low

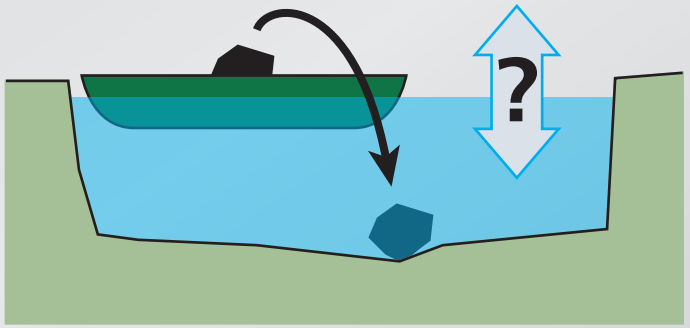
it was when the boulder was in the boat.

Before I tell you the answer, let's analyze what happened. You…

1. made a commitment
2. externalized your answer
3. moved from the answer/fact to reasoning
4. became emotionally invested in the learning process

Let's try it!

A boat carrying a large boulder is floating on a small pond. The boulder is thrown overboard and sinks to the bottom of the pond.



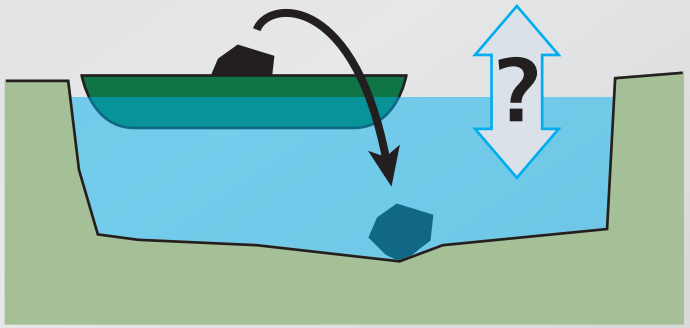
After the boulder sinks to the bottom of the pond, the level of the water in the pond is

1. higher than
2. the same as
3. lower than

it was when the boulder was in the boat.

Let's try it!

A boat carrying a large boulder is floating on a small pond. The boulder is thrown overboard and sinks to the bottom of the pond.



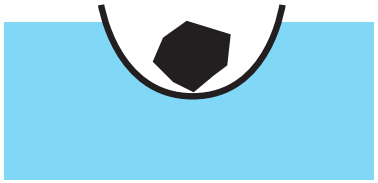
After the boulder sinks to the bottom of the pond, the level of the water in the pond is

1. higher than
2. the same as
3. lower than ✔

it was when the boulder was in the boat.

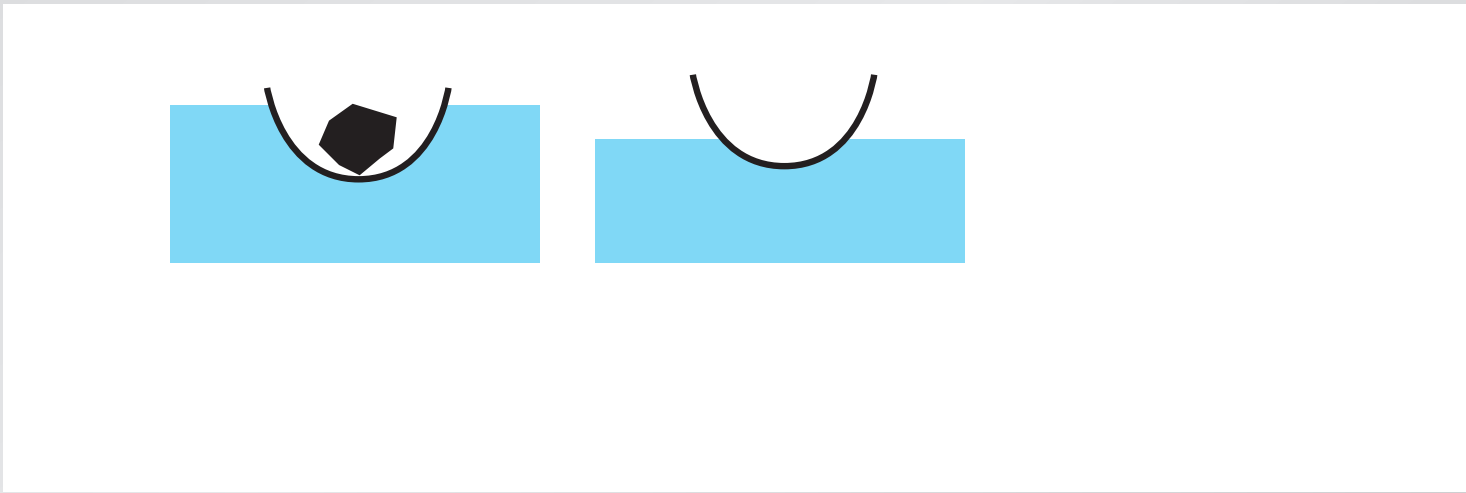
Let's try it!

remember: amount of displaced water



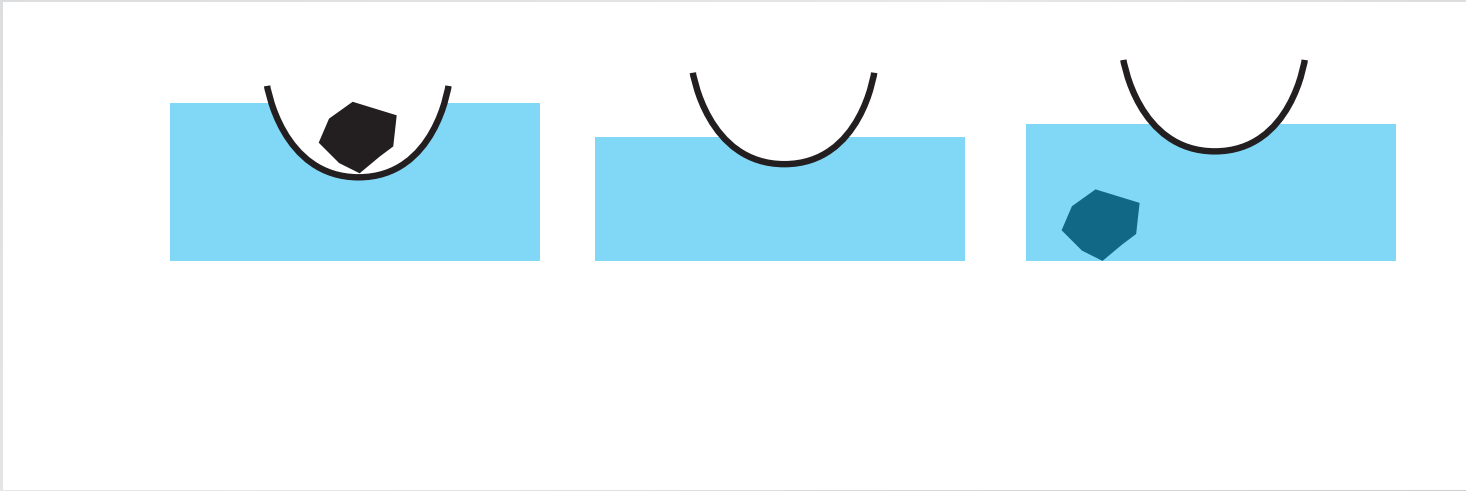
Let's try it!

remember: amount of displaced water



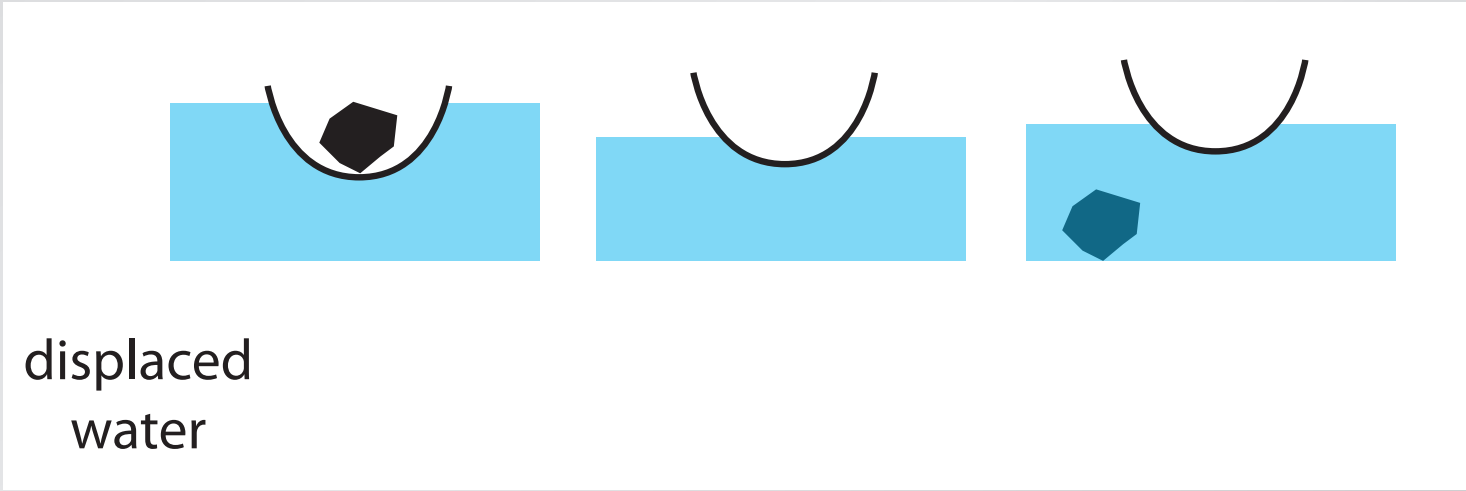
Let's try it!

remember: amount of displaced water



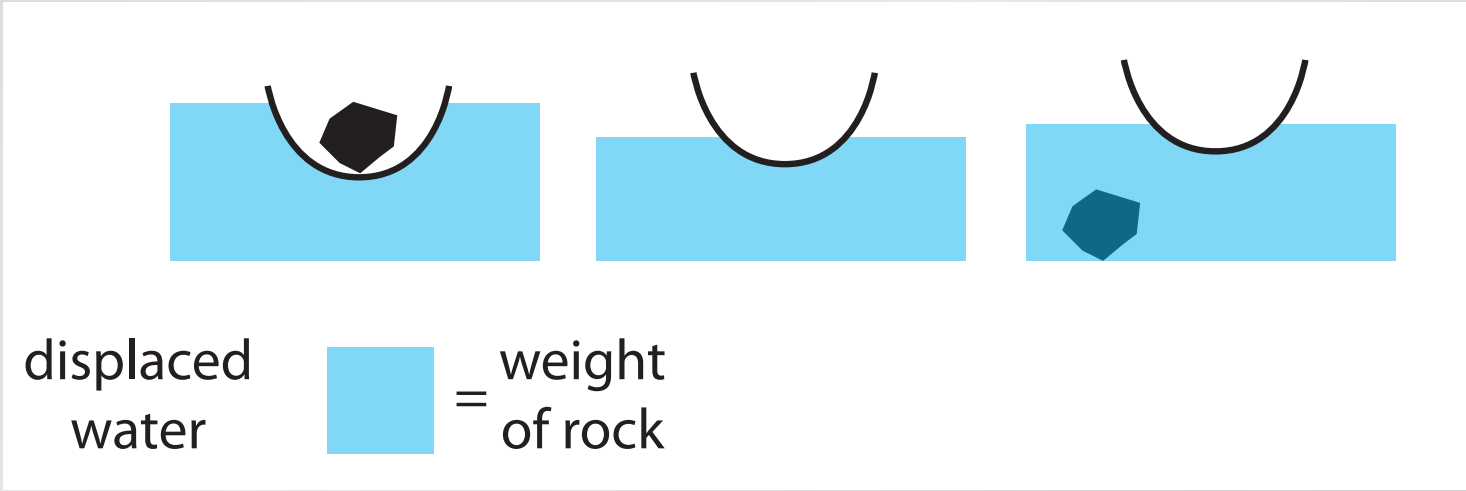
Let's try it!

remember: amount of displaced water



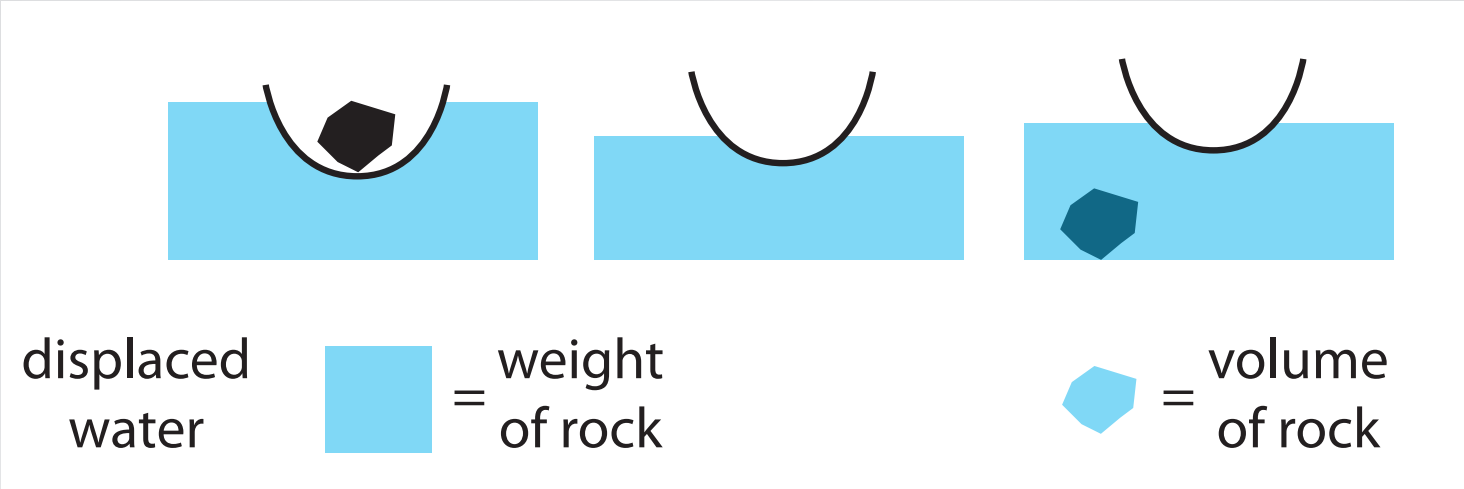
Let's try it!

remember: amount of displaced water



Let's try it!

remember: amount of displaced water



Let's try it!

remember: amount of displaced water

you won't forget this

Frequently Asked Questions

“How can I make sure all students participate?”

Frequently Asked Questions

“When/which poll results do I show?“

Frequently Asked Questions

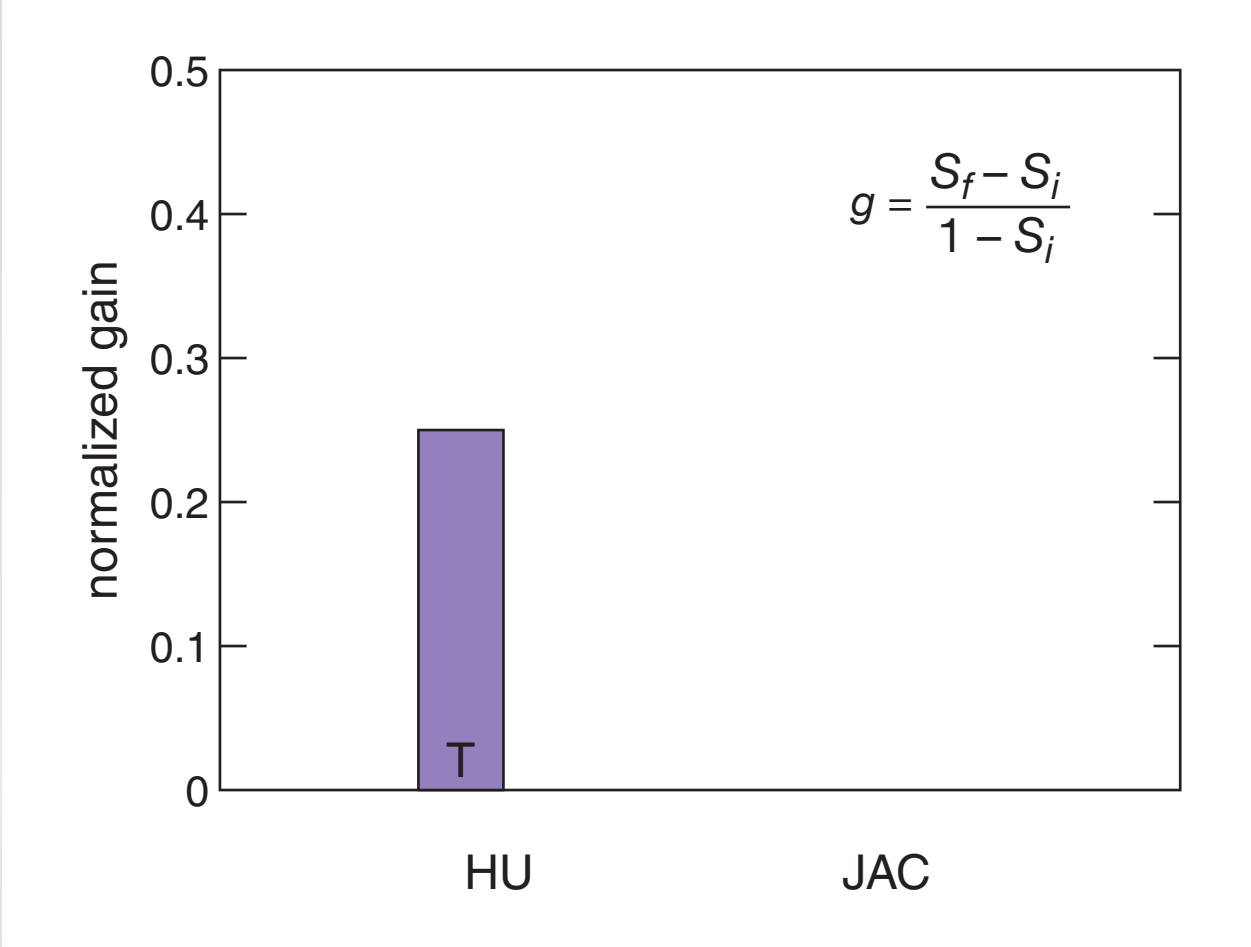
“Will it work at my institution?”

It works here…

…but will it work here?

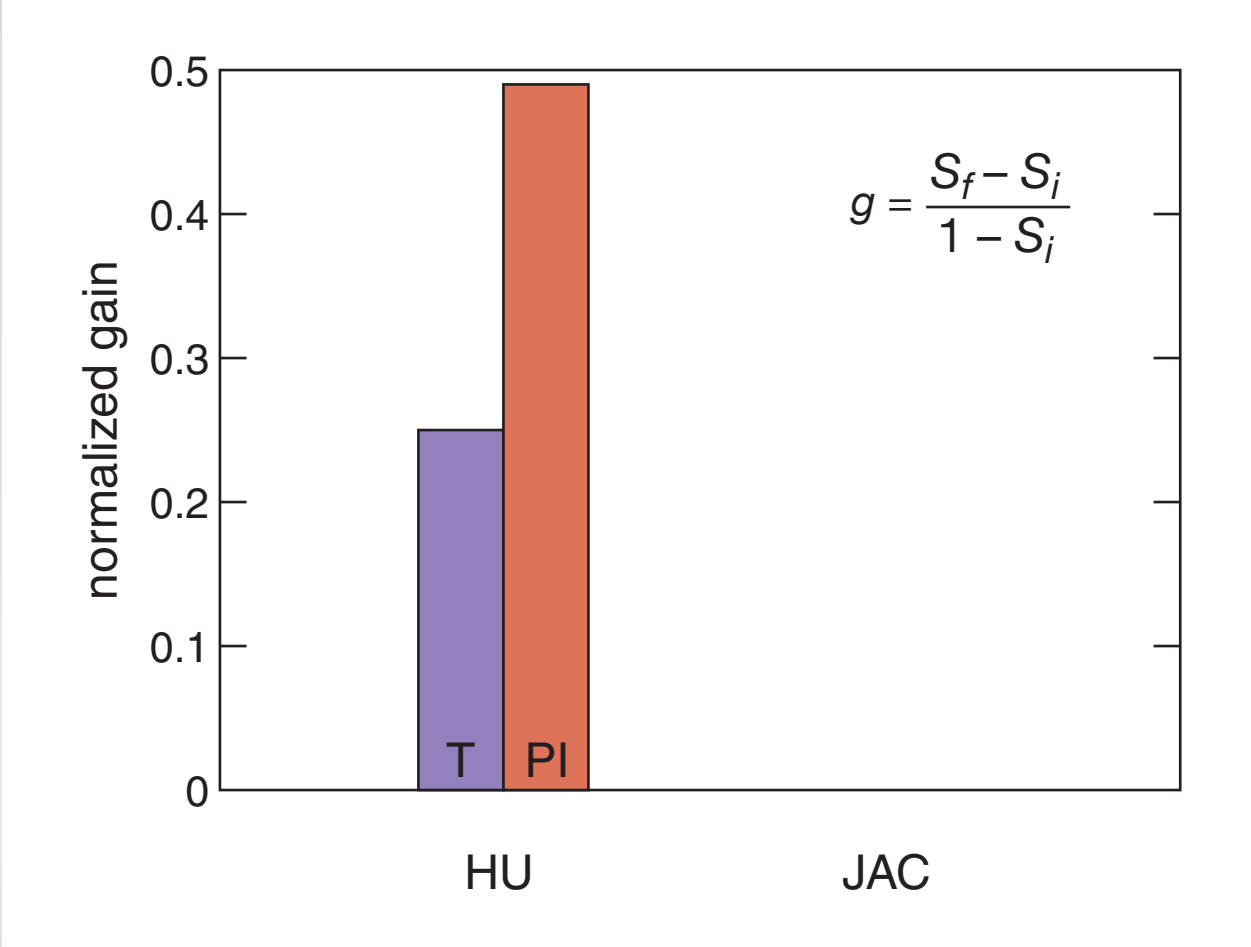
Will it work at my institution?

FCI normalized gain



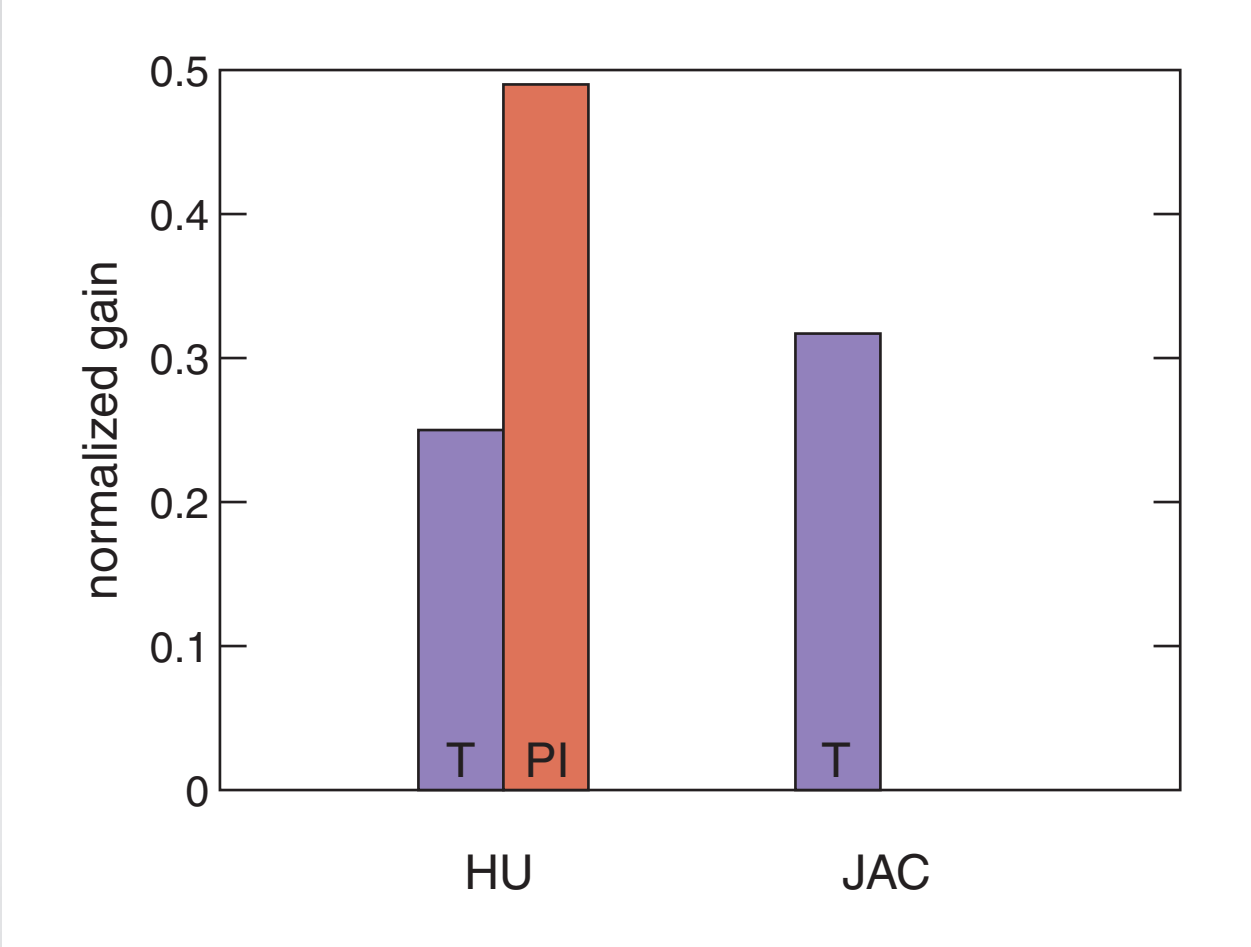
Will it work at my institution?

FCI normalized gain



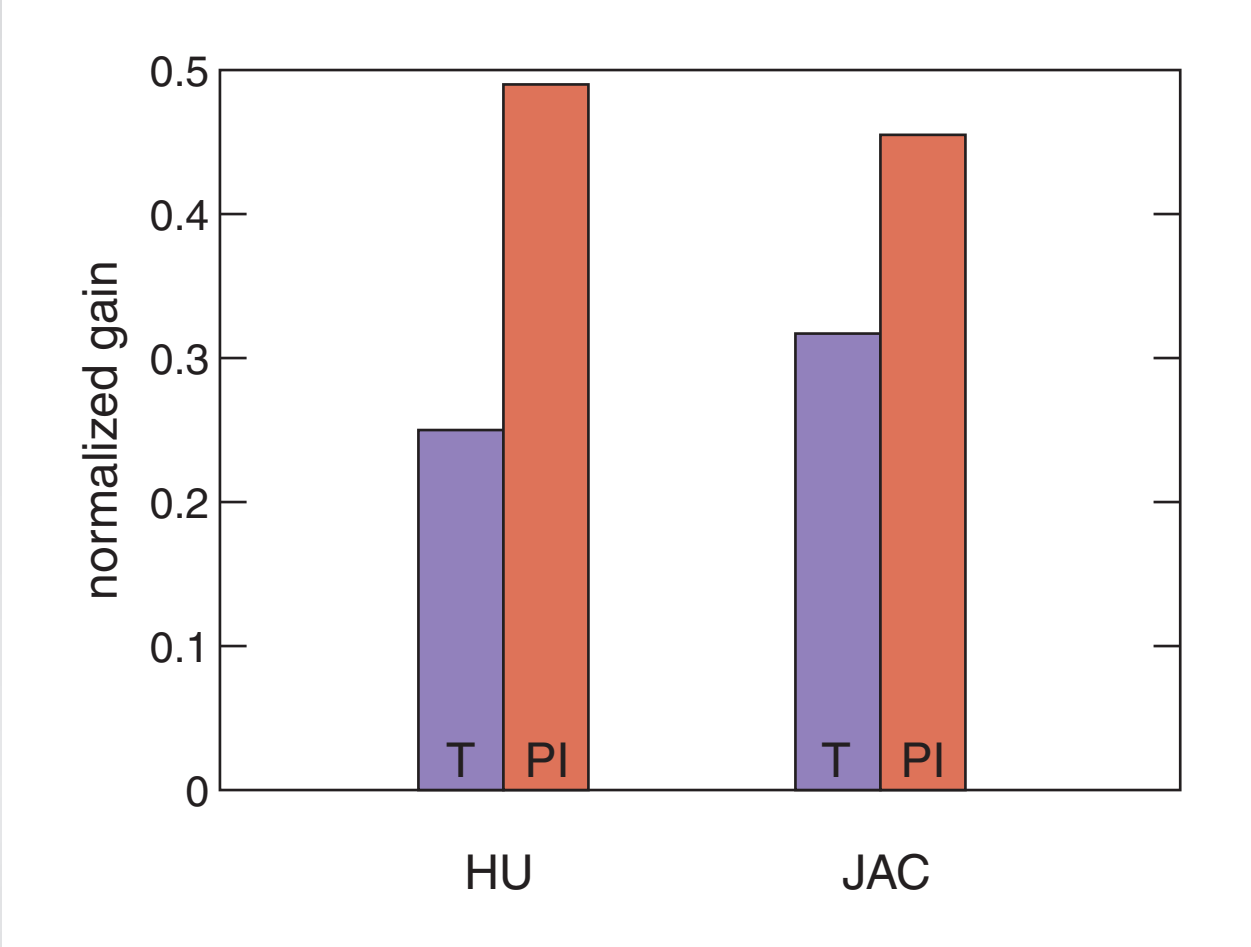
Will it work at my institution?

FCI normalized gain



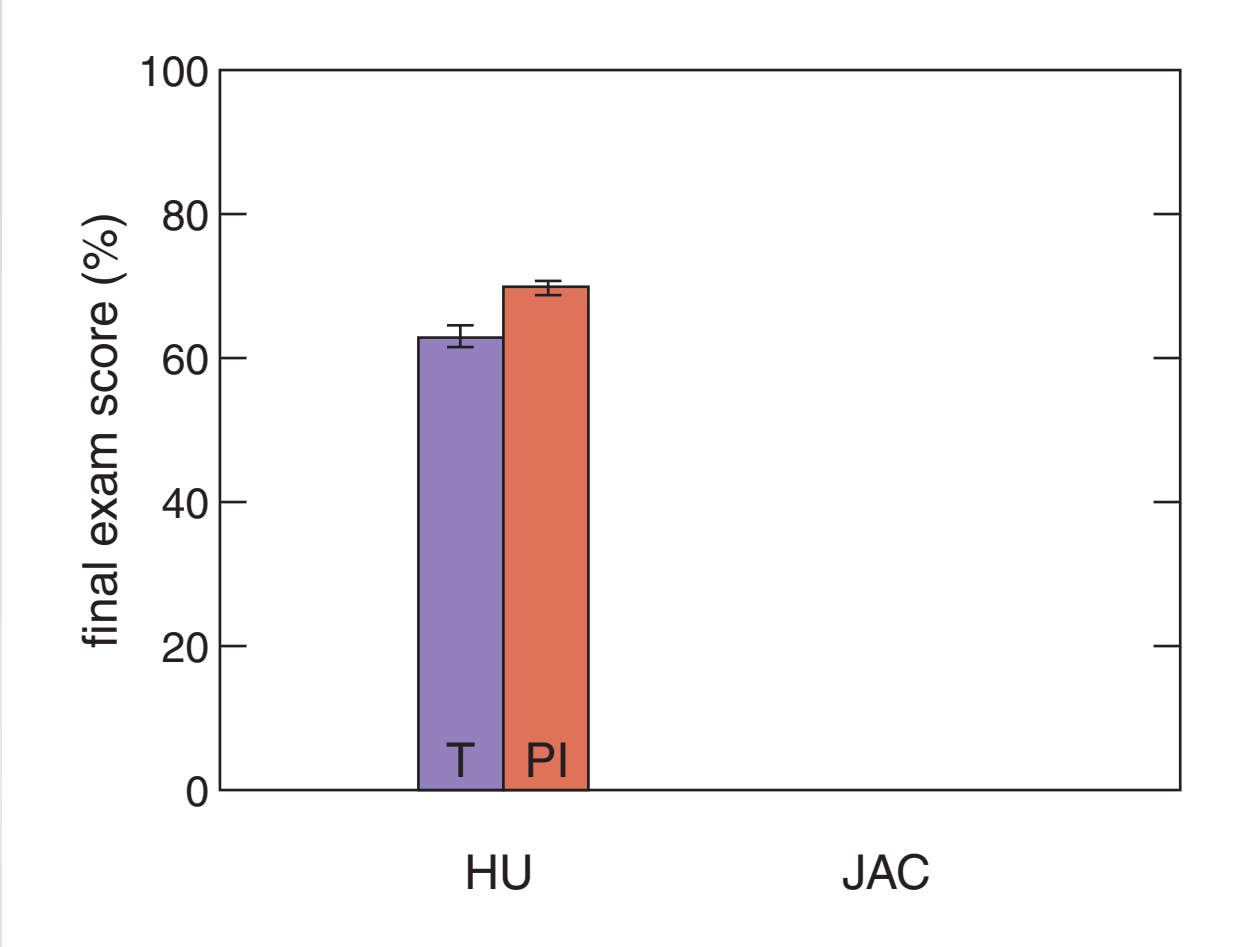
Will it work at my institution?

FCI normalized gain



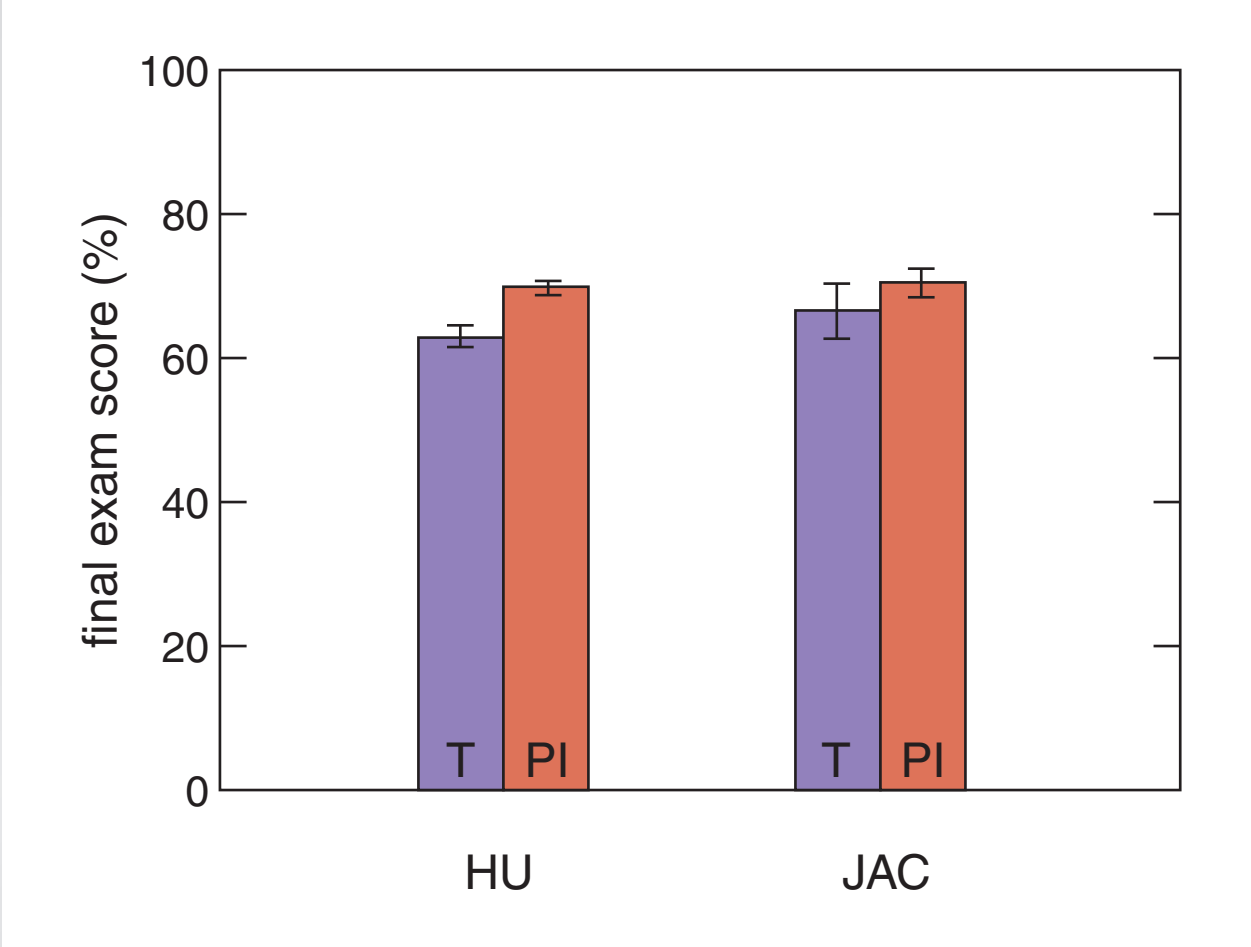
Will it work at my institution?

exam performance



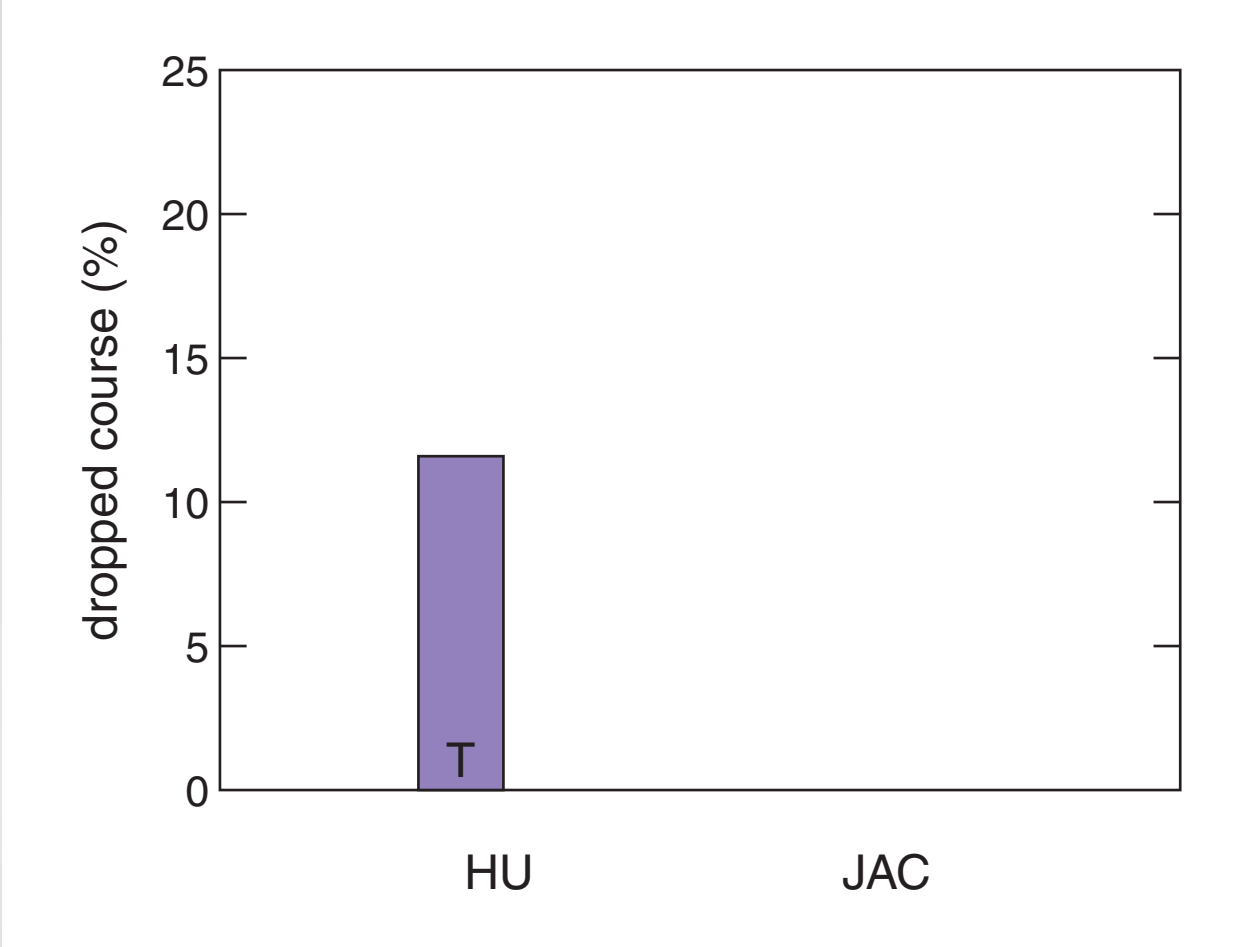
Will it work at my institution?

exam performance



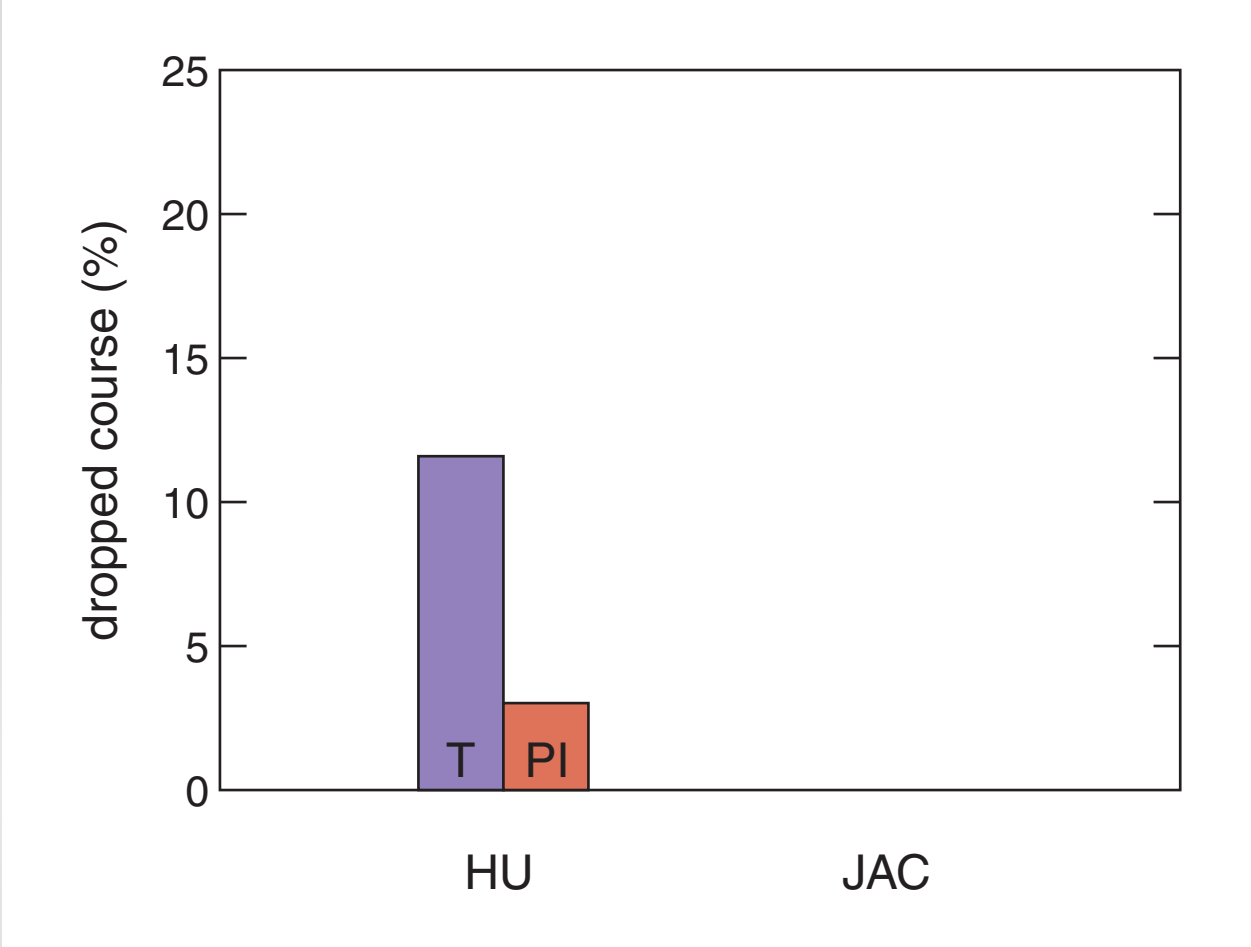
Will it work at my institution?

student retention



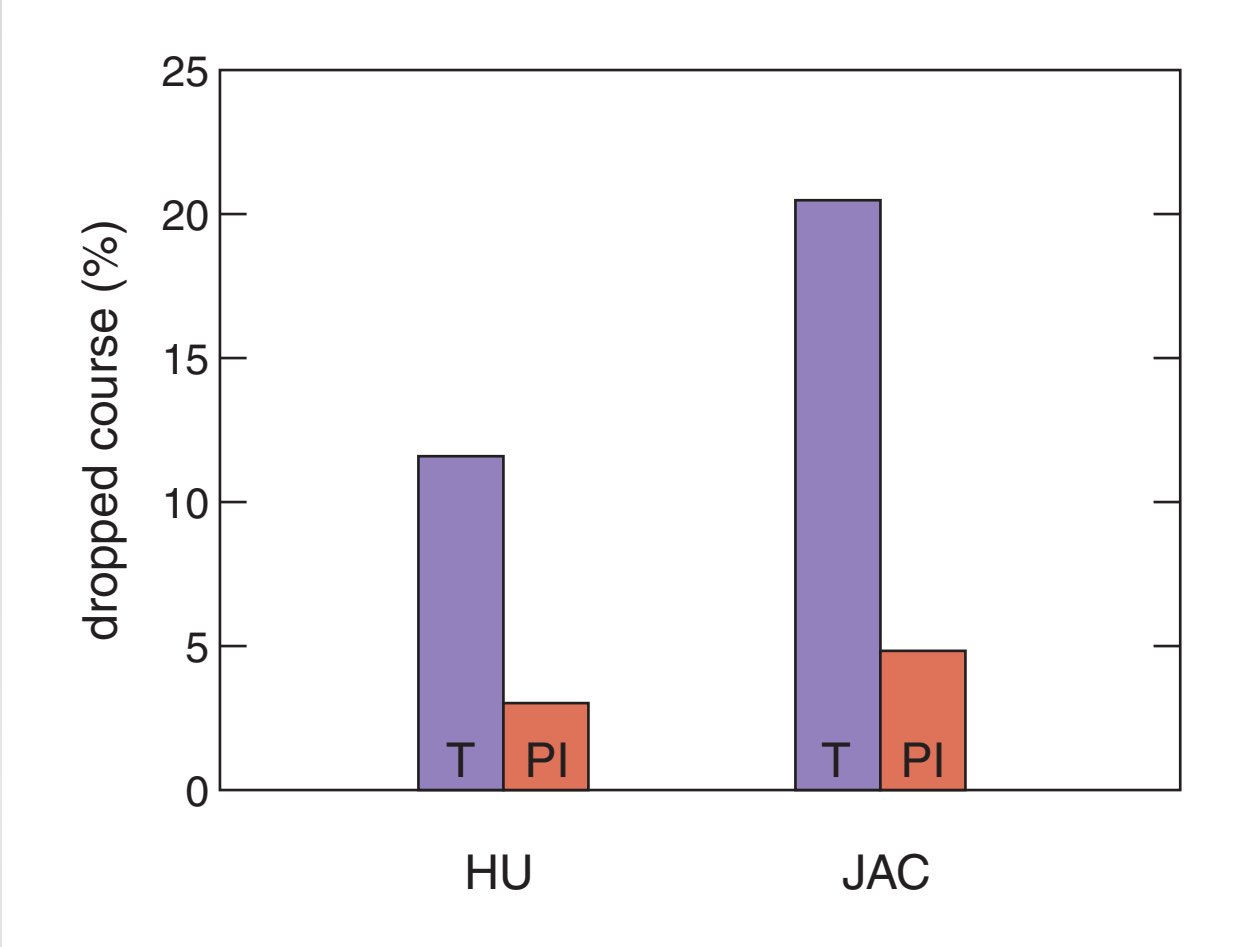
Will it work at my institution?

student retention



Will it work at my institution?

student retention



Will it work at my institution?

similar learning gains in different environments

Frequently Asked Questions

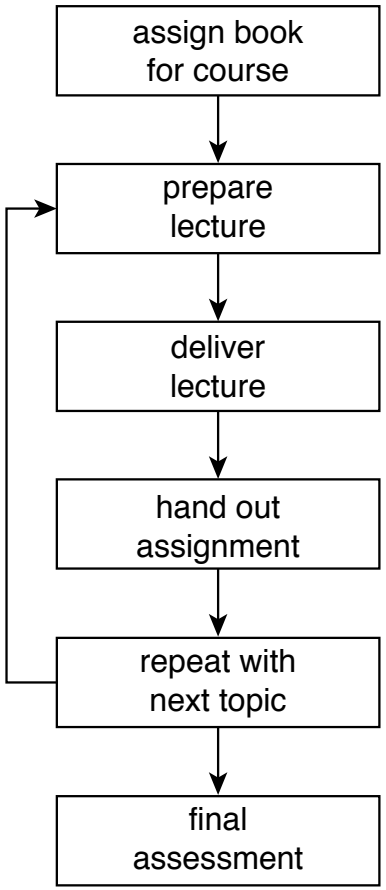
“Can PI be used in small or graduate level classes?”

Implementing PI & JiTT

"How is preparing a PI class different from preparing a lecture-based class?"

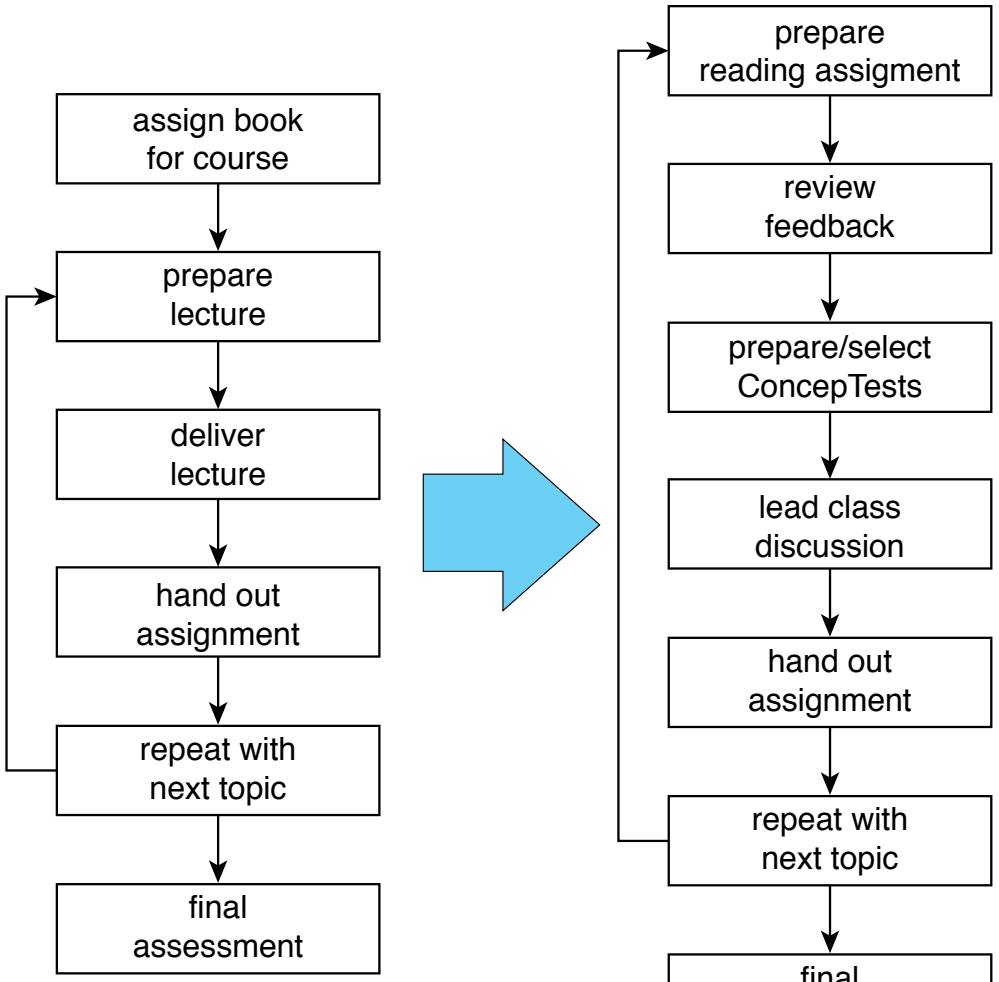
Implementing PI & JiTT

preparing for a lecture-based class



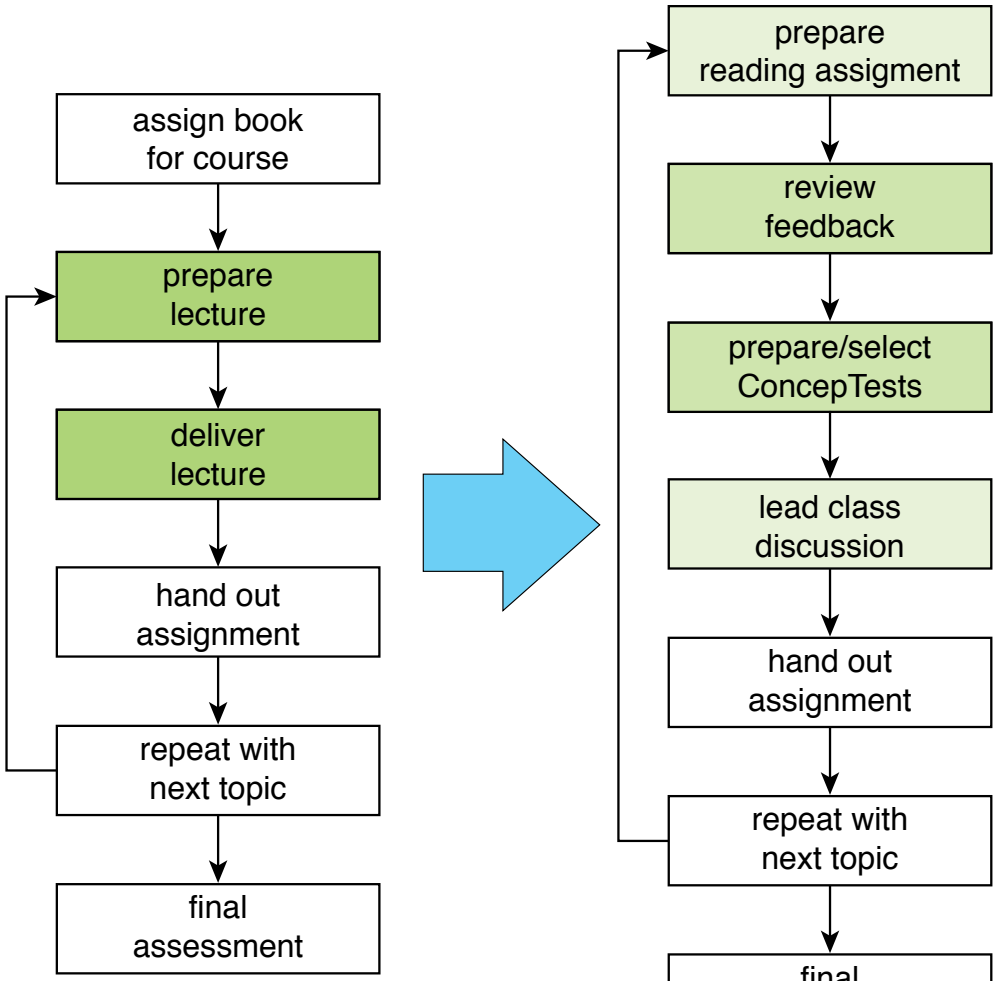
Implementing PI & JiTT

transitioning: where does the effort go?



Implementing PI & JiTT

transitioning: where does the effort go?



Implementing PI & JiTT

New activities:

1. **Reading assignment**
2. **ConcepTests**

Implementing PI & JiTT

“How do I cover everything using this method?”

Implementing PI & JiTT

	traditional	PI
in-class coverage	complete	partial

Implementing PI & JiTT

	traditional	PI
in-class coverage	complete	partial
out-of-class coverage	?	complete

Implementing PI & JiTT

	traditional	PI
in-class coverage	complete	partial
out-of-class coverage	?	complete
material learned	little	substantial

Implementing PI & JiTT

	traditional	PI
in-class coverage	complete	partial
out-of-class coverage	?	complete
material learned	little	substantial

what good is coverage if little is retained?

Frequently Asked Questions

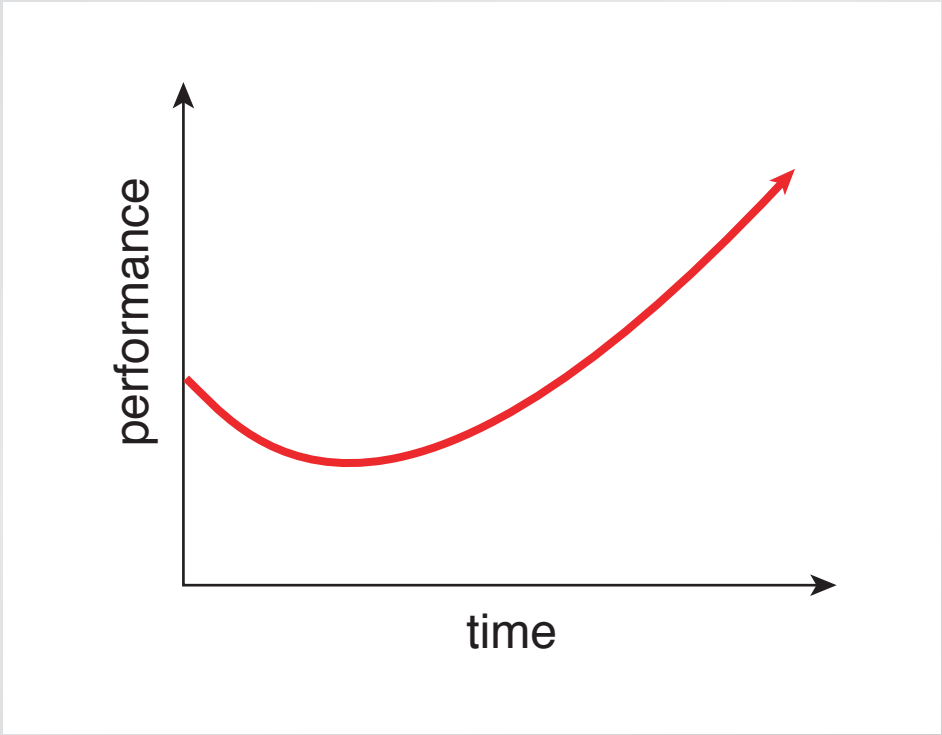
“What will changing to PI do to my course evaluations?”

Frequently Asked Questions

"How do I deal with students who resist this new approach to studying?"

Student resistance

After changing, things might get *worse* before they get better!



Student resistance

Written on Wednesday Feb 16, two weeks into the course:

> Subject: concerns
>
> Professor Mazur,
>
> Here are a few concerns. I speak for many of my classmates.
>
> 1) You are giving us WAY to much work. After spending multiple hours on the problem set, and not being able to figure out many of the questions, I now see that we have an additional 6 or 7 pages or homework in the workbook. I just spent 4 hours on the lab, and I am not confident on almost half of the questions. This is more work than I have had all semester in all of my other classes combined.
>
> 2) If you are going to give us this much work, I would suggest re-structuring the lectures. I find the readings very difficult to understand. I am not a bad student (I got a solid A in physics 1a), but it is very difficult to internalize the readings. You should spend most of the lecture going over, point by point, the readings in their entirety. While the PRS clickers are fun, they do not help me understand the complex material.
>
> I am extremely flustered by the incredibly large amount of work, and my inability to understand it, and I am strongly considering dropping the course.

Student resistance

Written on Monday May 23, just after the final exam:

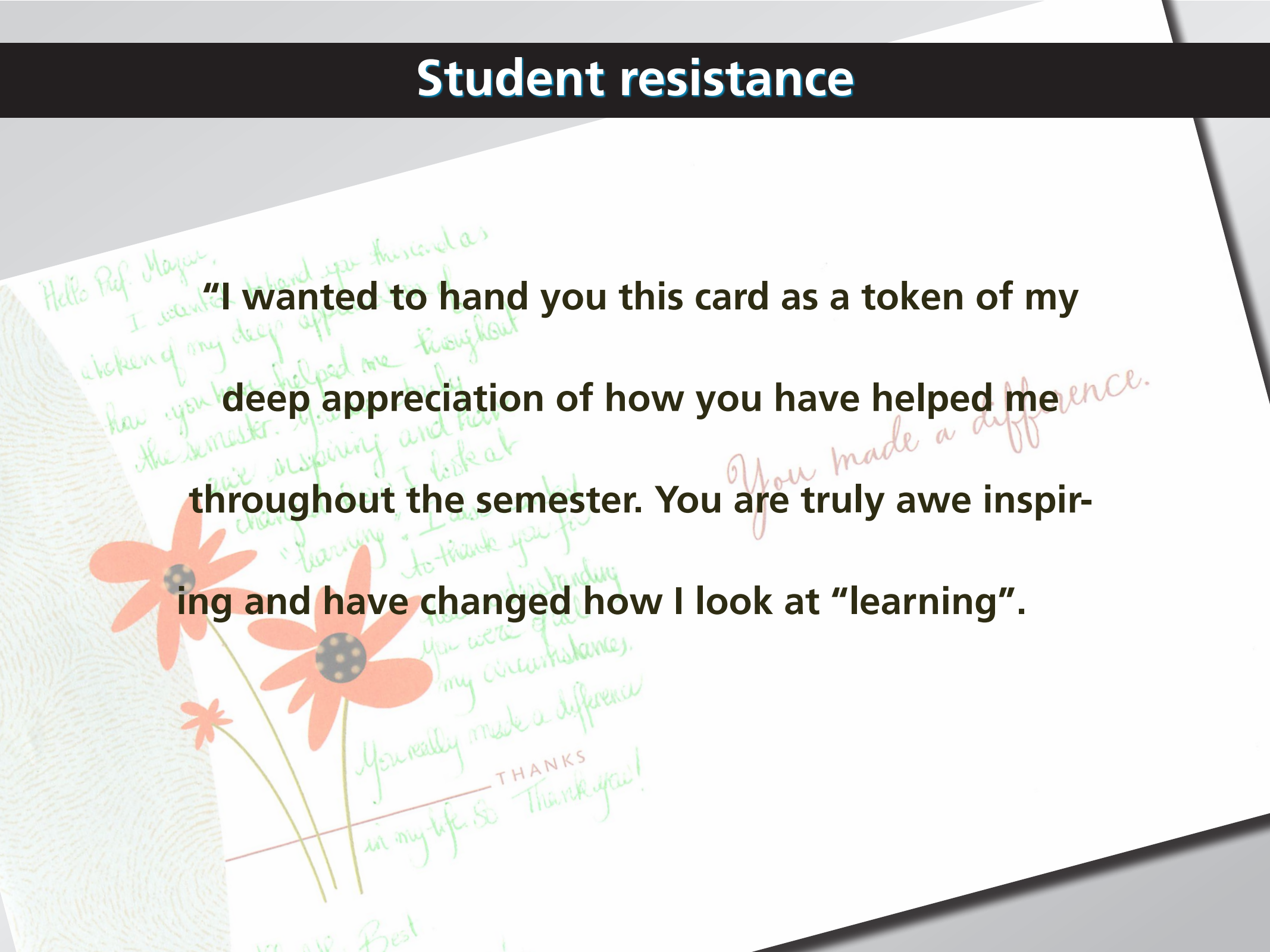
> Subject: Thanks!
>
> Professor Mazur,
>
> First of all I want to thank you for a great semester. You are an excellent professor, and it is clear that you truly care about each and every student.
>
> The exam went well today. I'm not sure to what extent you will curve the final grades (if at all), but it looks like I may be right around the cutoff point between an A and an A-. I studied as hard as I could and I'm keeping my fingers crossed about the A, but no matter what happens with my grade you should know that you are one of the best professors that I have ever had at Harvard.
>
> Thanks again!

Student resistance

Student resistance

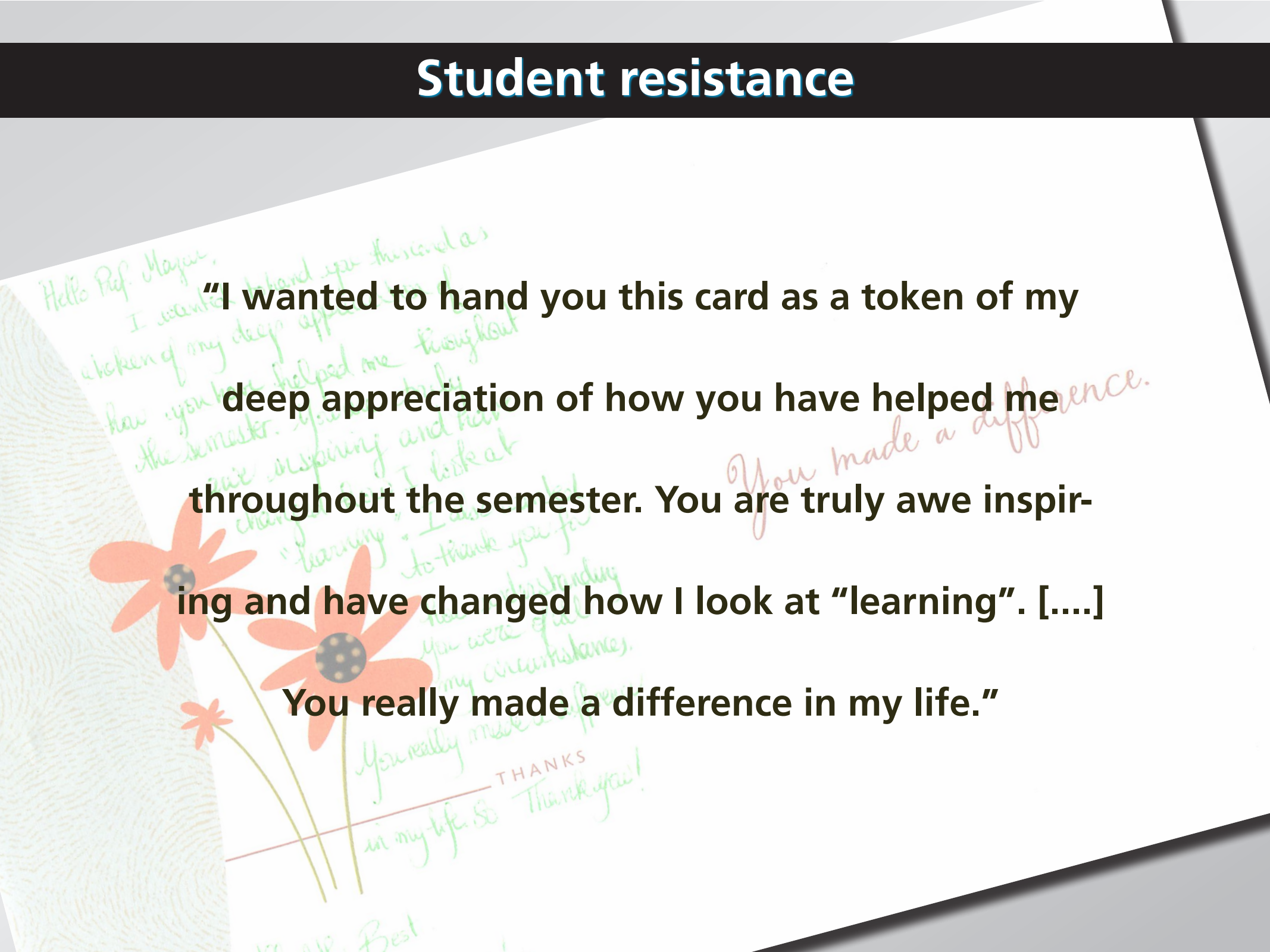
"I wanted to hand you this card as a token of my deep appreciation of how you have helped me throughout the semester.

Student resistance



"I wanted to hand you this card as a token of my deep appreciation of how you have helped me throughout the semester. You are truly awe inspiring and have changed how I look at "learning".

Student resistance



"I wanted to hand you this card as a token of my deep appreciation of how you have helped me throughout the semester. You are truly awe inspiring and have changed how I look at "learning". [....] You really made a difference in my life."

Student resistance

and don’t forget…

Student resistance

and don’t forget…

PI leads to better learning and retention!

ConcepTests

“Where can I get examples of good questions?”

ConcepTests

Books with ConcepTests:

- Physics (Prentice Hall)
- Chemistry (Prentice Hall)
- Astronomy (Prentice Hall)
- Calculus (Wiley)

ConcepTests

… or try searching Google:

<subject> “Peer Instruction”

<subject> ConcepTest

<subject> “Concept Test”

<subject> clickers

ConcepTests

Types of questions

- survey
- model testing
- discussion
- select from list

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.

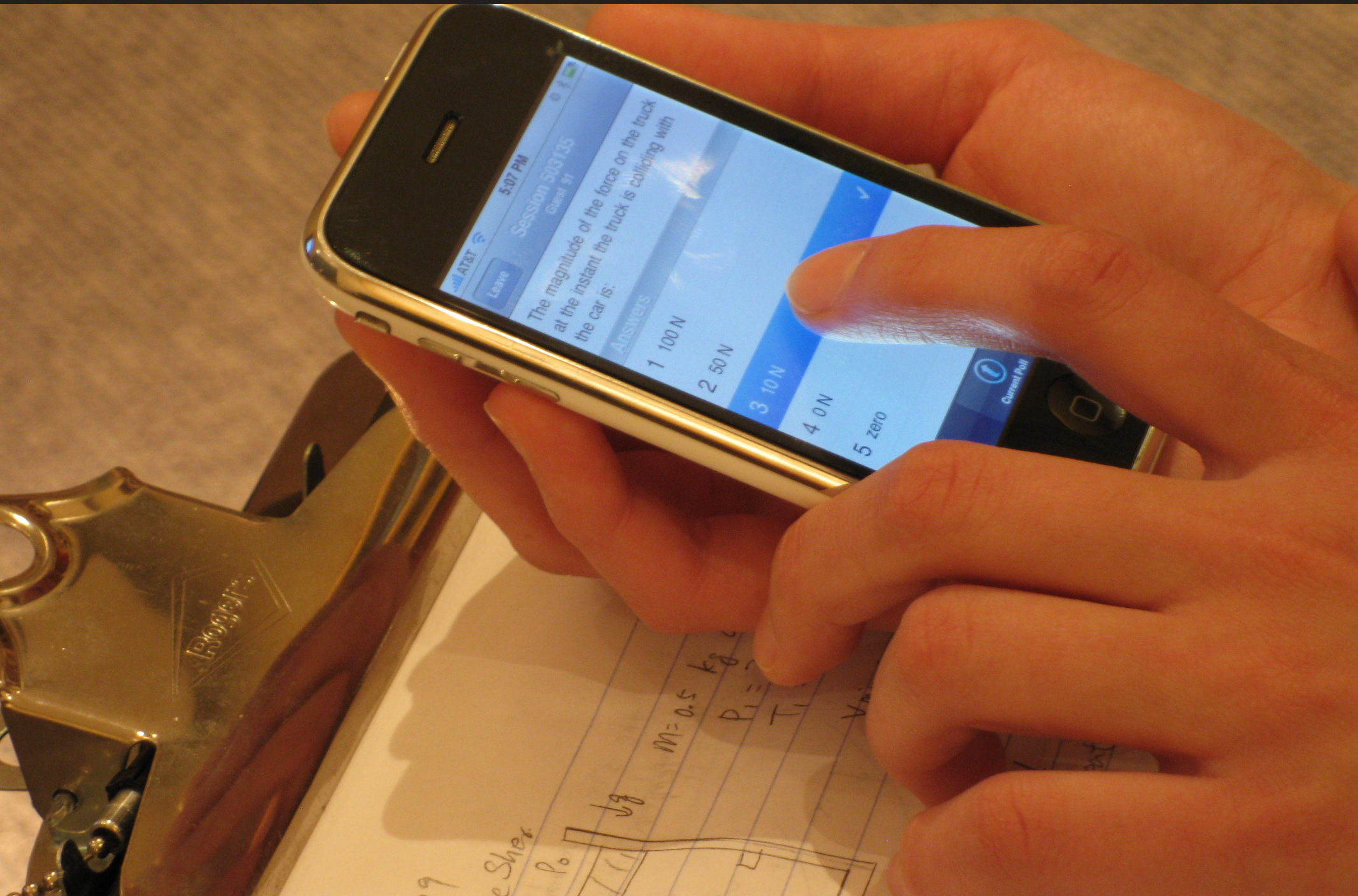
Let's try it!

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

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.


Join now!
PeerInstruction.net

Summary


AT&T
5:07 PM
Session 5051755
Guest 51
Leave
The magnitude of the force on the truck at the instant the truck is colliding with the car is:
Answers
1 100 N
2 50 N
3 10 N
4 0 N
5 zero
Current Poll

Summary

PI easy to implement (and improves learning gains)

Summary

PI easy to implement (and improves learning gains)

technology facilitates active engagement (but not required)

Funding:

National Science Foundation

for a copy of this presentation:

http://mazur.harvard.edu

Follow me!  **eric_mazur**

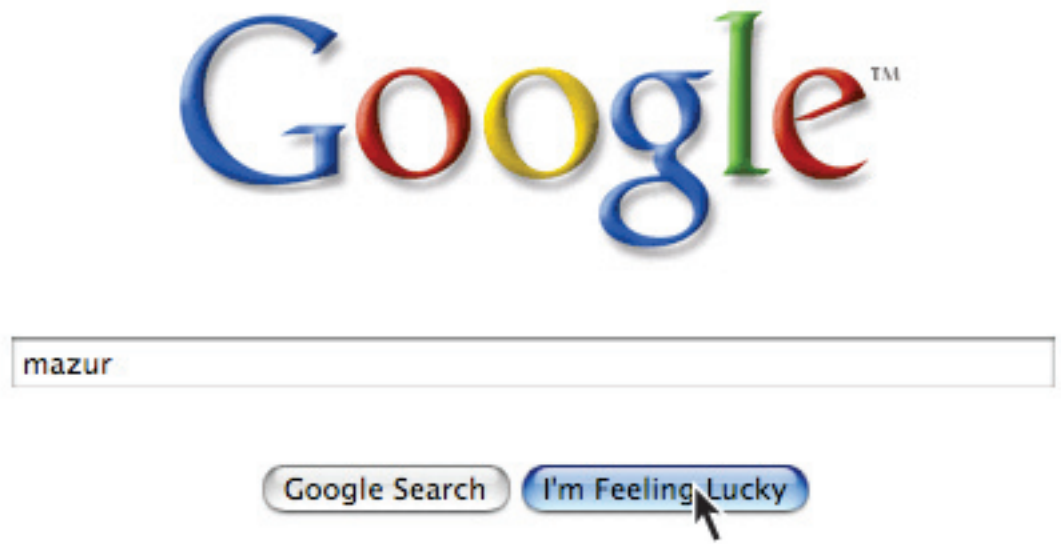
Don’t forget to complete survey!

(see information packet)

Google Search I'm Feeling Lucky


Google™
mazur
Google Search
I'm Feeling Lucky


Google
mazur
Google Search
I'm Feeling Lucky


Google
mazur
Google Search
I'm Feeling Lucky

Funding:

National Science Foundation

for a copy of this presentation:

http://mazur.harvard.edu

Follow me!  **eric_mazur**