Peer Instruction Workshop

COPI2012
Beijing Normal University
Beijing, China, 14 December 2012

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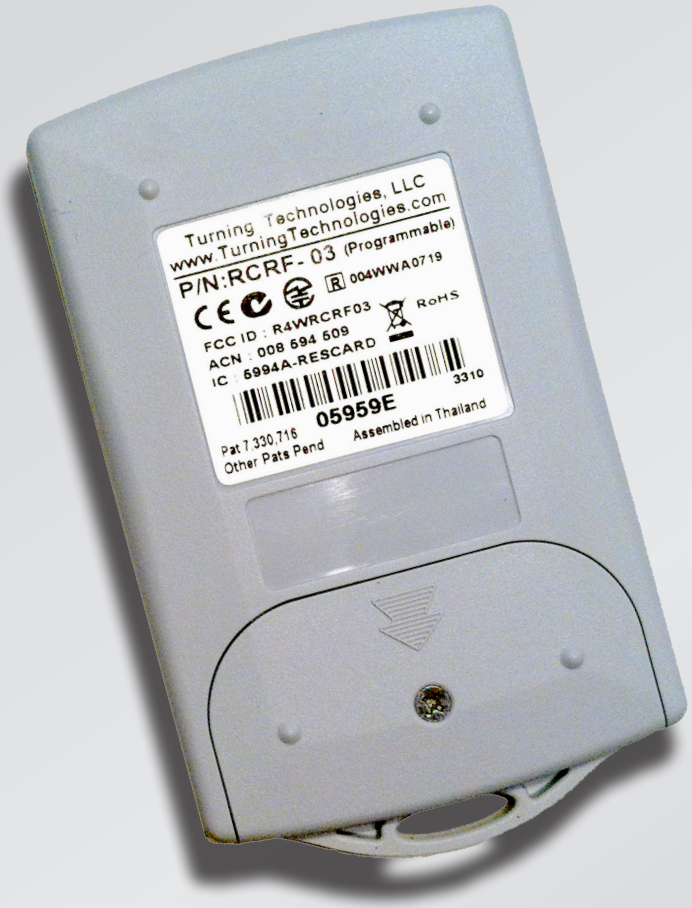

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Quick survey…

Peer Instruction…

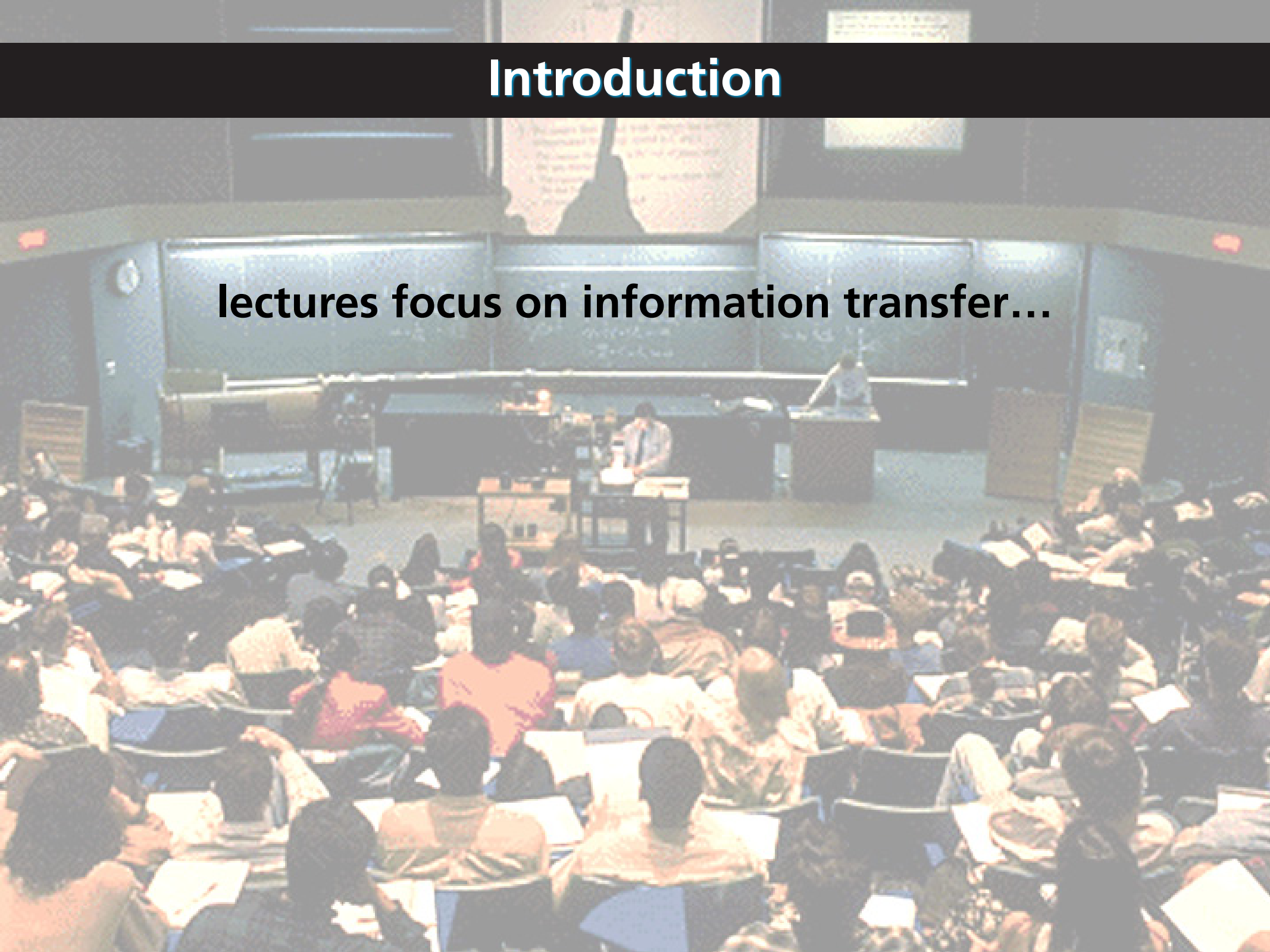
1. Never heard of it.
2. Heard of it, but don’t really know what it is.
3. Quite familiar with it.
4. I heard you speak about it so often, I could give your talk

Quick survey…

Peer Instruction…

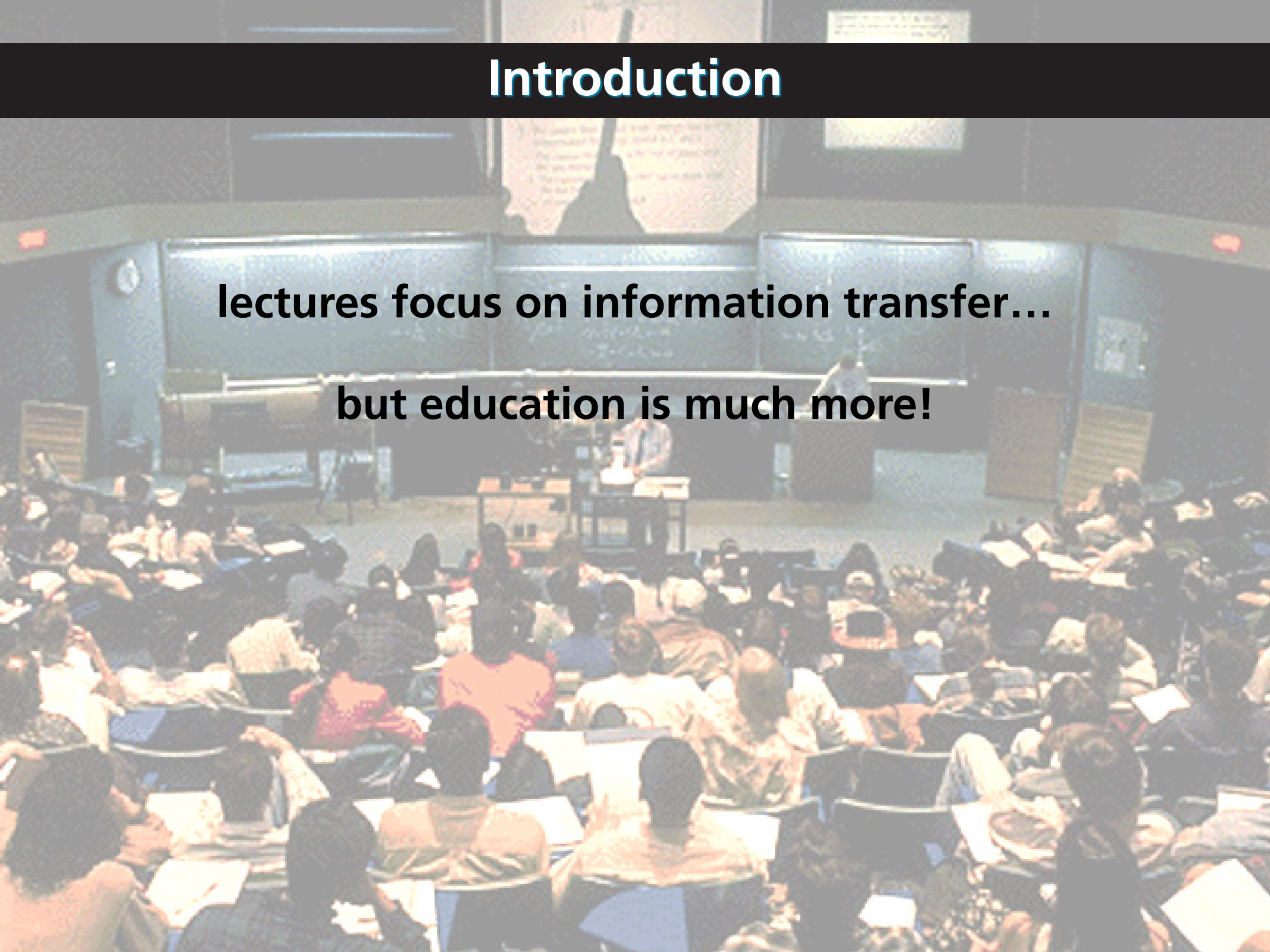
1. Never heard of it.
2. Don’t use it in my classes, but I’m open to it.
3. Considering using it in my classes.
4. I have used it it in my classes a few times only.
5. I use it regularly in my classes.

Introduction



lectures focus on information transfer…

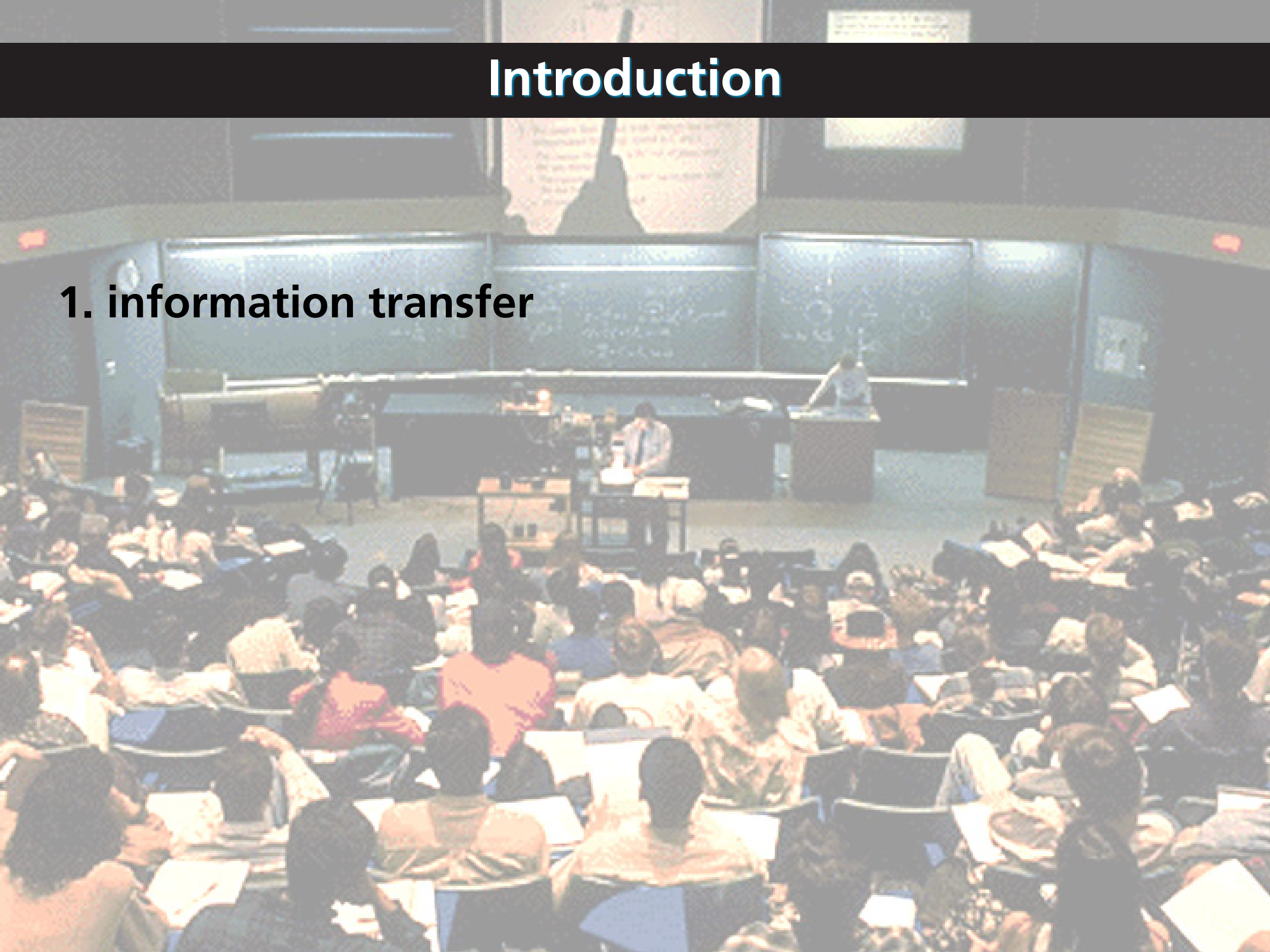
Introduction



lectures focus on information transfer…

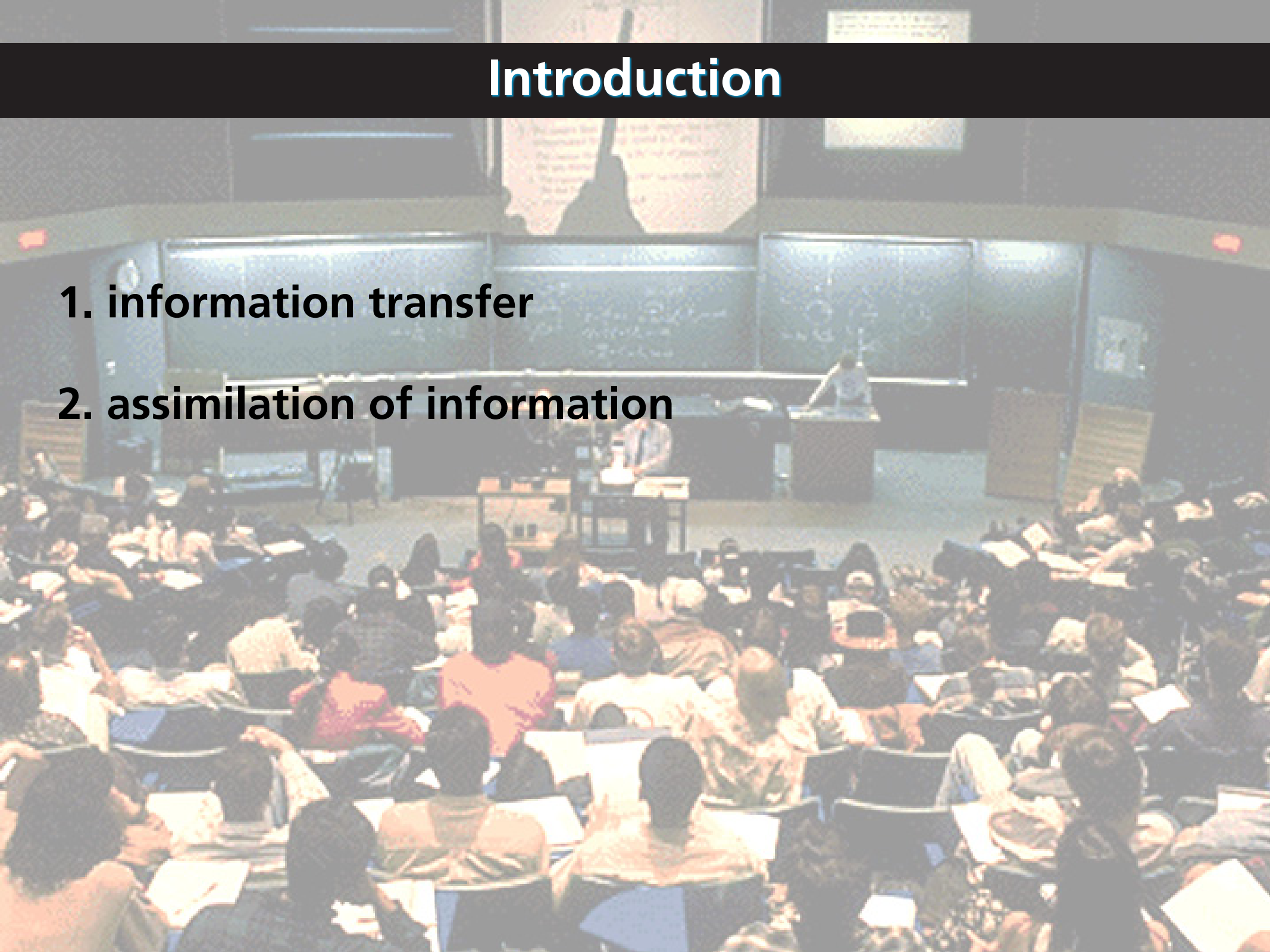
but education is much more!

Introduction



1. information transfer

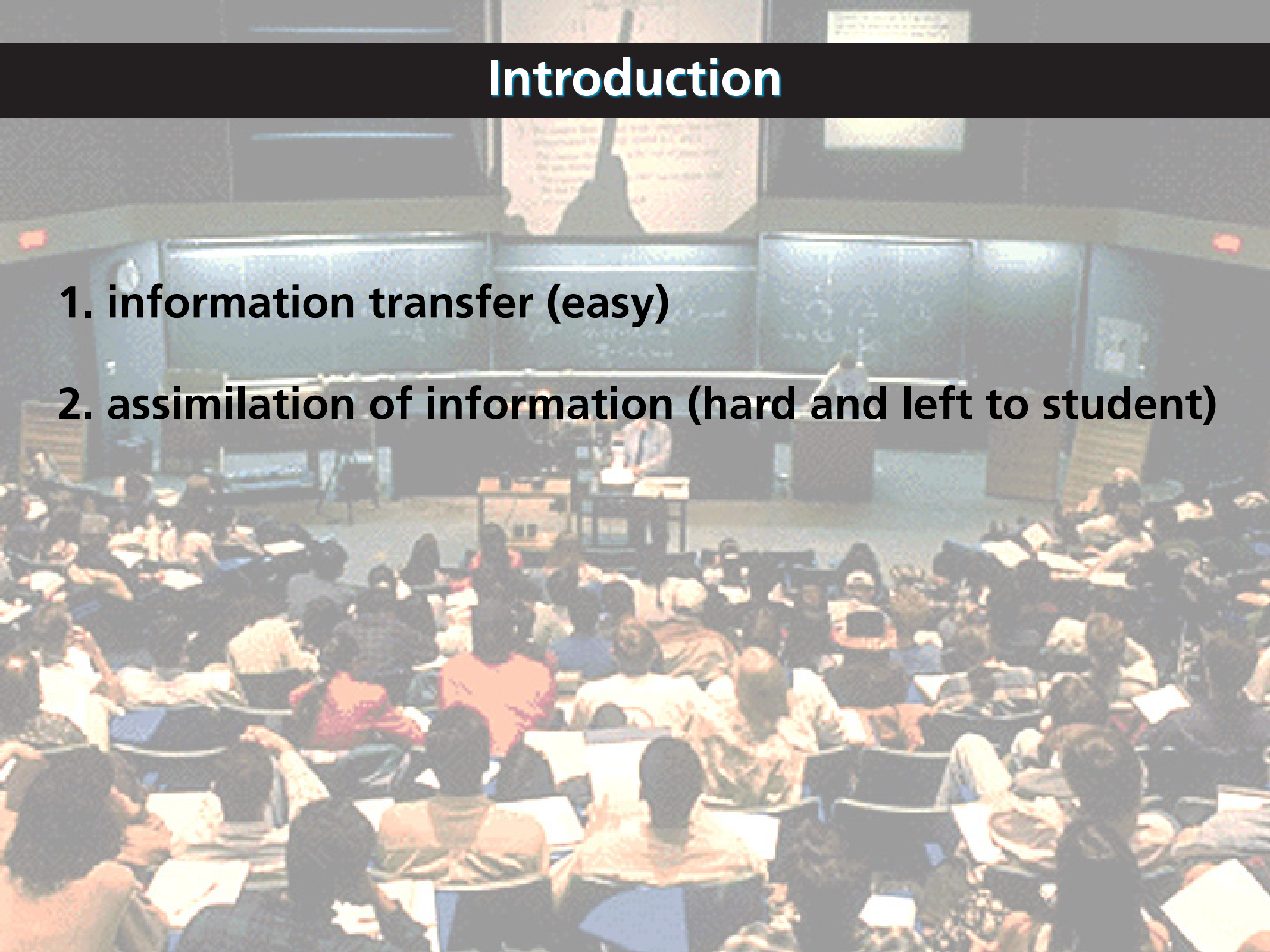
Introduction



1. information transfer

2. assimilation of information

Introduction



1. information transfer (easy)

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

Introduction

Solution: move information transfer out of classroom!

Introduction

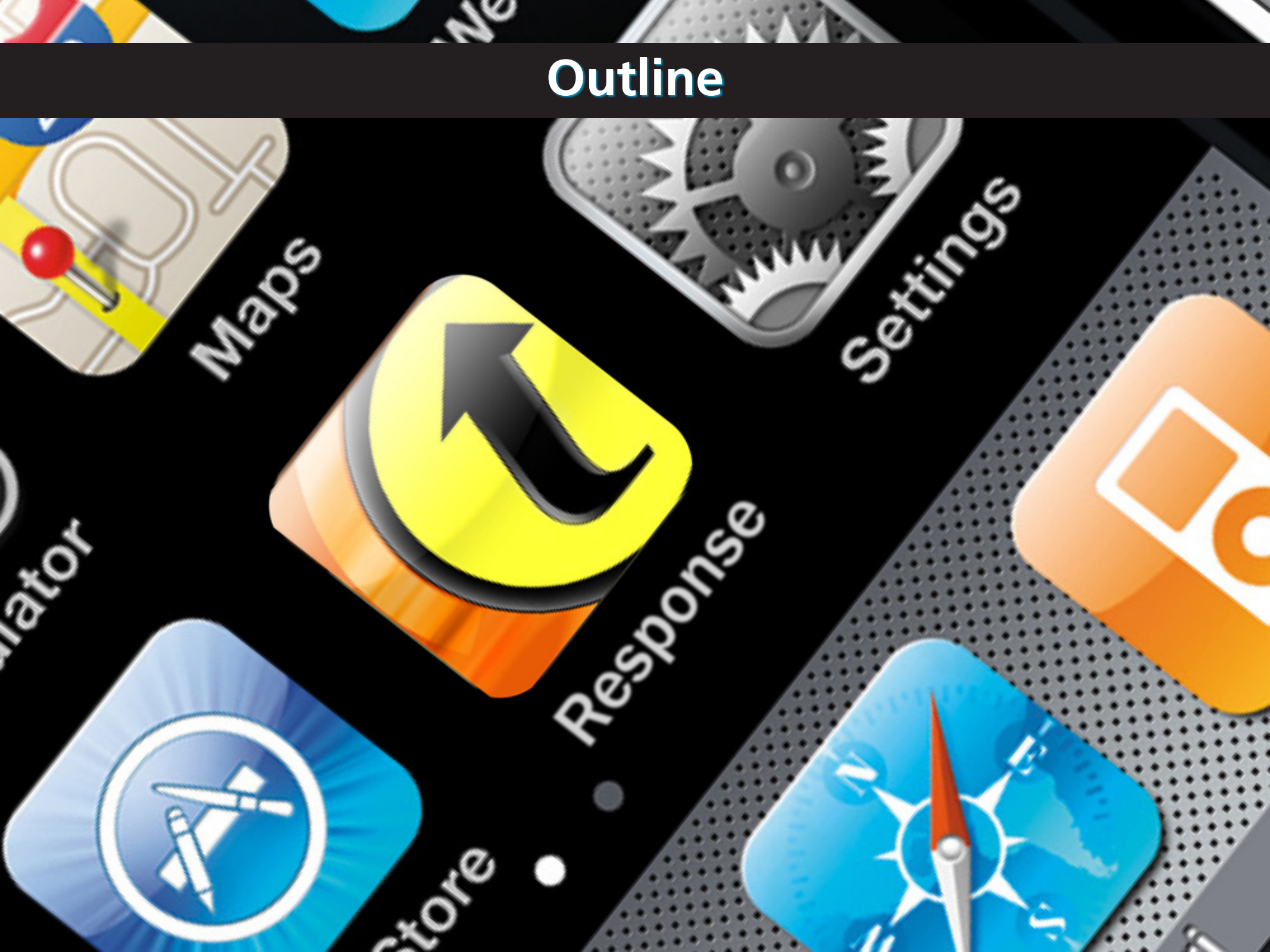
How to move information transfer out of classroom?

Introduction

How to move information transfer out of classroom?

Use JiTT (before class) and PI (in class)!

Outline



Outline

- PI & JiTT Overview
- Implementing PI & JiTT
- ConcepTests

PI & JiTT Overview

"How can I be sure that my students will prepare for class?"

PI & JiTT Overview

Students do not come to class prepared, because...

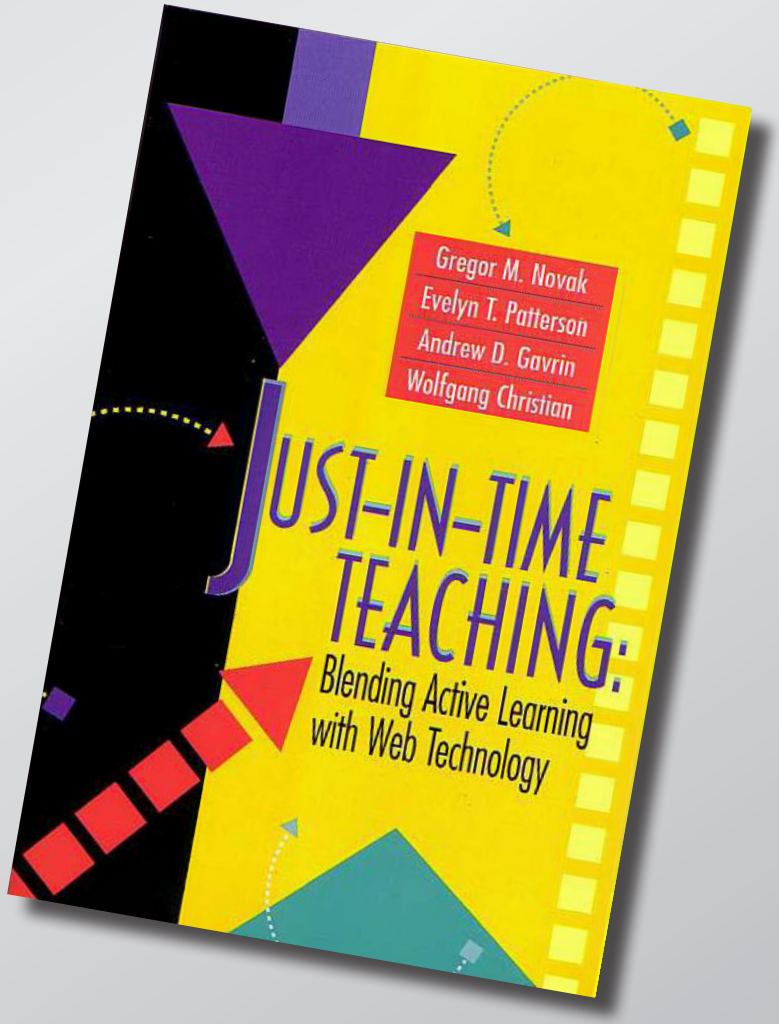
1. they don't have time.
2. they are not motivated to learn.
3. their instructors take away the incentive.
4. they do not have the requisite skills.
5. of some other reason.
6. They do come prepared in my class!

(select what you consider to be the main reason)

PI & JiTT Overview

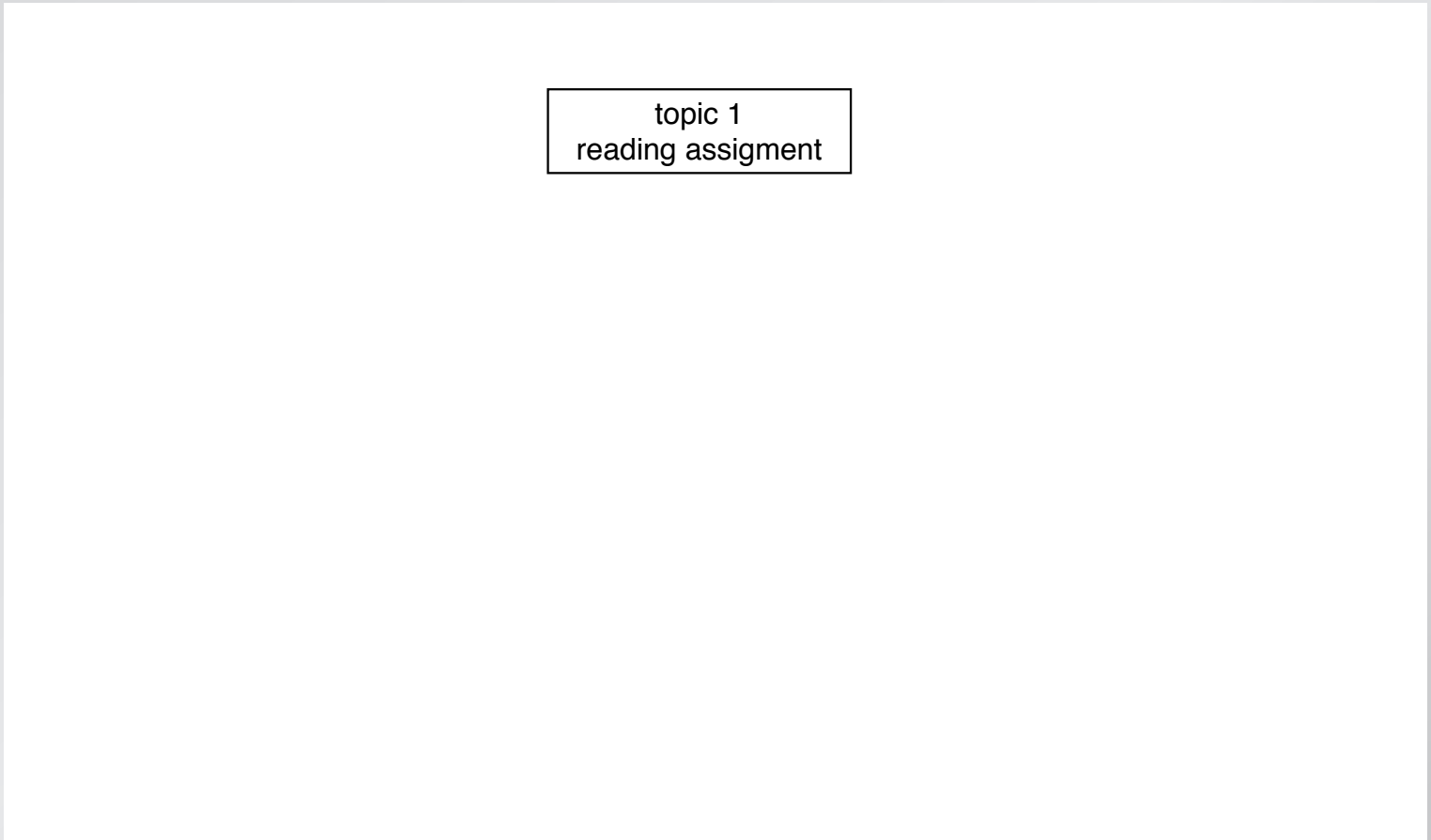
Just-in-time-Teaching (JiTT)

www.jitt.org



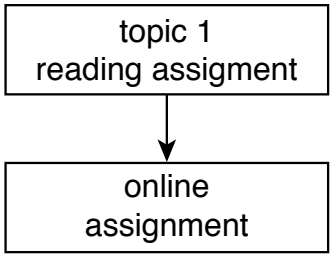
PI & JiTT Overview

JiTT workflow



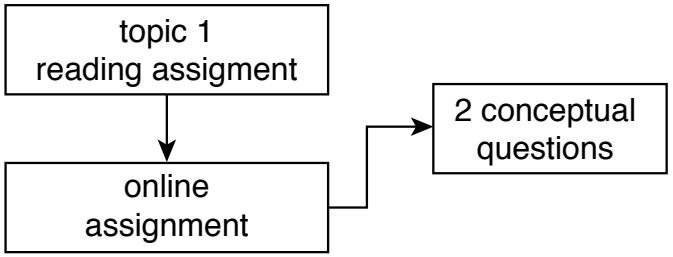
PI & JiTT Overview

JiTT workflow



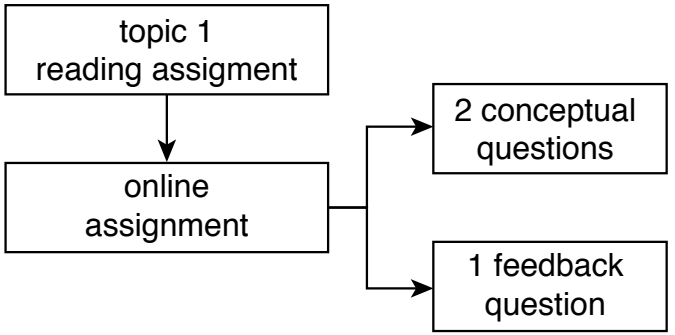
PI & JiTT Overview

JiTT workflow



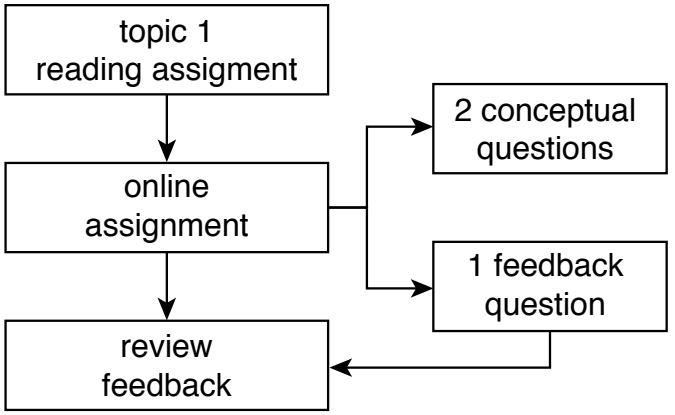
PI & JiTT Overview

JiTT workflow



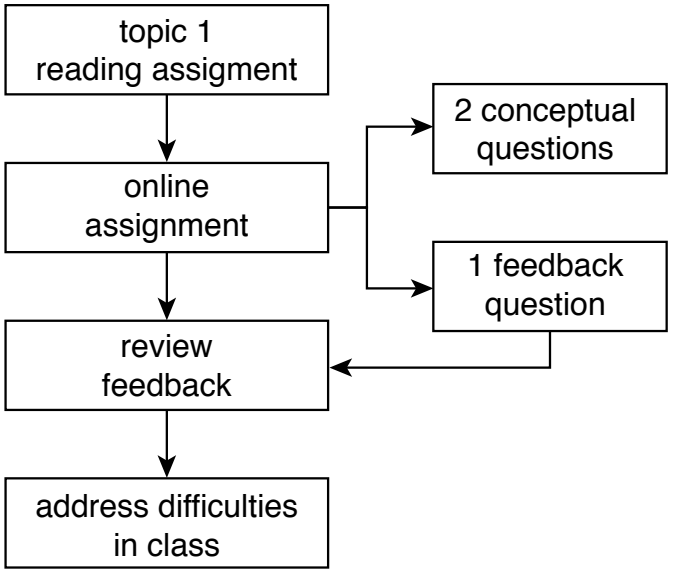
PI & JiTT Overview

JiTT workflow



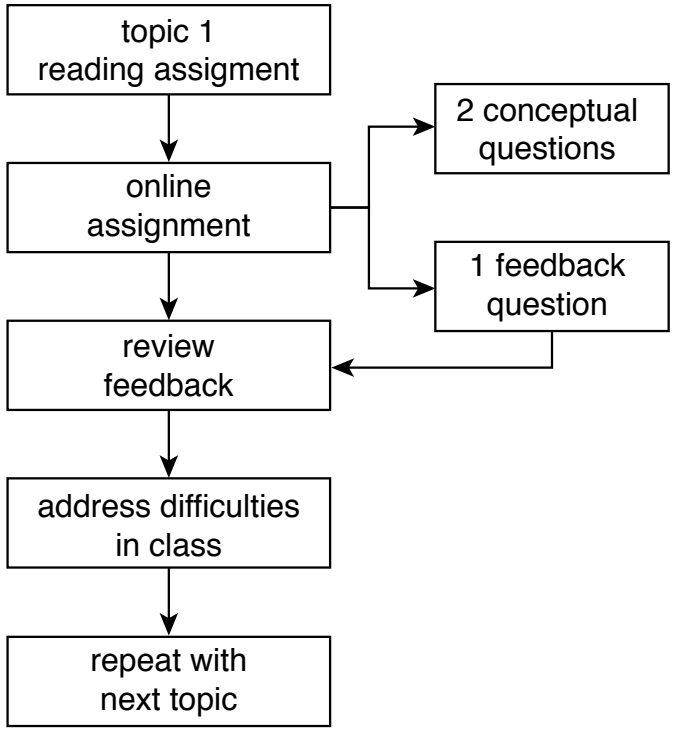
PI & JiTT Overview

JiTT workflow



PI & JiTT Overview

JiTT workflow



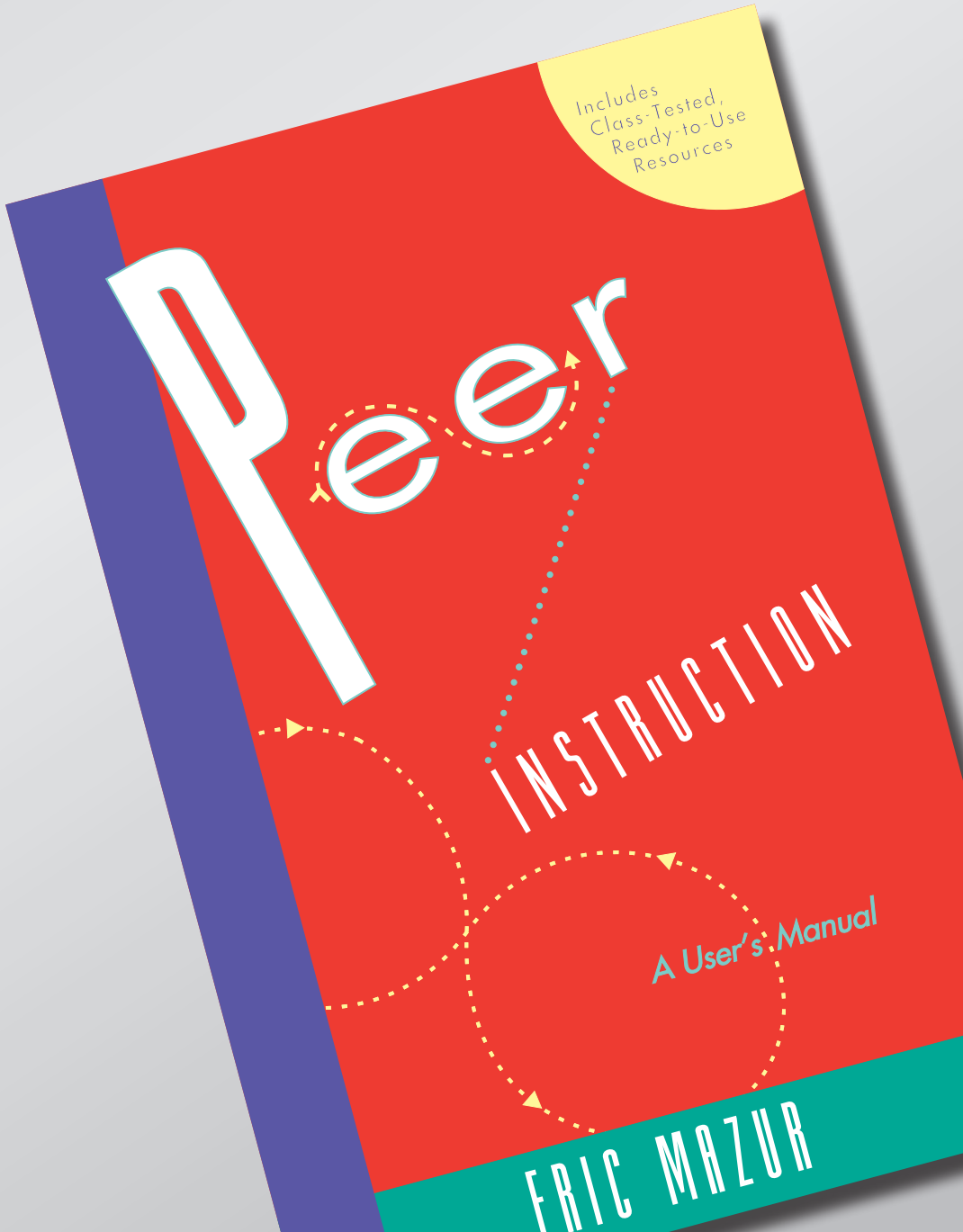
PI & JiTT Overview

JiTT:

- prepares you for class
- prepares students for class
- helps you address student difficulties

PI & JiTT Overview

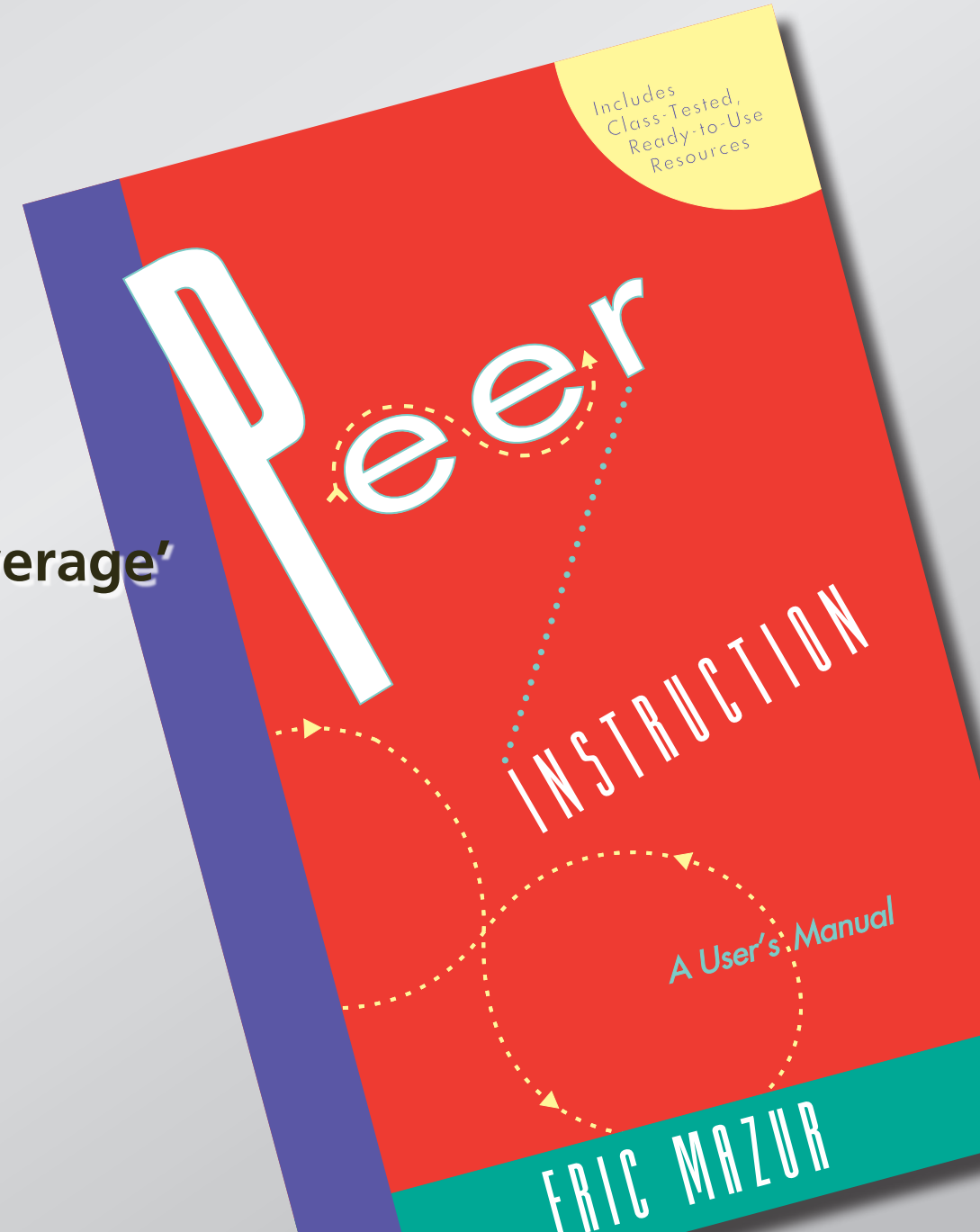
Peer Instruction (PI)



PI & JiTT Overview

Main features:

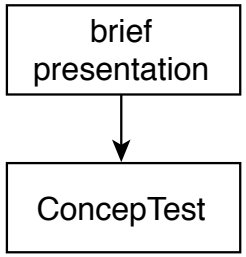
- **pre-class assignment**
- **in-class: depth, not 'coverage'**
- **ConcepTests**



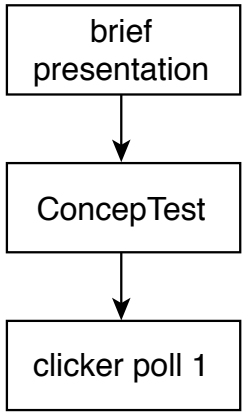
PI & JiTT Overview

brief
presentation

PI & JiTT Overview



PI & JiTT Overview



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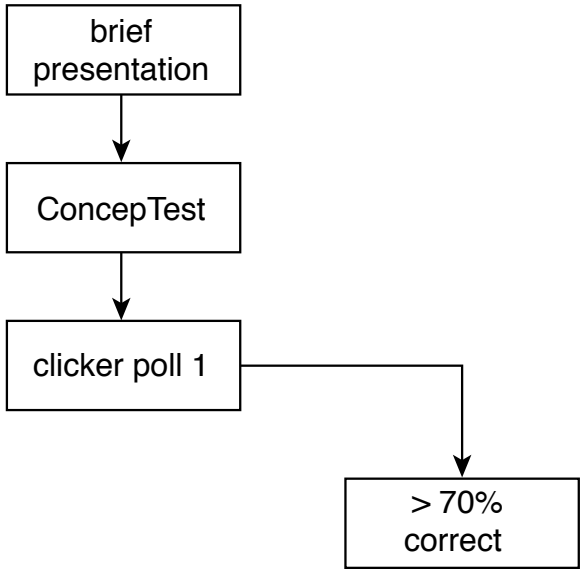

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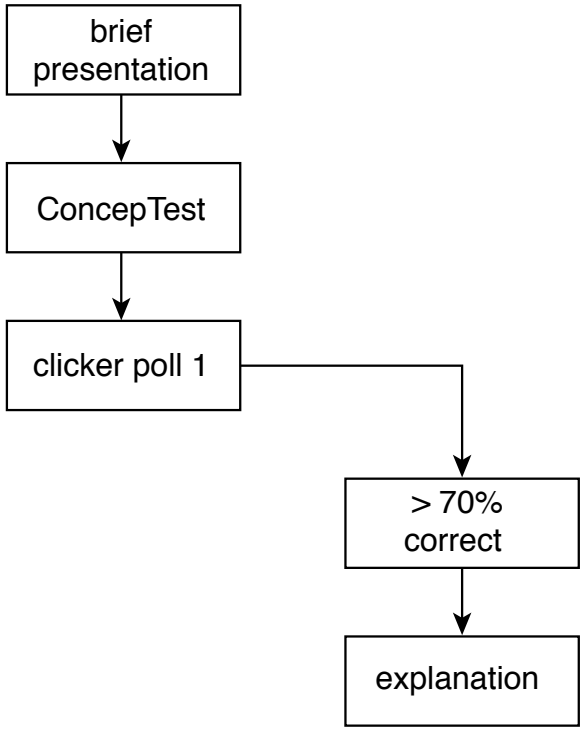

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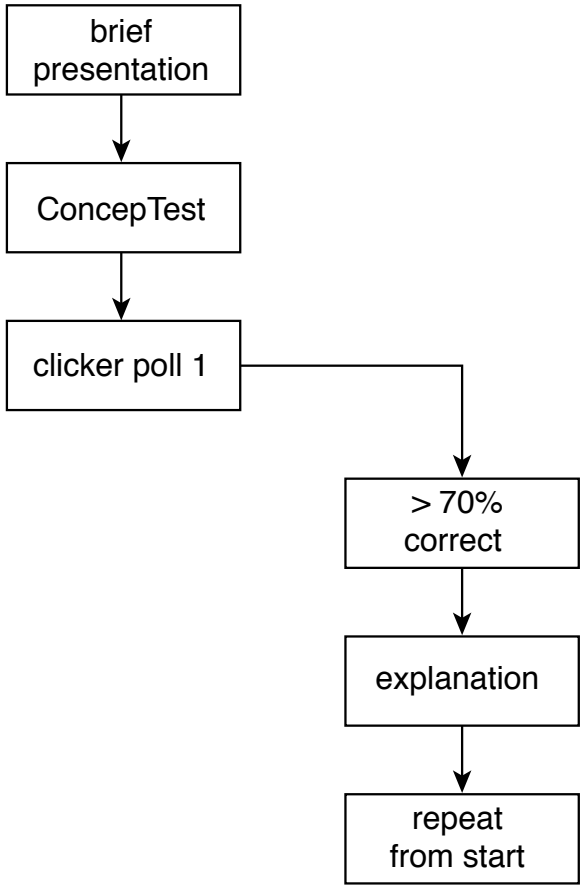

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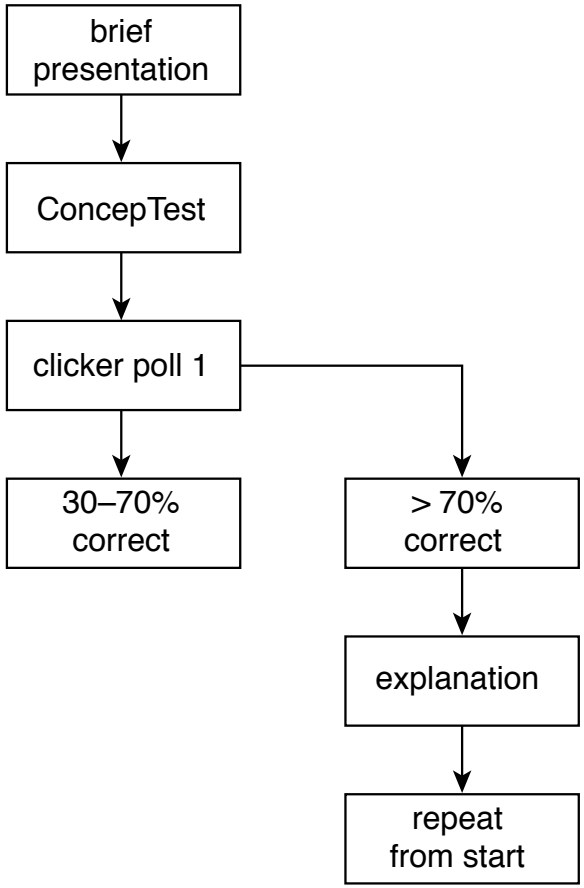

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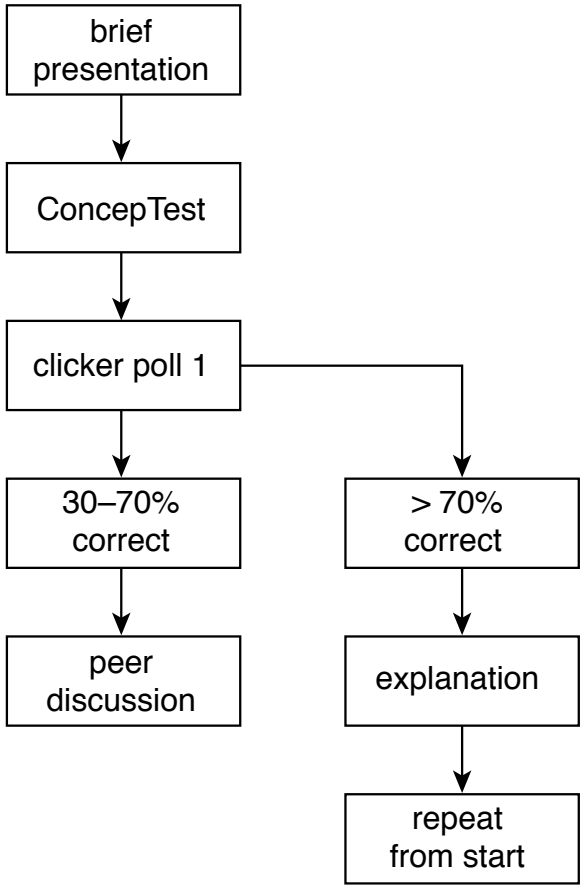

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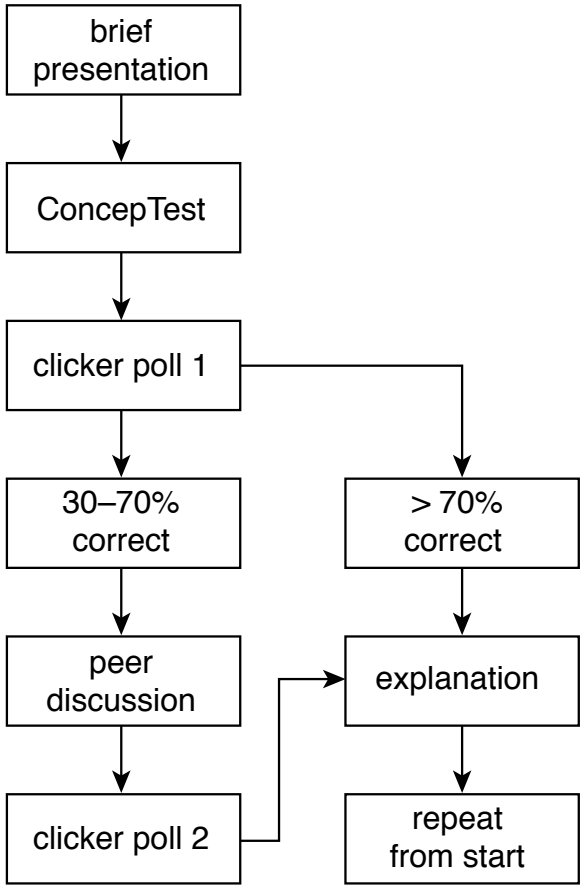

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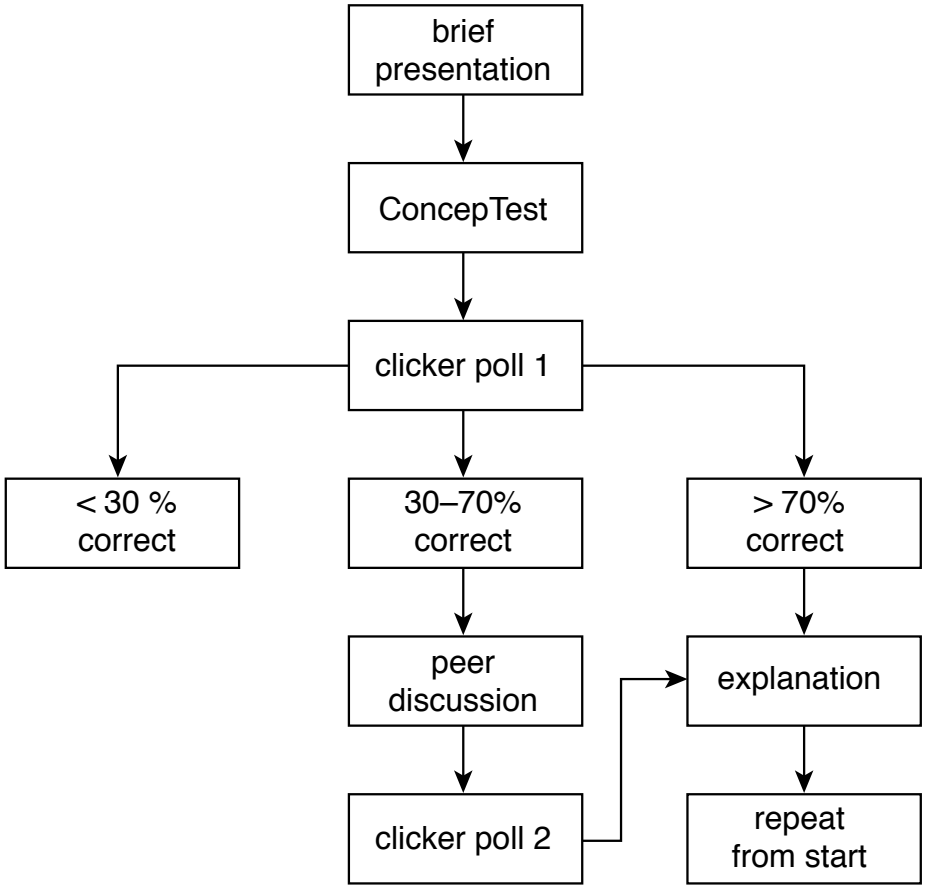

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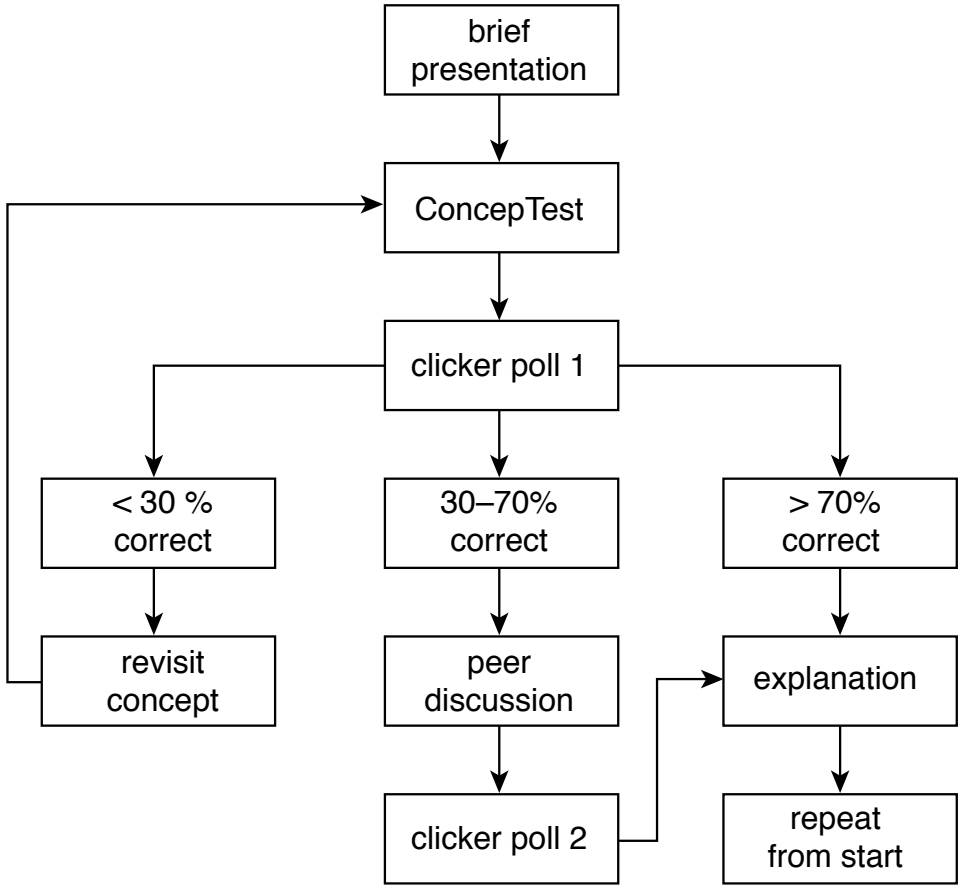

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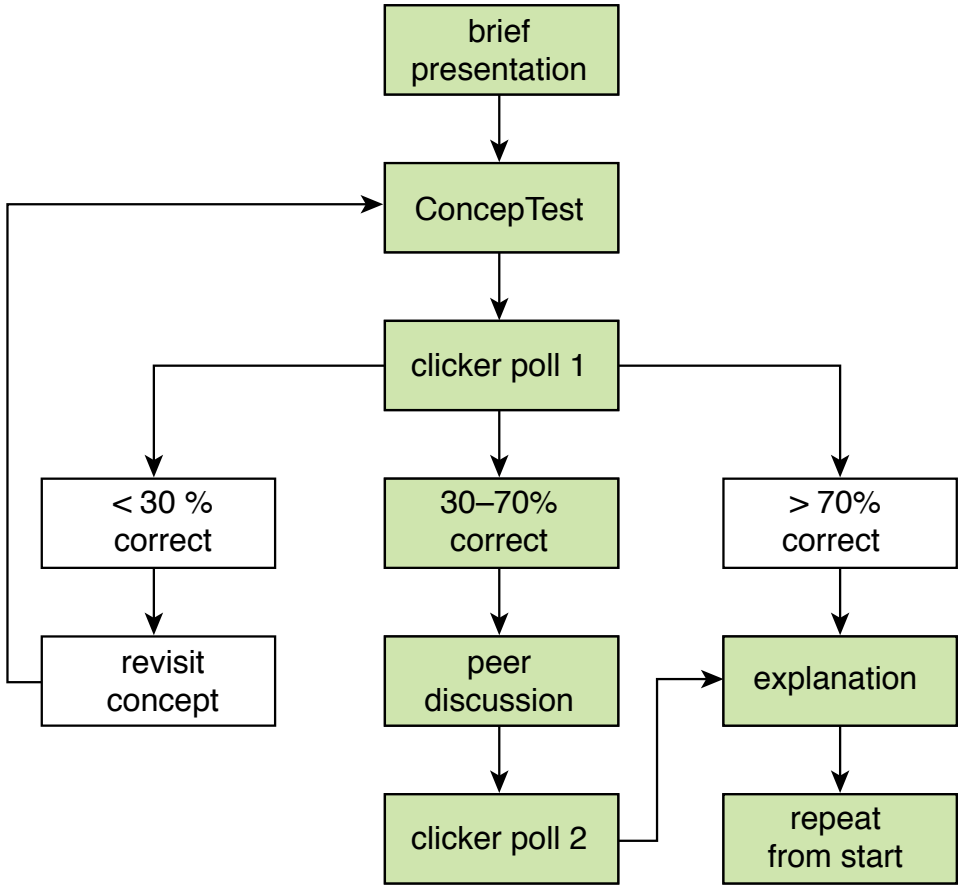


PI & JiTT Overview

PI:

- **helps students overcome difficulties**
- **encourages deep learning**
- **provides depth, not “coverage”**
- **helps you become aware of misconceptions**

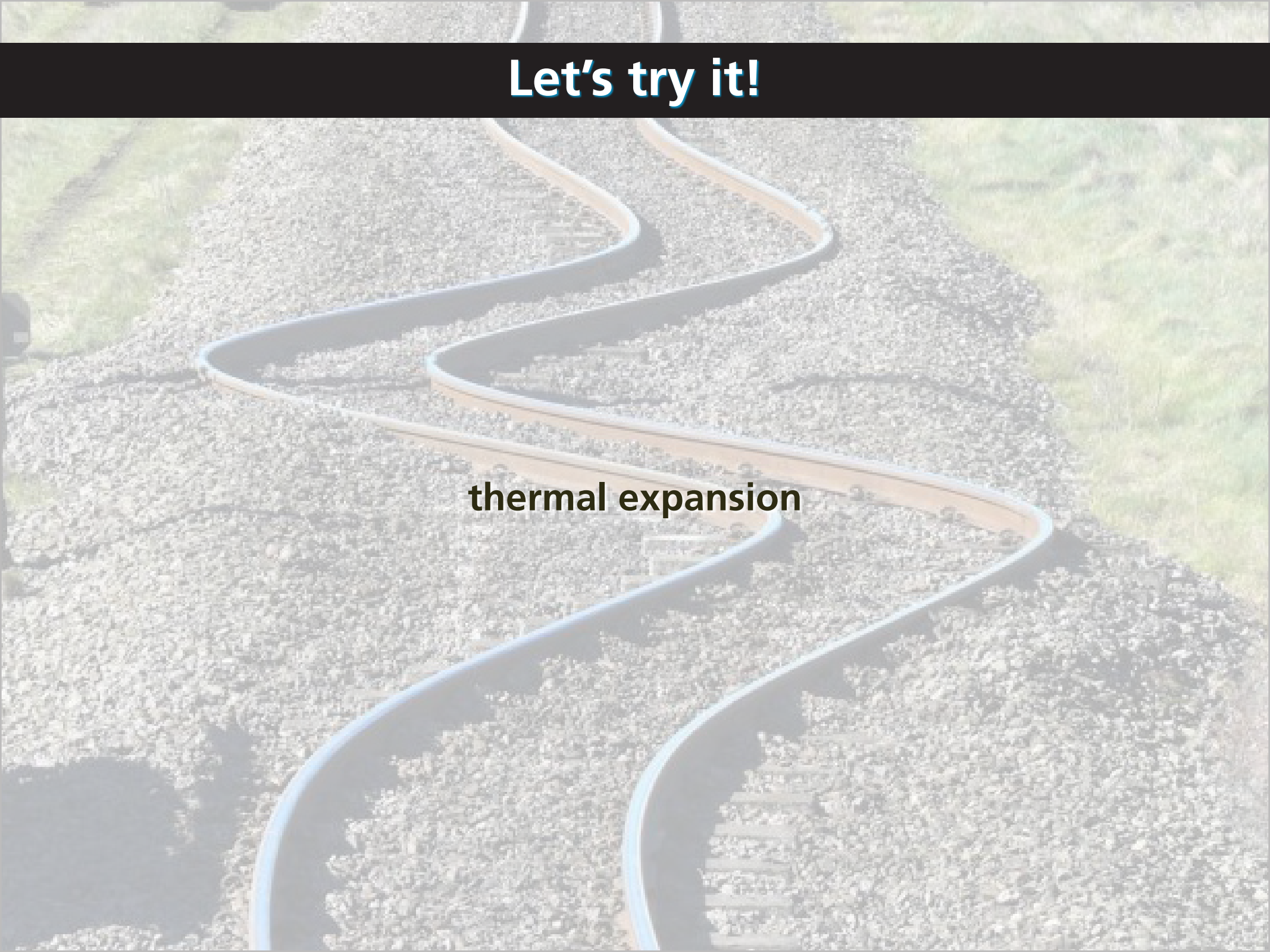
PI & JiTT Overview

“How do I promote fruitful discussion?”

PI & JiTT Overview

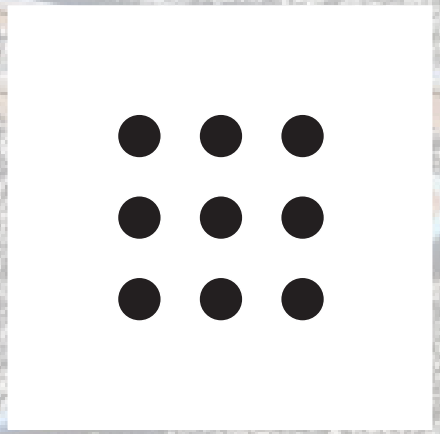
Find someone with a *different* answer

Let's try it!



Let's try it!

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



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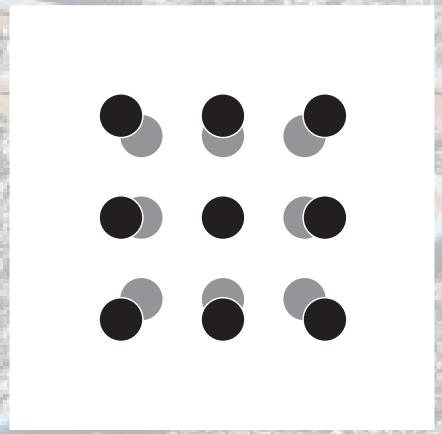
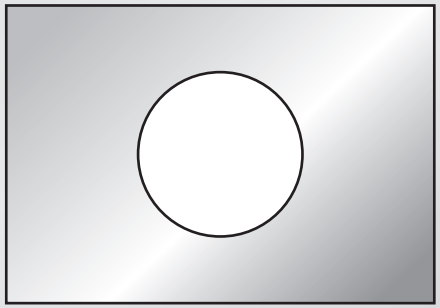


Let's try it!

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

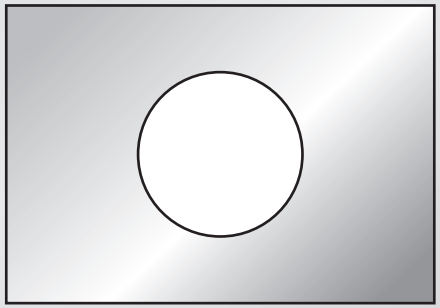
Let's try it!

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.

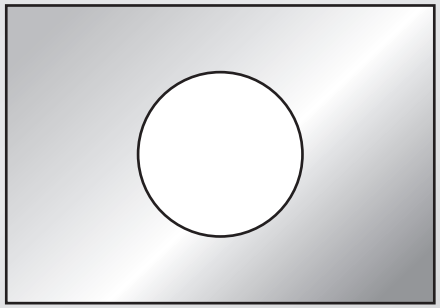
When the plate is uniformly heated, the diameter of the hole

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

you got all fired up!

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!

Before I tell you the answer…

Let's try it!

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

Let's try it!

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

You…

Let's try it!

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

You…

1. made a commitment

Let's try it!

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

You…

1. made a commitment
2. externalized your answer

Let's try it!

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!

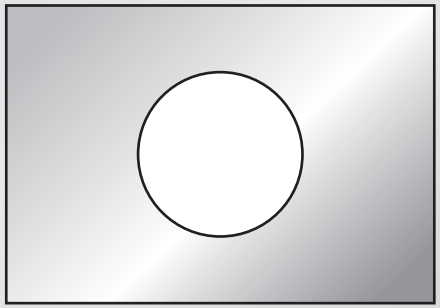
Before I tell you the answer, let's analyze what happened.

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!

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



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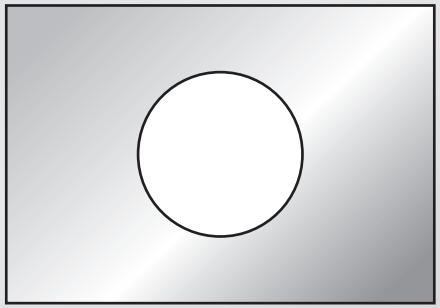


When the plate is uniformly heated, the diameter of the hole

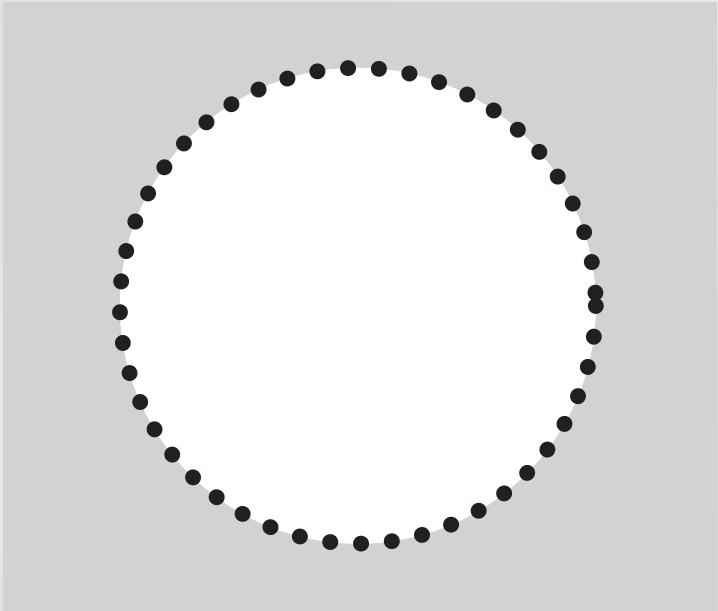
1. increases. ✔

2. stays the same.

3. decreases.

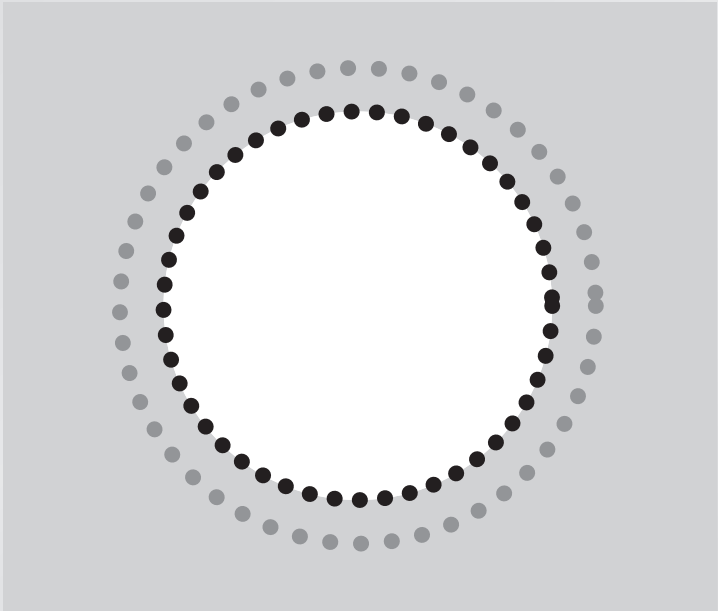
Let's try it!

consider the atoms at the rim of the hole



Let's try it!

consider the atoms at the rim of the hole



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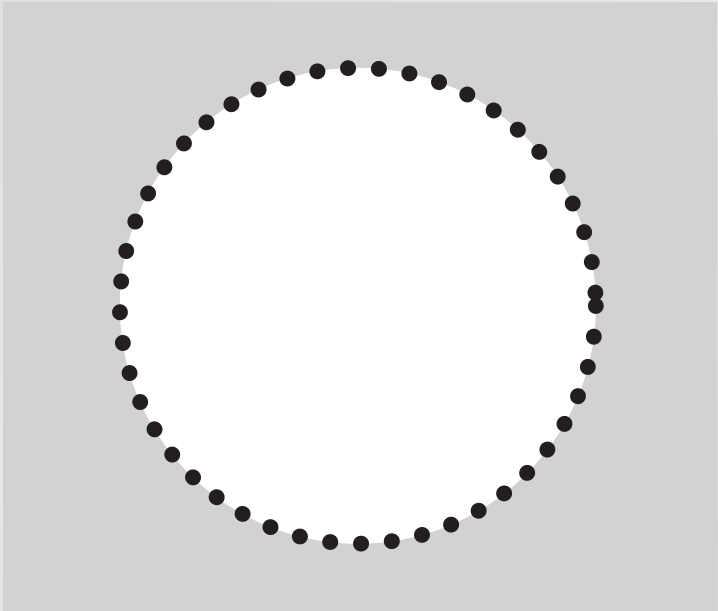
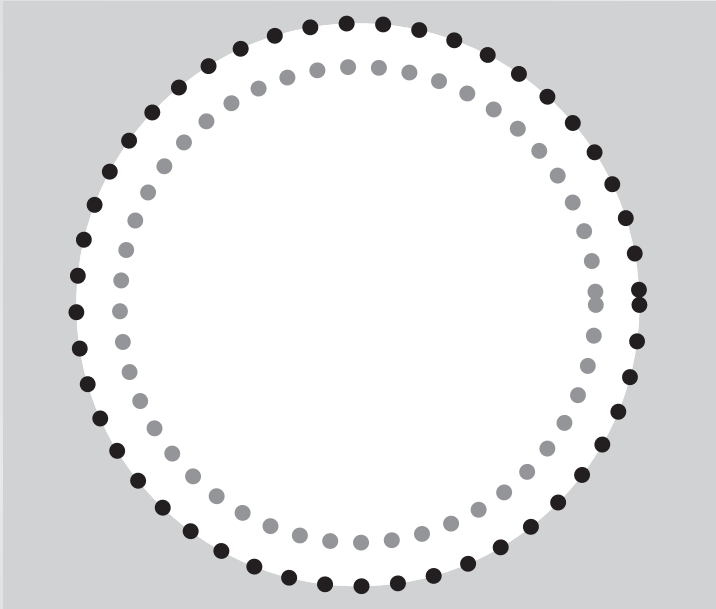
consider the atoms at the rim of the hole



Let's try it!

consider the atoms at the rim of the hole



Let's try it!

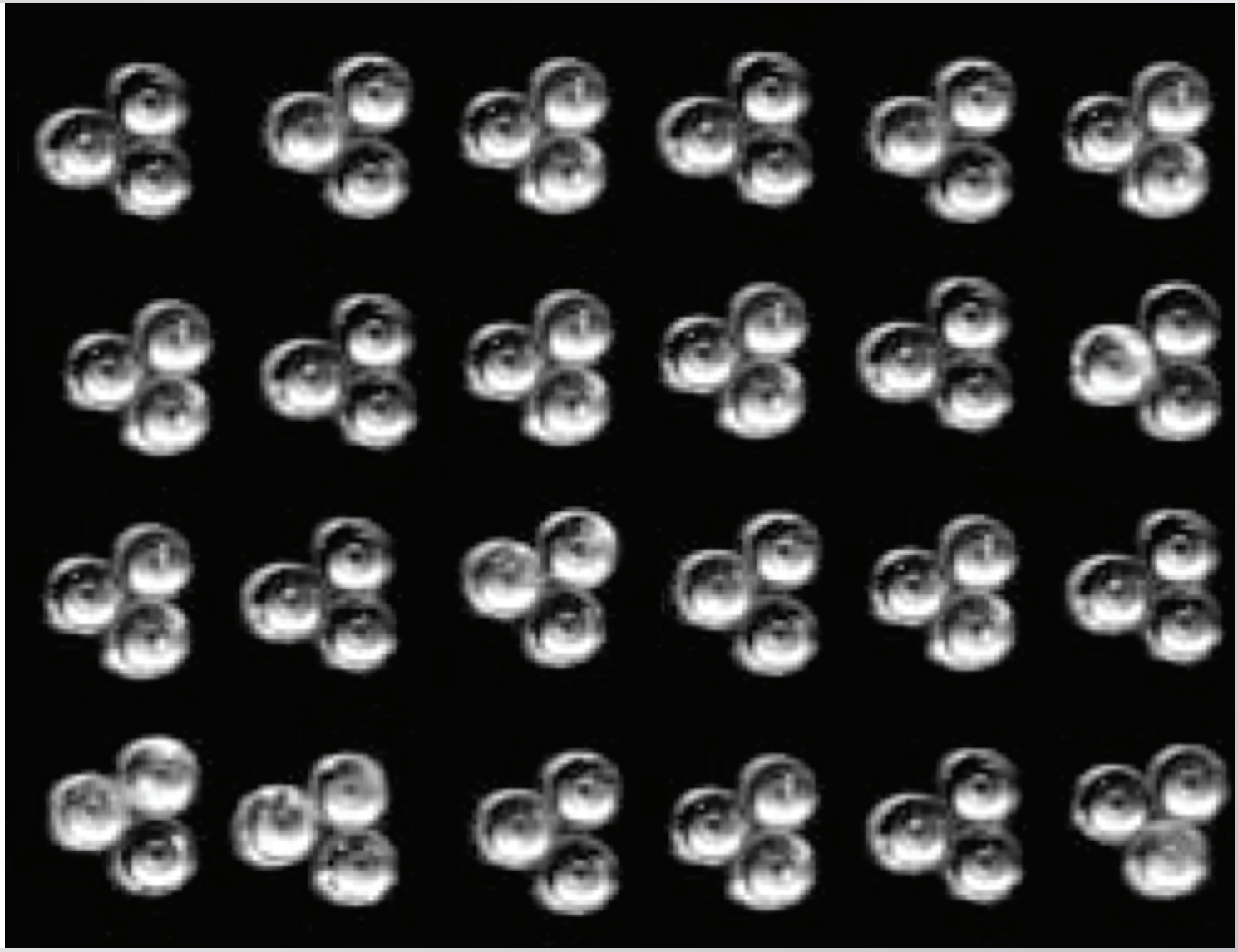
consider the atoms at the rim of the hole

PI & JiTT Overview

“Can this method be used in my class,

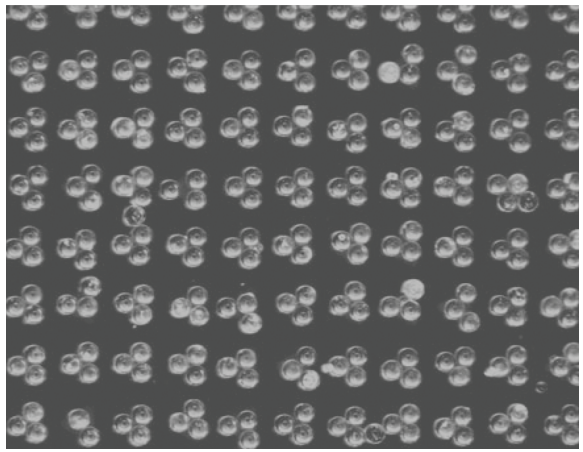
where questions don’t necessarily have right answers?”

Let's try it!

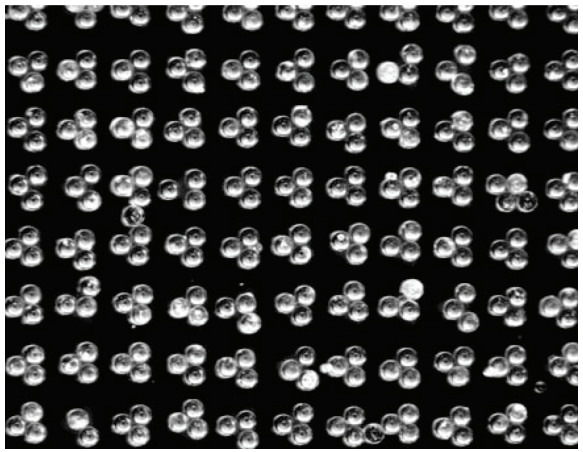


Let's try it!

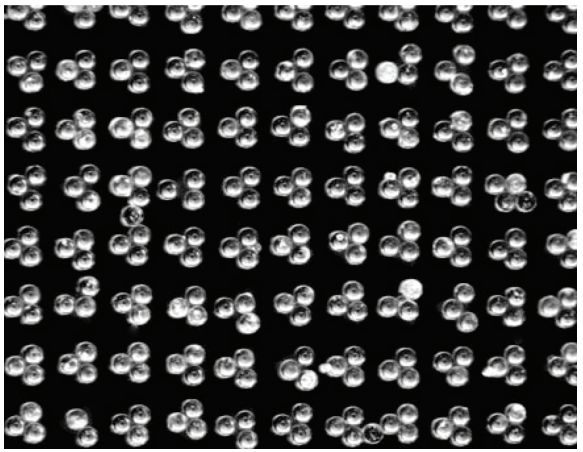
original



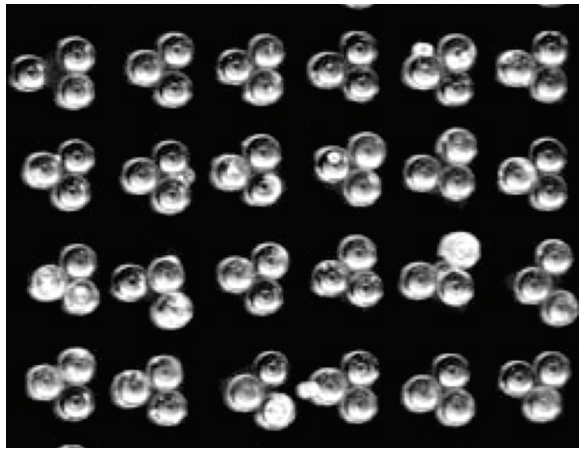
1. adjust contrast



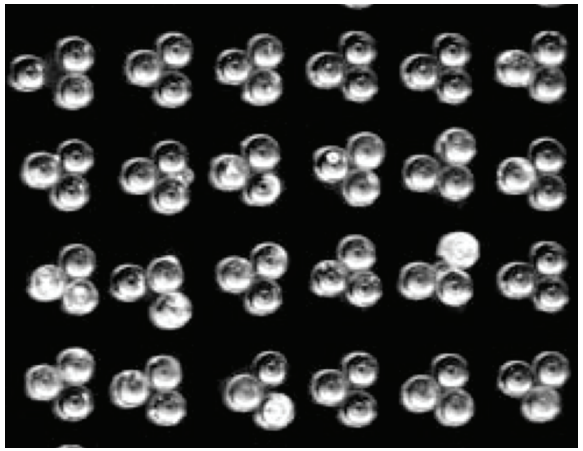
2. remove blemishes



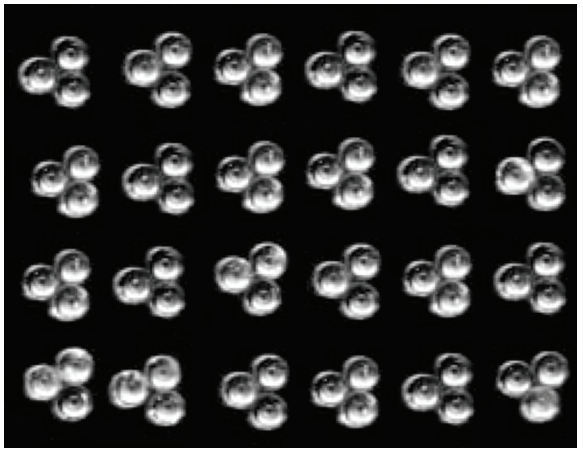
3. crop



4. remove outliers

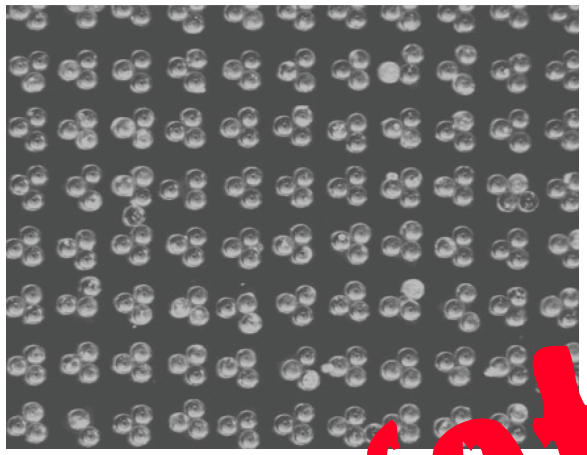


5. reconstruct



Let's try it!

original

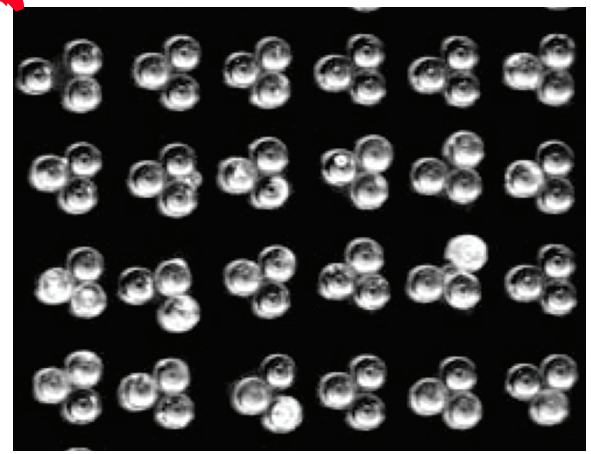


1. adjust contrast

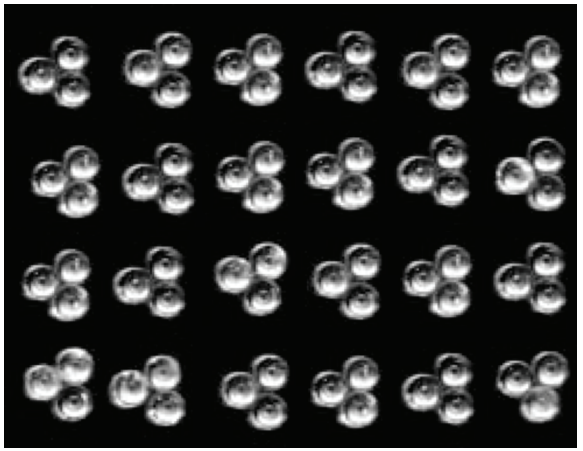
2. remove blemishes

3. crop

4. remove outliers



5. reconstruct



you got all engaged!

Outline

- PI & JiTT Overview
- **Implementing PI & JiTT**
- ConcepTests

Implementing PI & JiTT

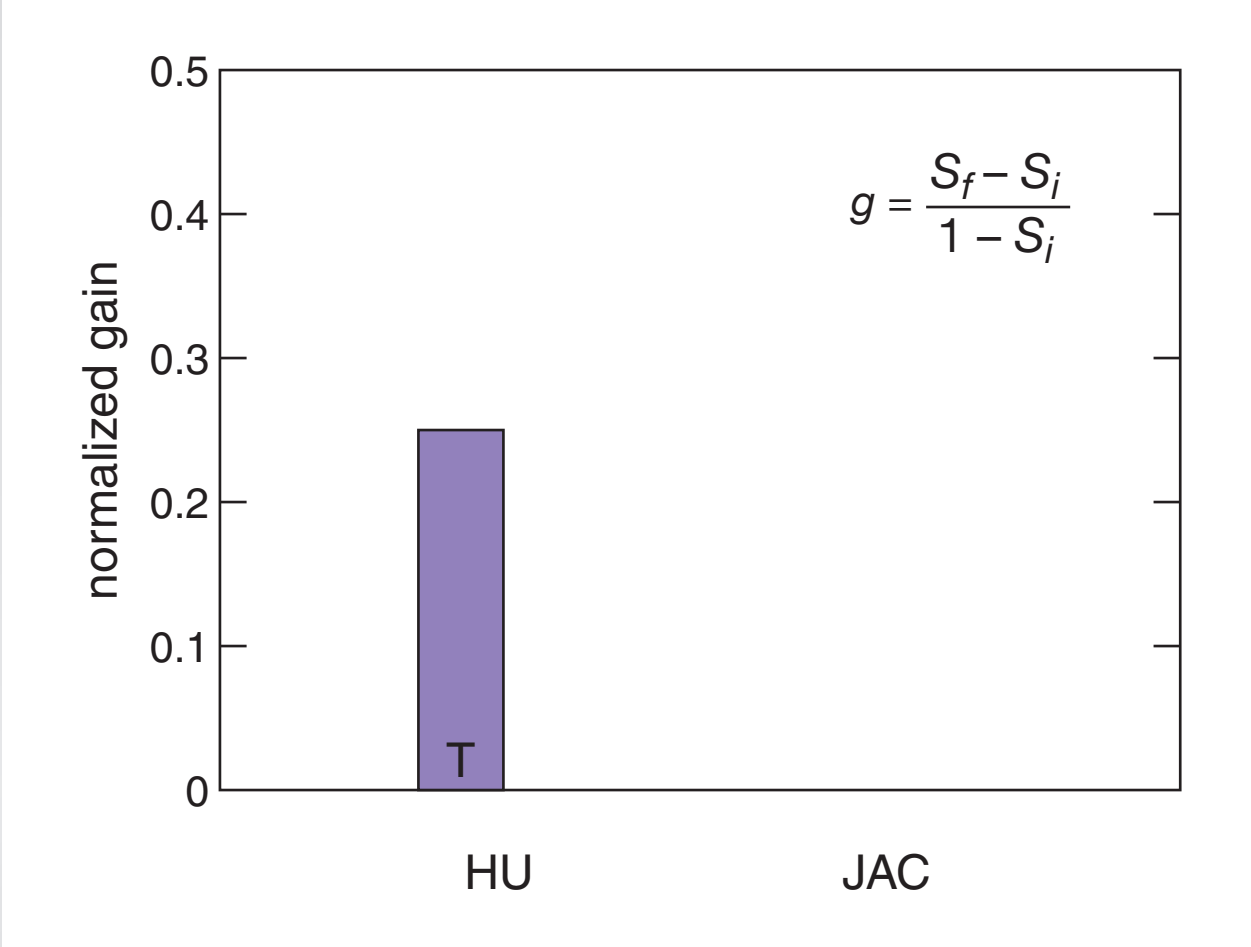
“Will it work at my institution?”

It works here…

…but will it work here?

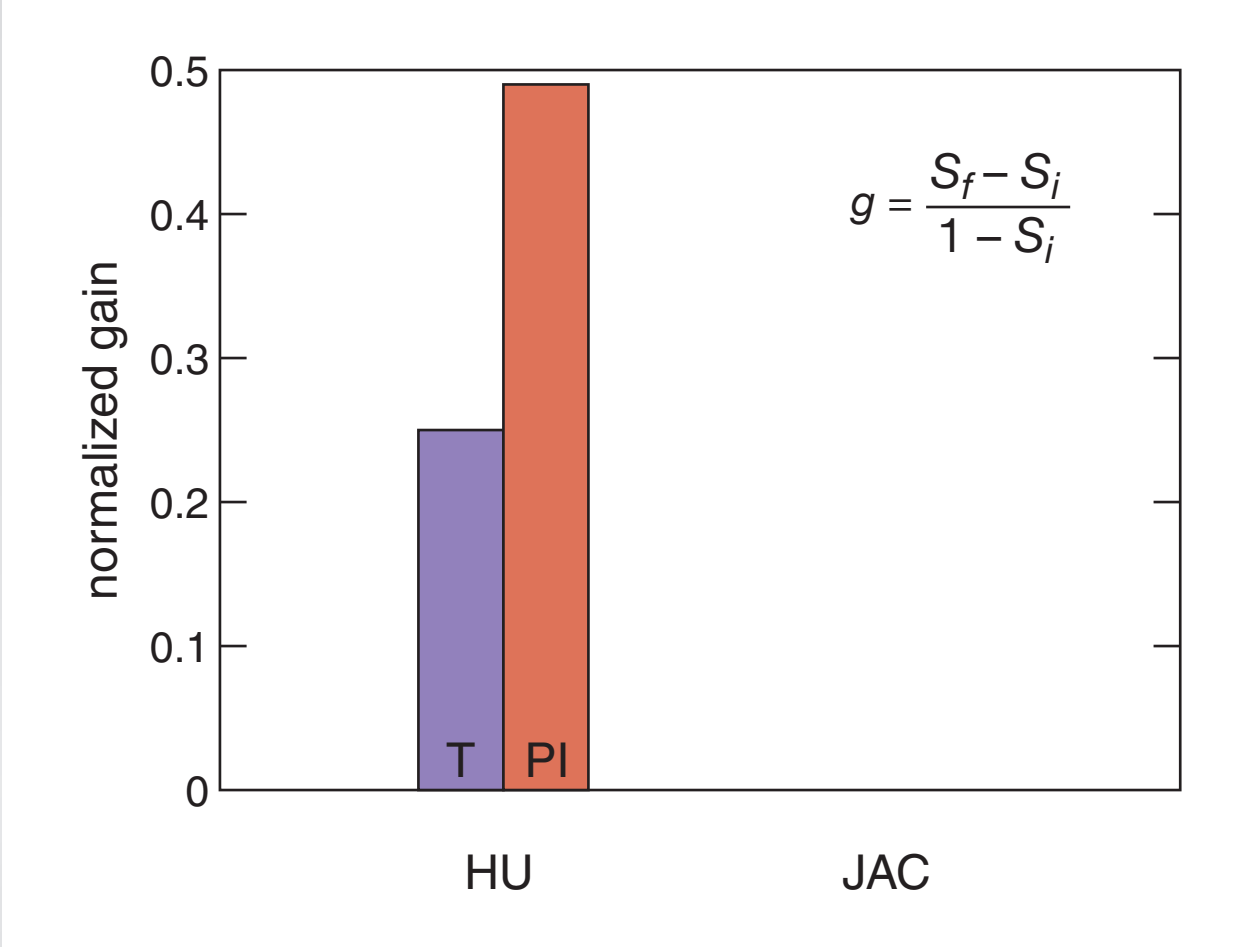
Implementing PI & JiTT

FCI normalized gain



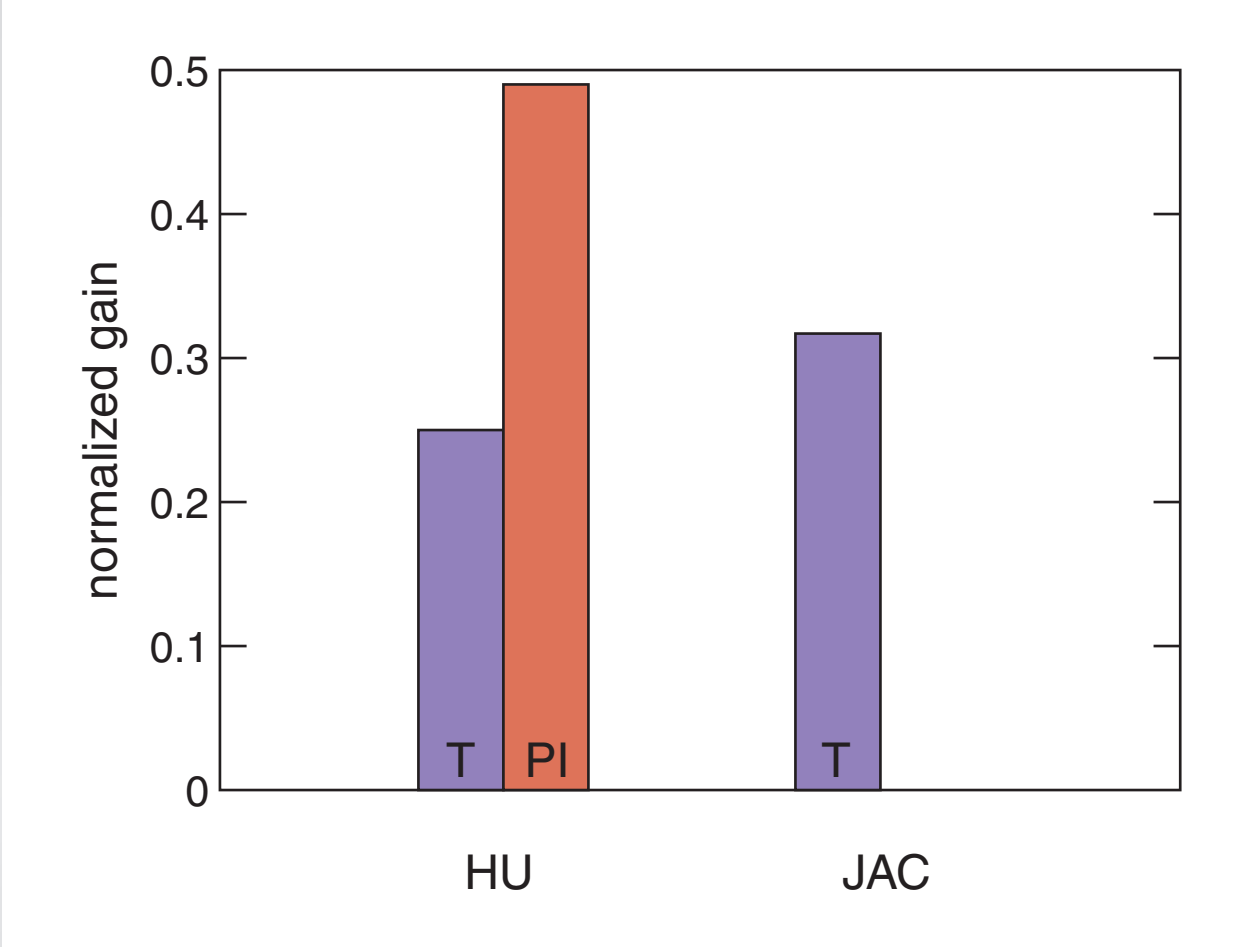
Implementing PI & JiTT

FCI normalized gain



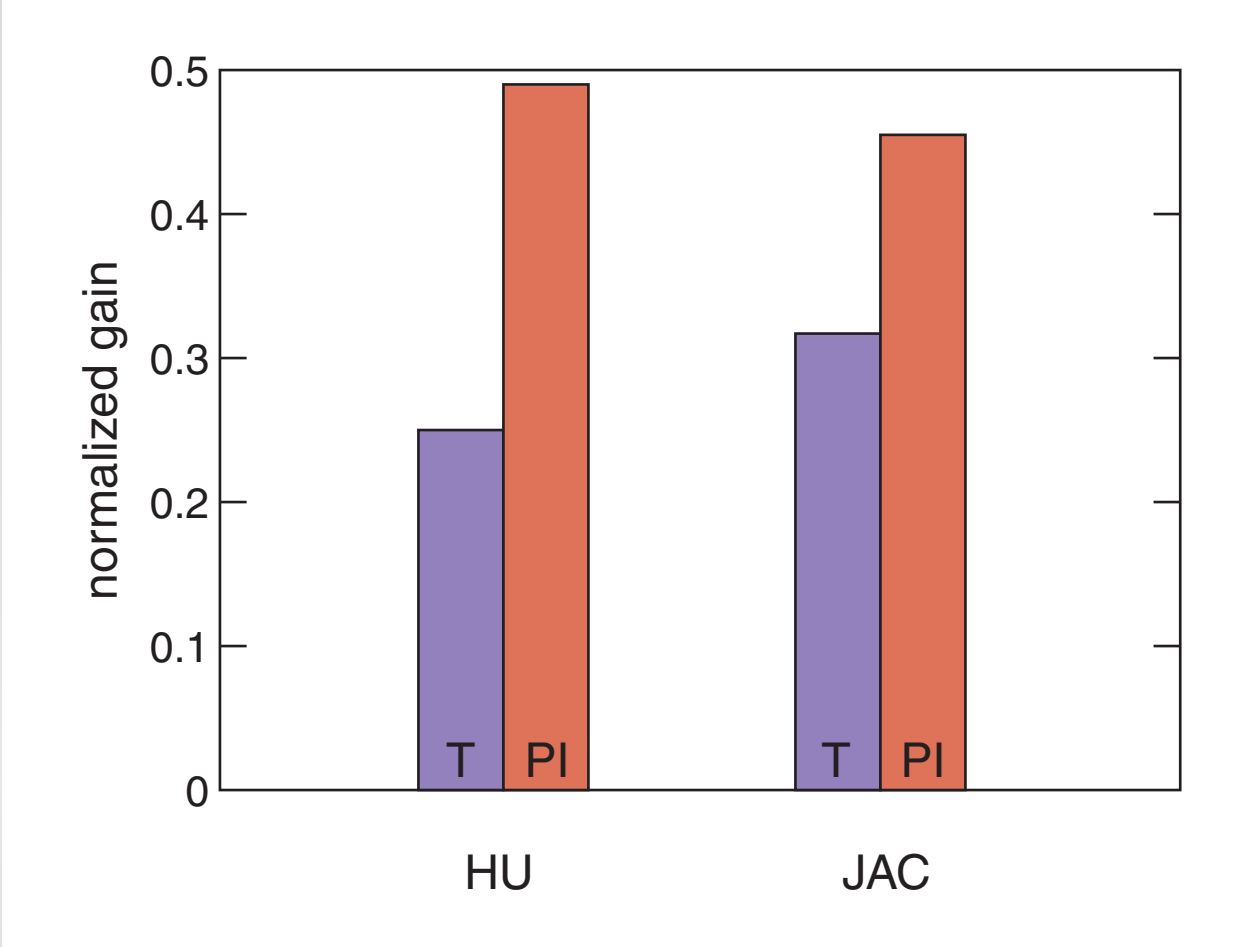
Implementing PI & JiTT

FCI normalized gain



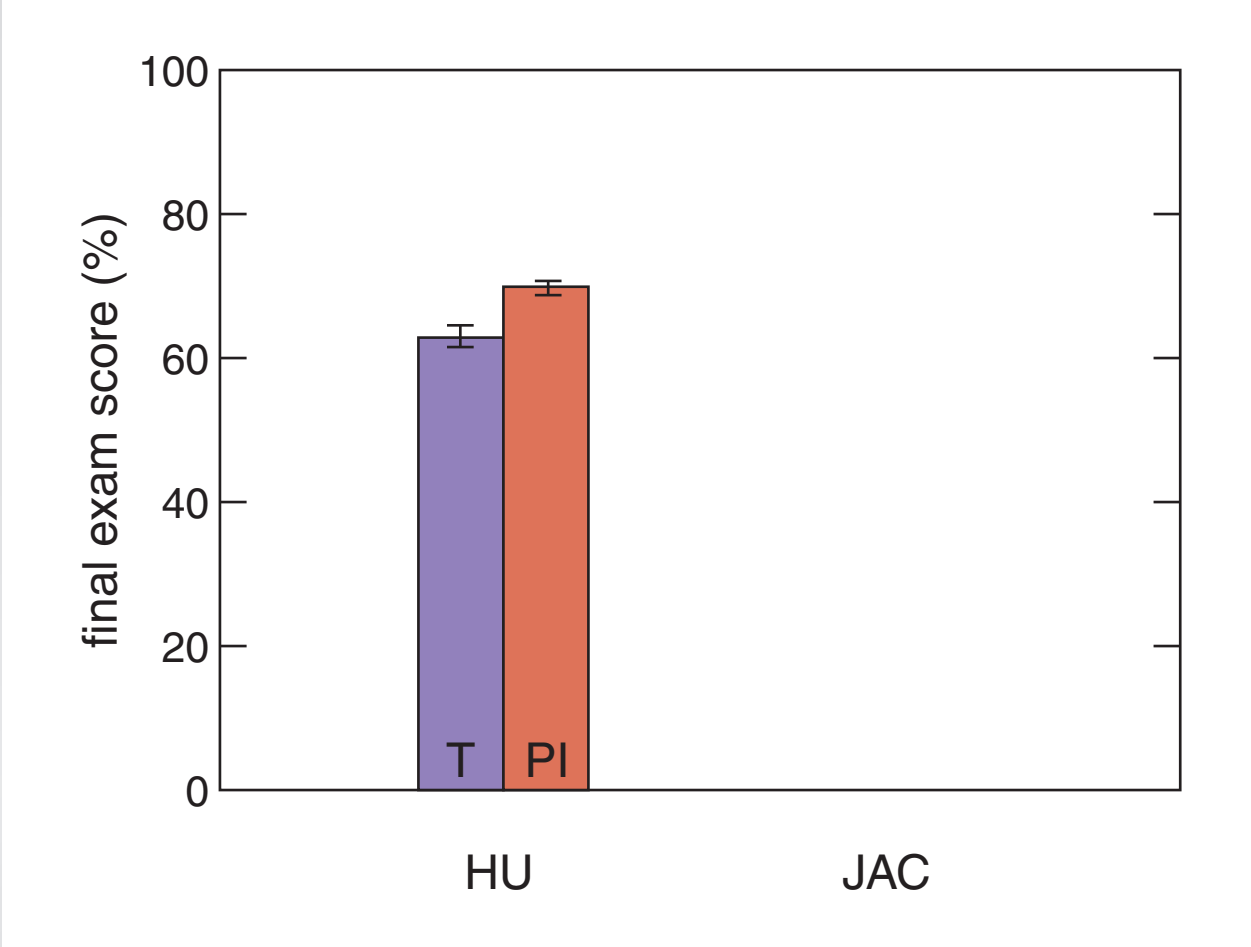
Implementing PI & JiTT

FCI normalized gain



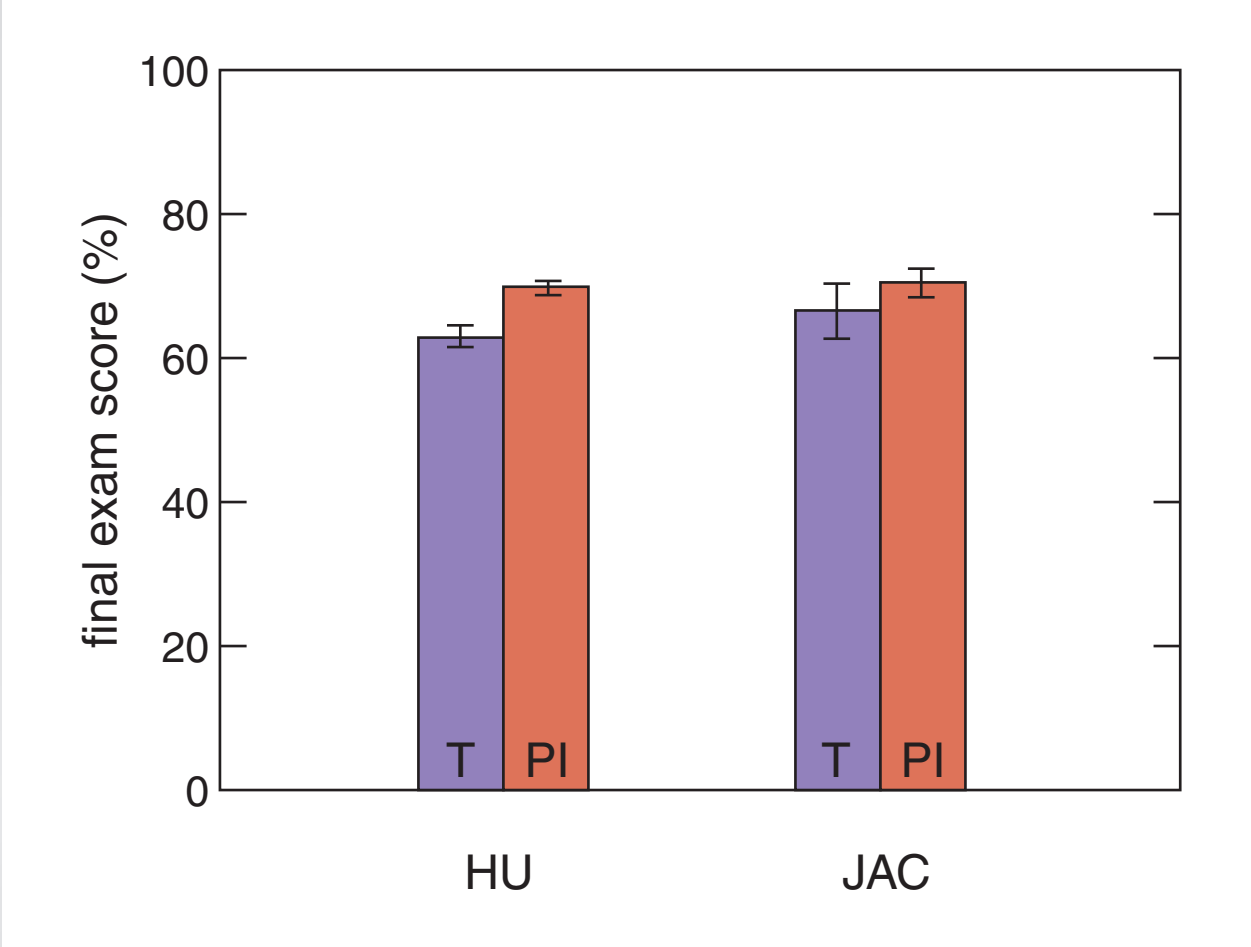
Implementing PI & JiTT

exam performance



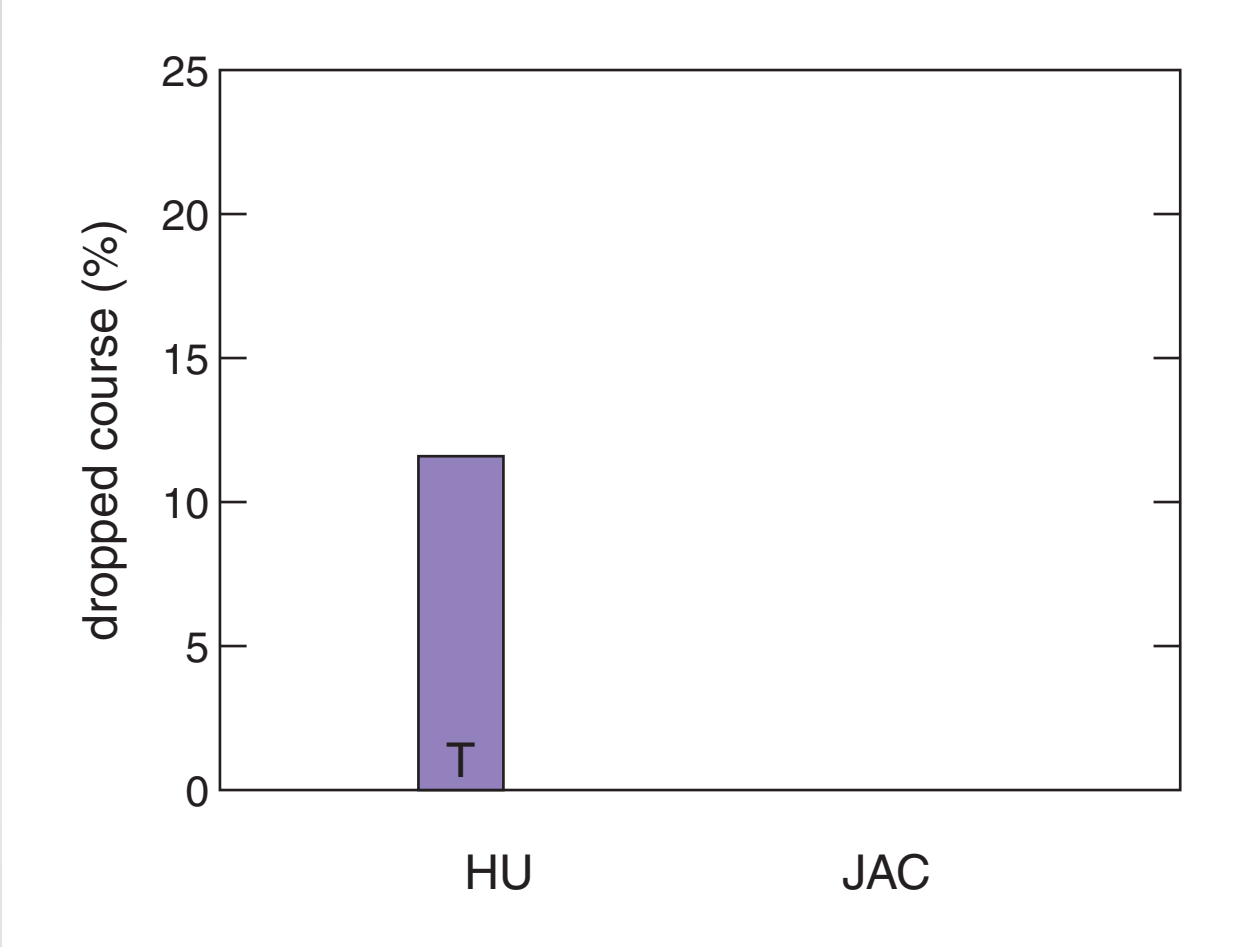
Implementing PI & JiTT

exam performance



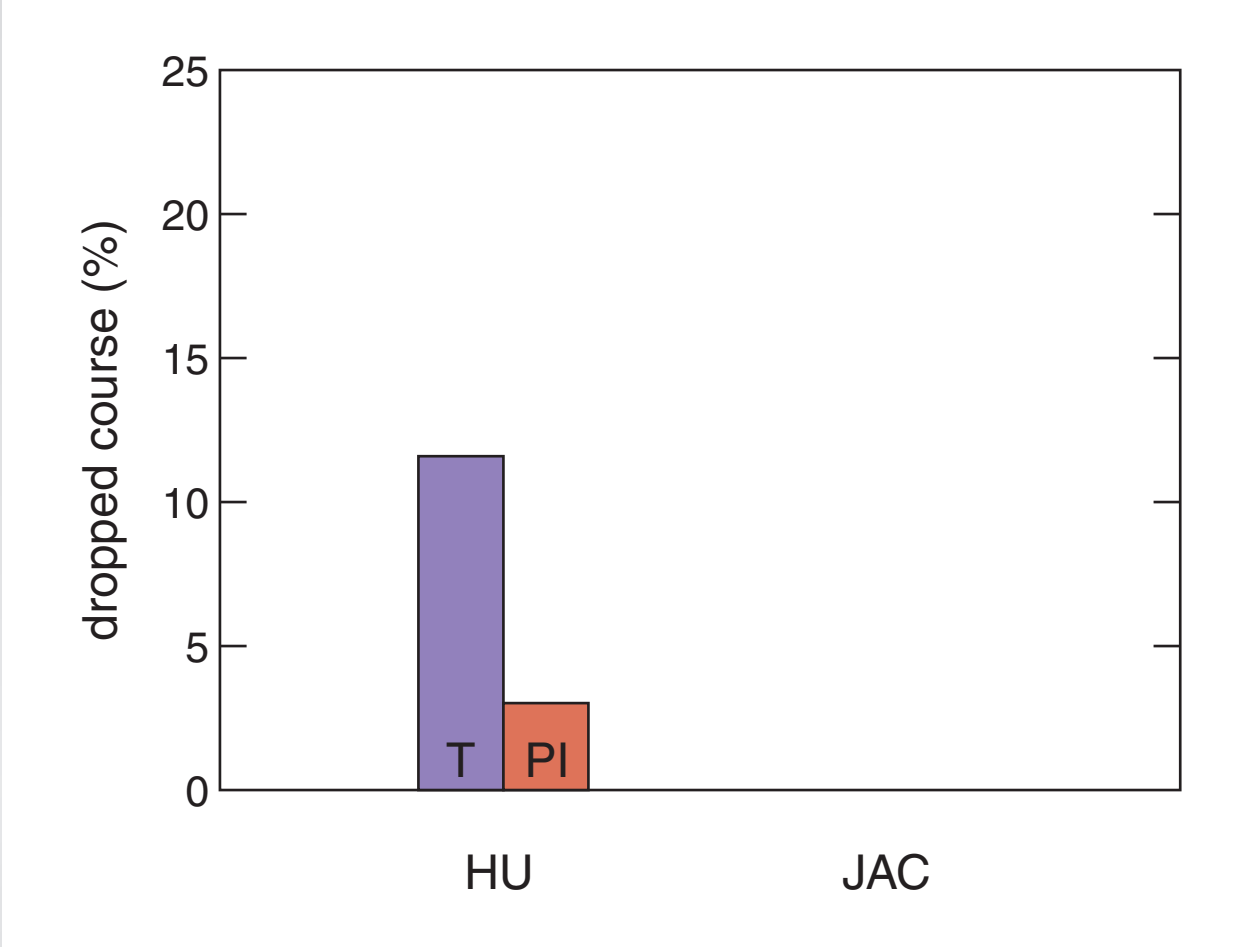
Implementing PI & JiTT

student retention



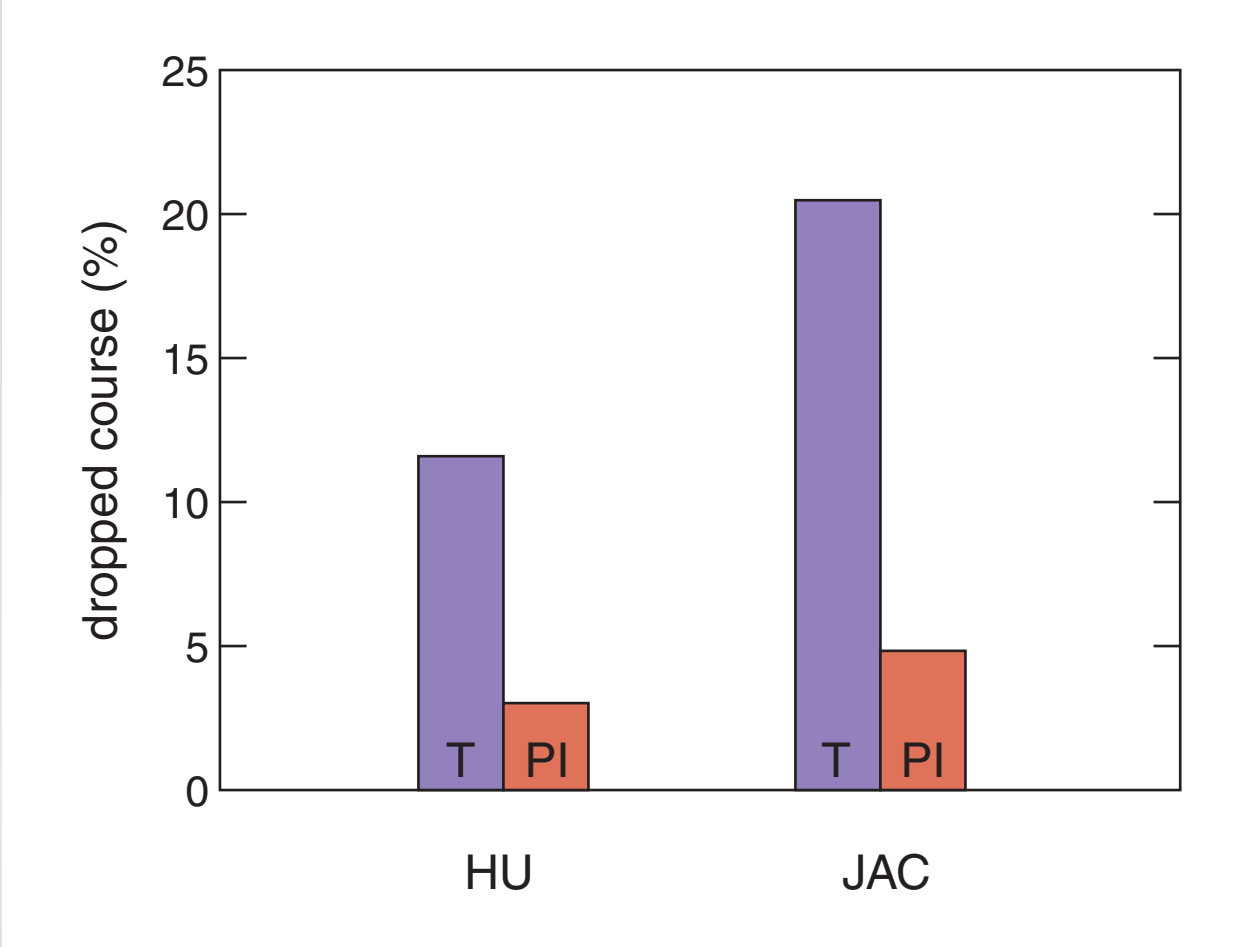
Implementing PI & JiTT

student retention



Implementing PI & JiTT

student retention



Implementing PI & JiTT

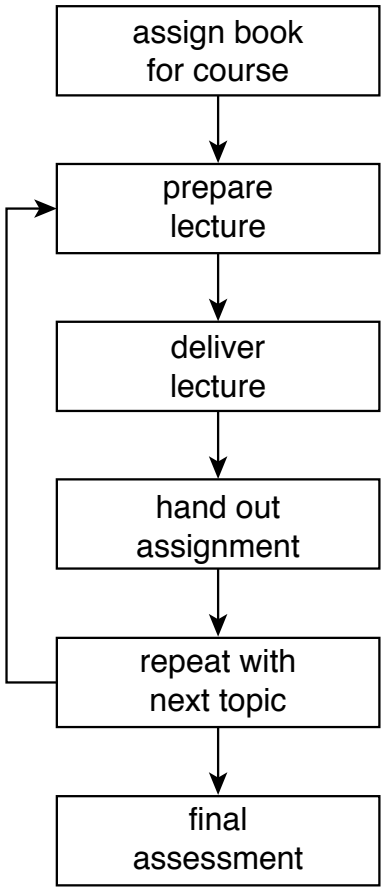
similar learning gains in different environments

Implementing PI & JiTT

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

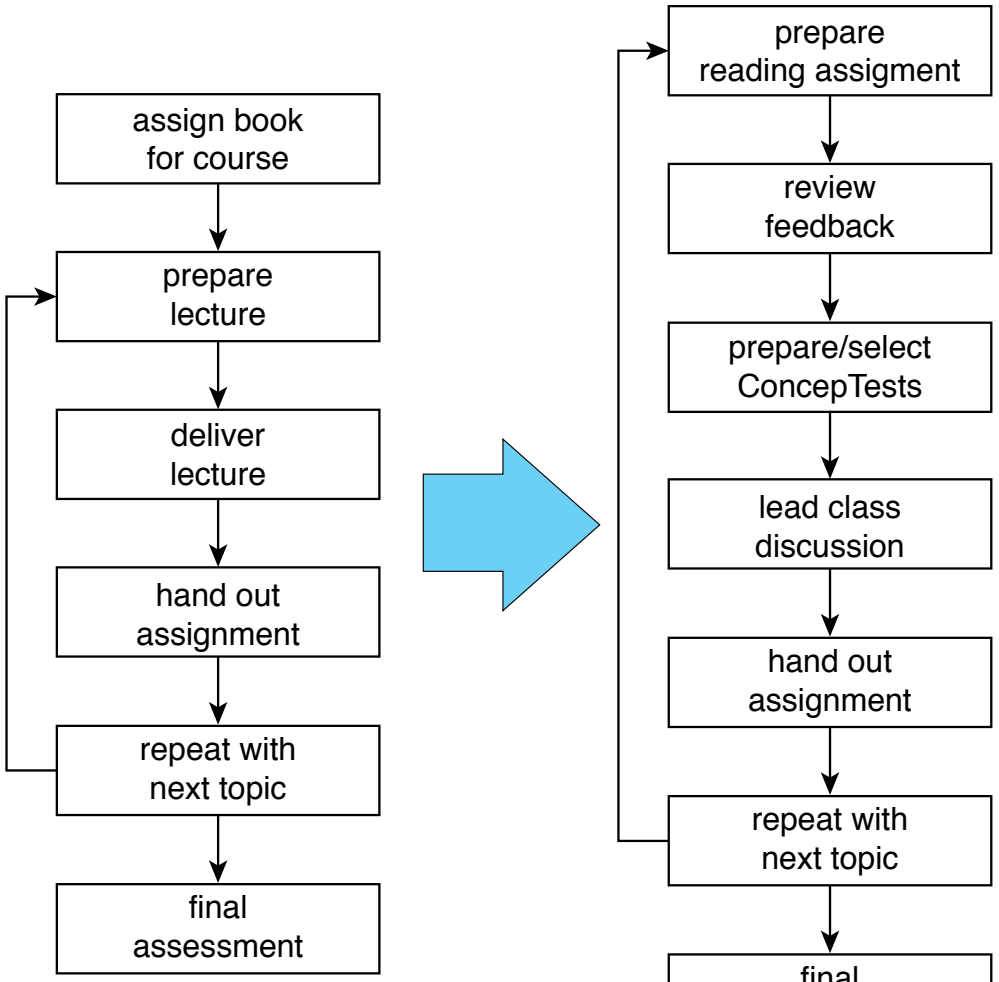
Implementing PI & JiTT

preparing for a lecture-based class



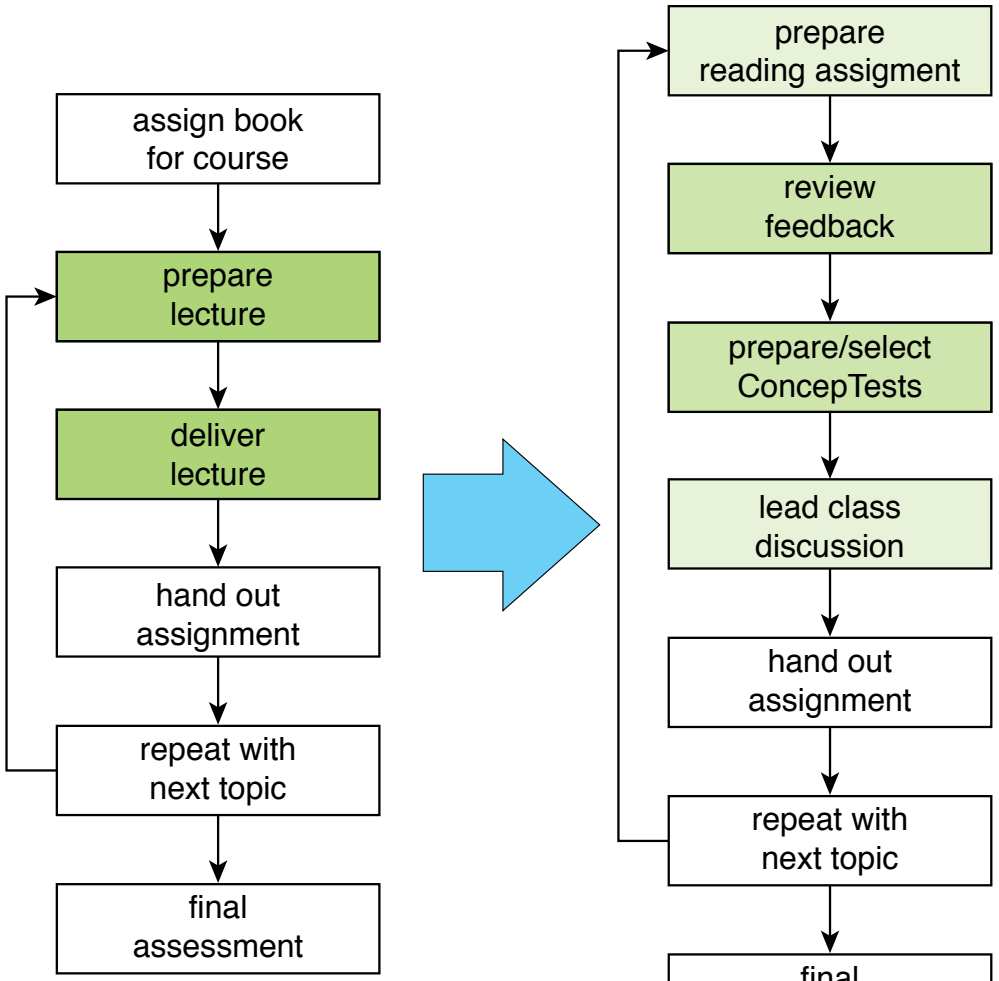
Implementing PI & JiTT

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

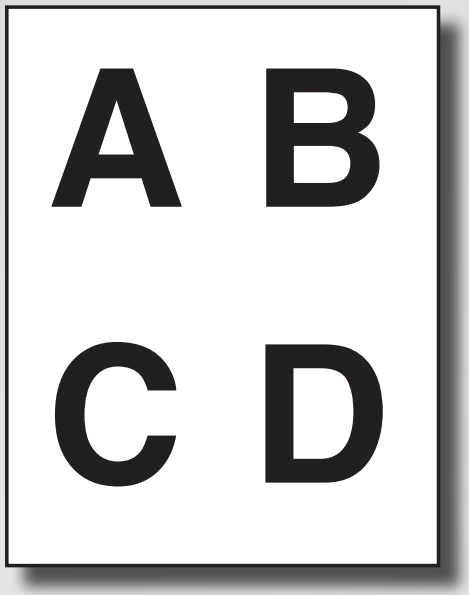
what good is coverage if little is retained?

Implementing PI & JiTT

“Do I need clickers?”

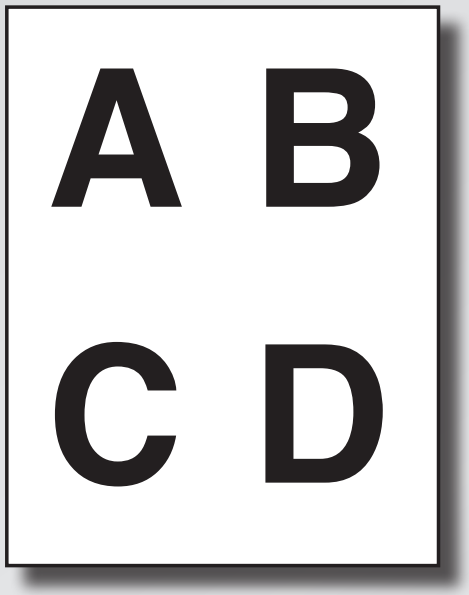
Implementing PI & JiTT

Flashcards: simple and effective



Implementing PI & JiTT

Flashcards: simple and effective



Meltzer and Mannivanan, South Eastern Louisiana University

Outline

- PI & JiTT Overview
- Implementing PI & JiTT
- ConcepTests

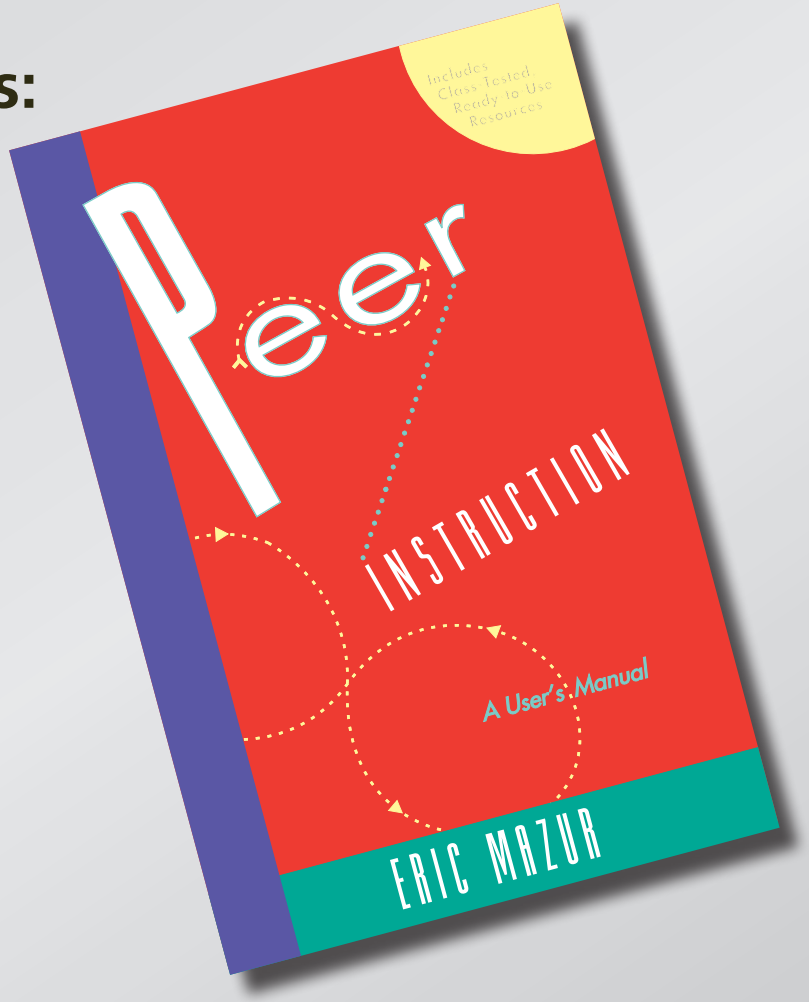
ConcepTests

“Where can I get examples of good questions?”

ConcepTests

Books with ConcepTests:

- **Physics (Prentice Hall)**



ConcepTests

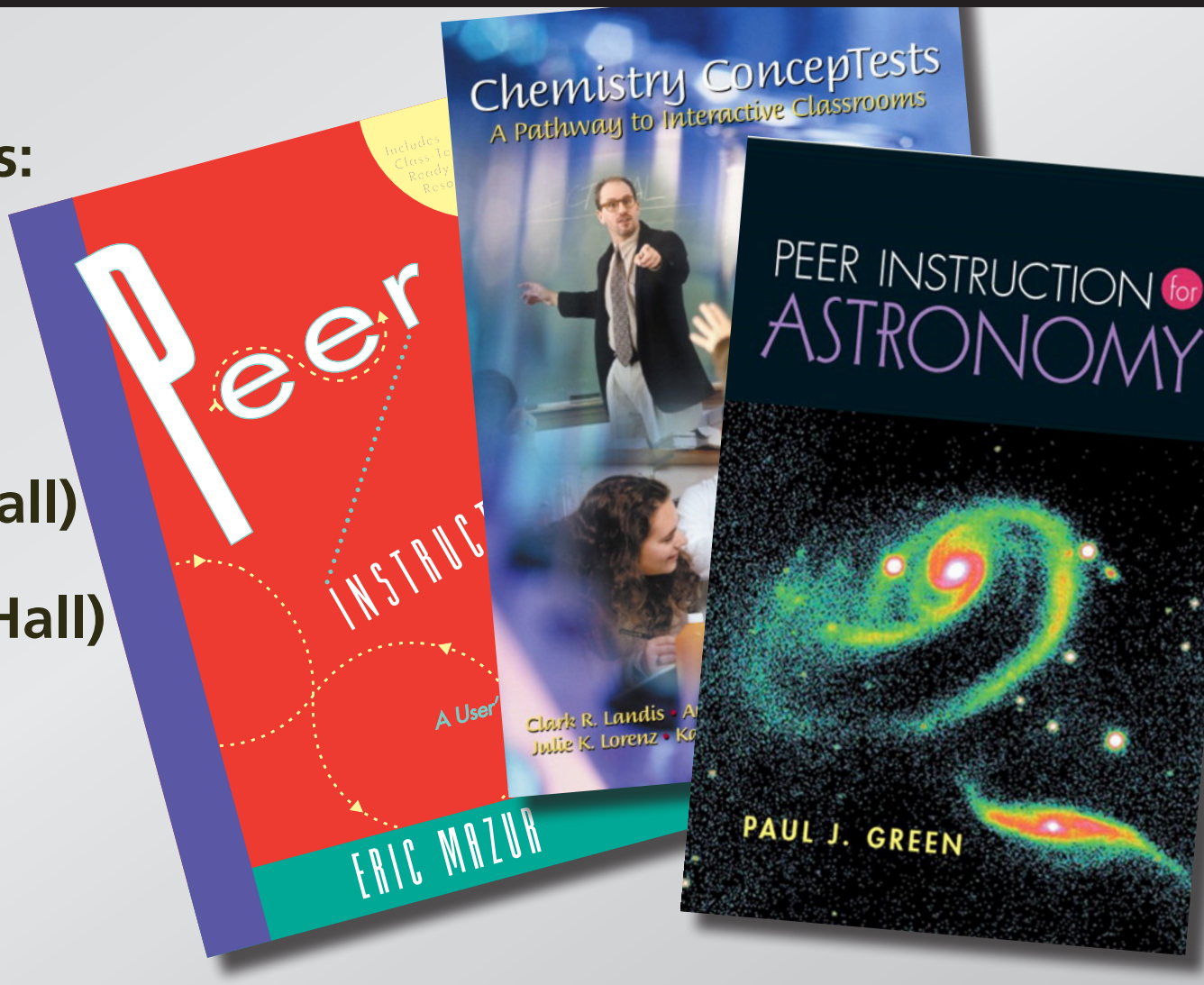
Books with ConcepTests:

- Physics (Prentice Hall)
- Chemistry (Prentice Hall)

ConcepTests

Books with ConcepTests:

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



ConcepTests

Books with ConcepTests:

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

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?

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ConcepTests

hole in plate/circumference	model
microscopy image	discussion
airline	fact

ConcepTests

hole in plate/circumference

model

microscopy image

discussion

airline

fact

fact-recall not engaging

ConcepTests

Good conceptual questions (ConcepTests):

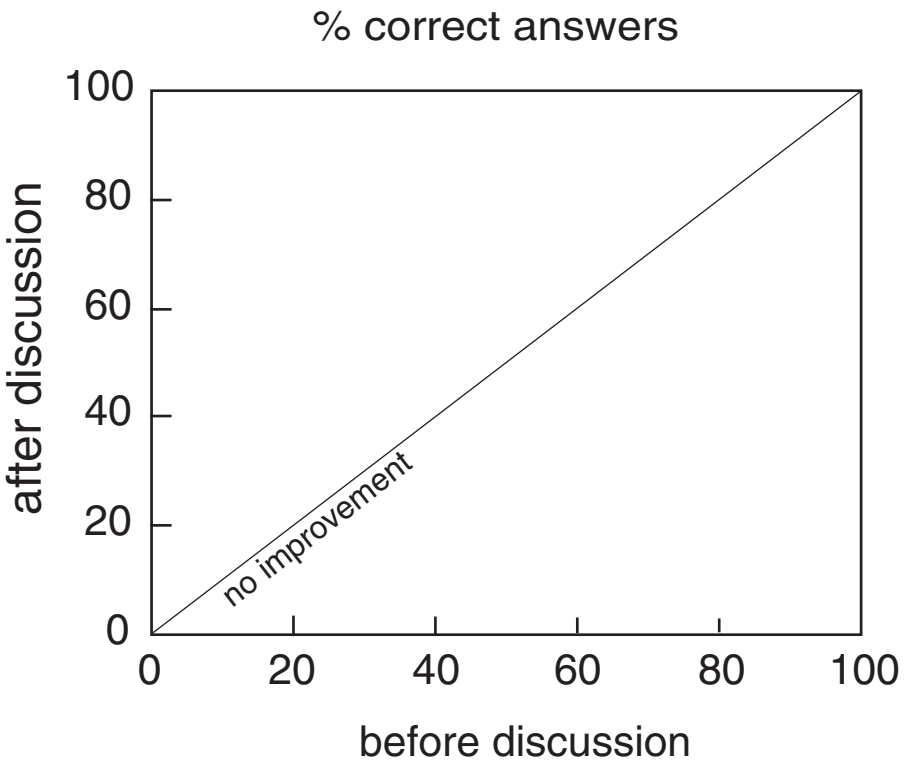
- are based on common student difficulties
- focus on single concept
- require more than “plug and chug” or recall
- are clear and concise
- are of manageable difficulty

ConcepTests

“How can I promote active/fruitful discussions?”

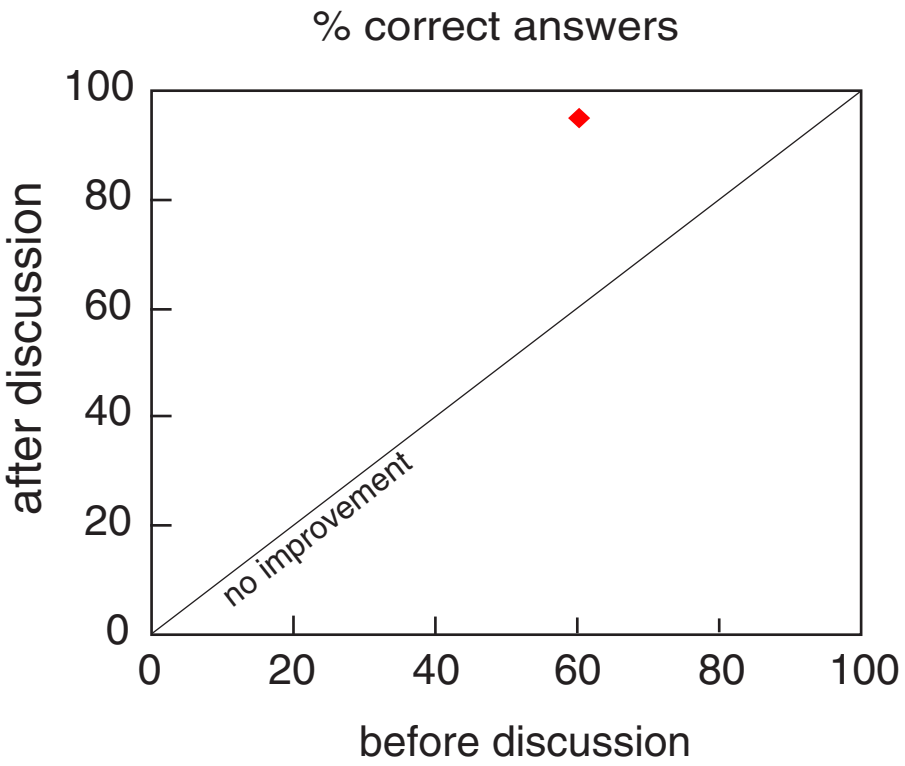
ConcepTests

ConcepTest data



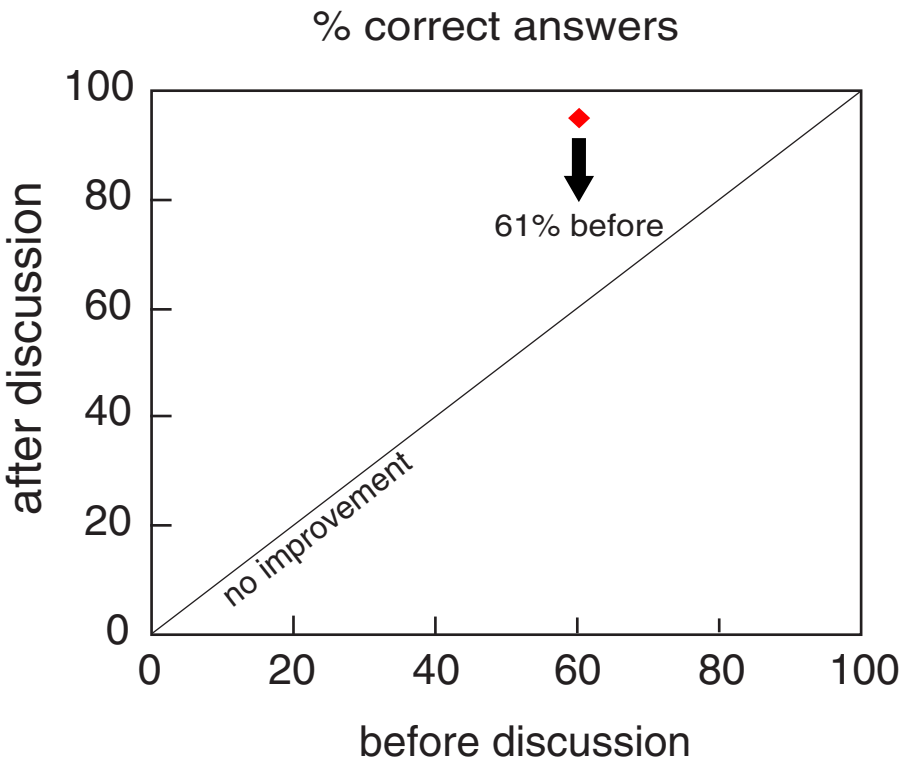
ConcepTests

ConcepTest data



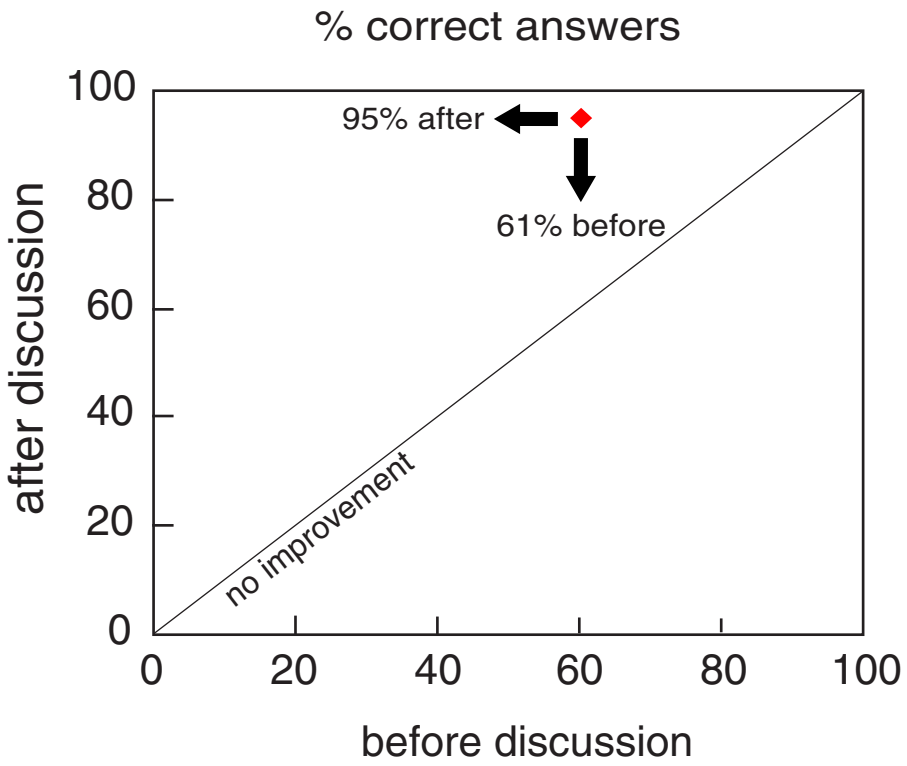
ConcepTests

ConcepTest data



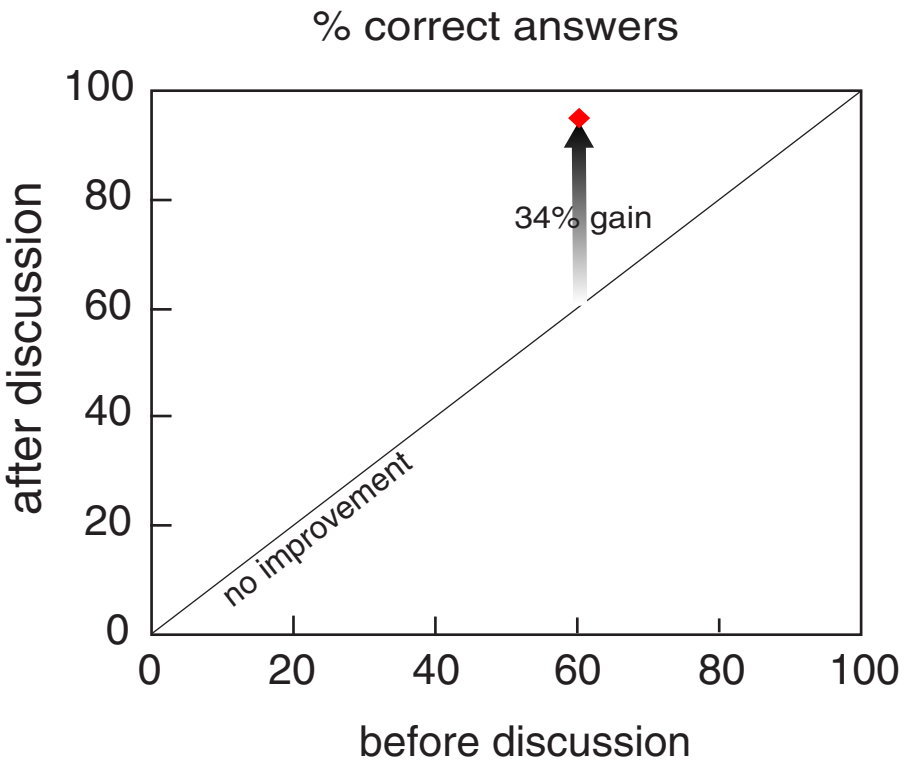
ConcepTests

ConcepTest data



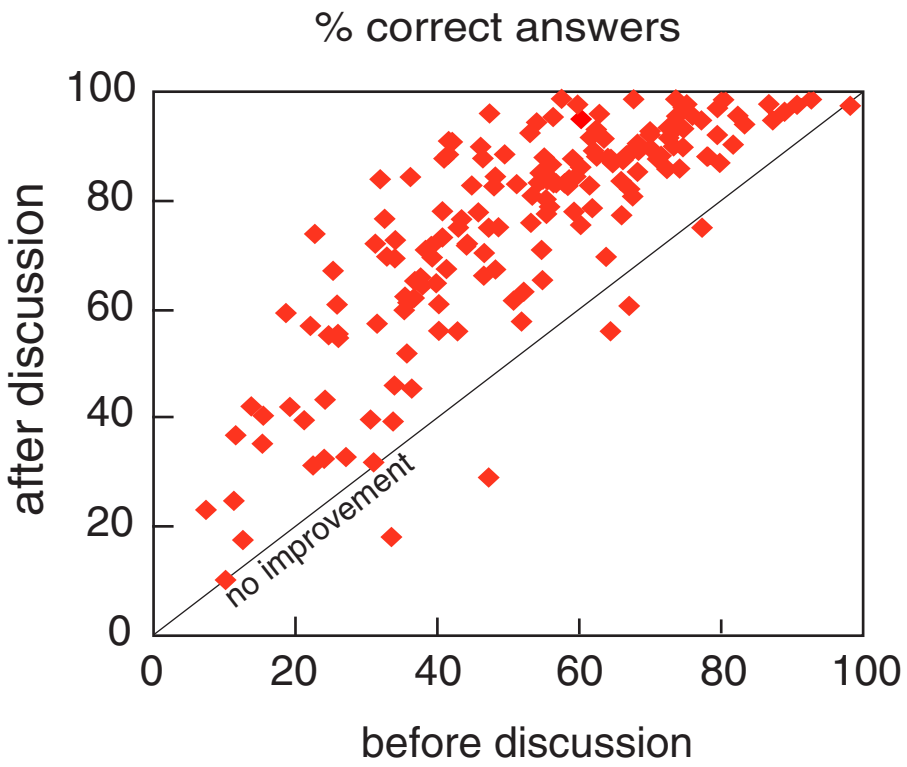
ConcepTests

ConcepTest data



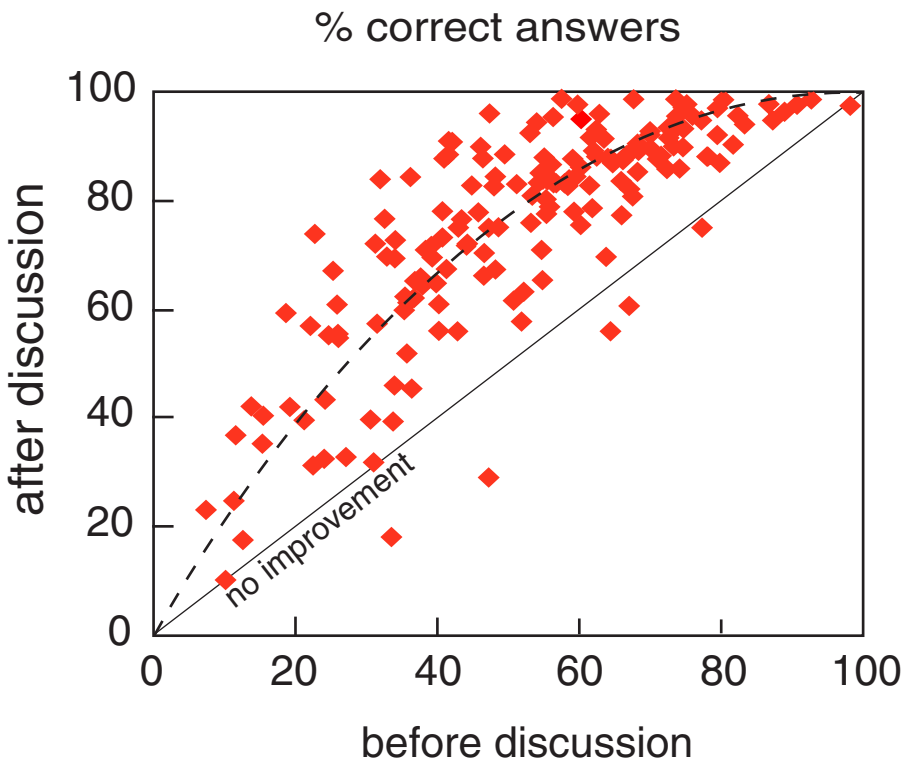
ConcepTests

ConcepTest data



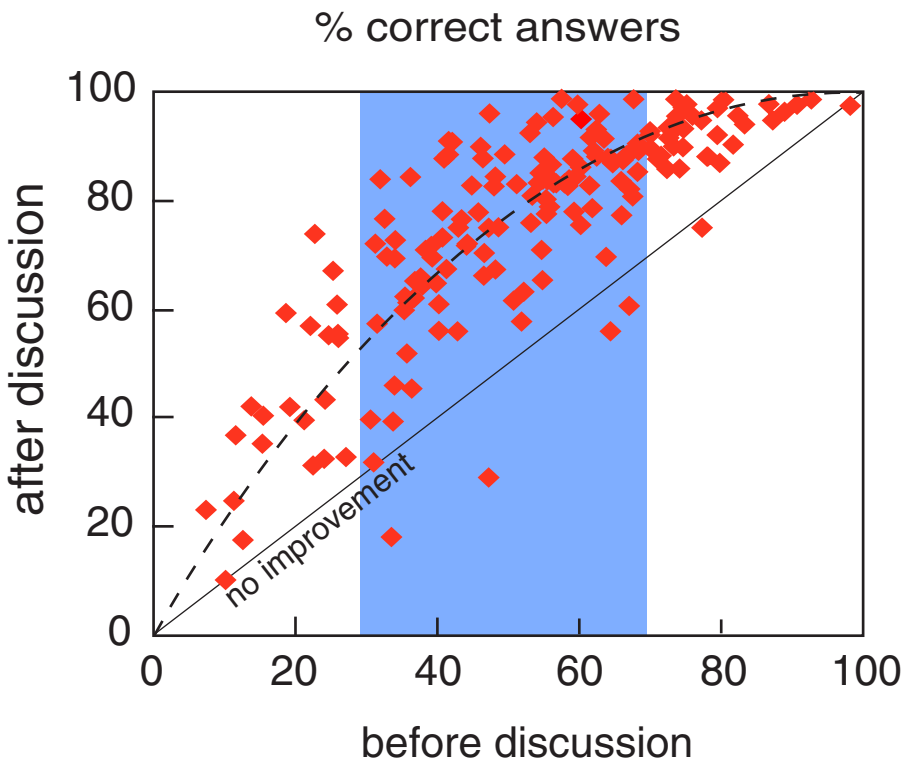
ConcepTests

ConcepTest data

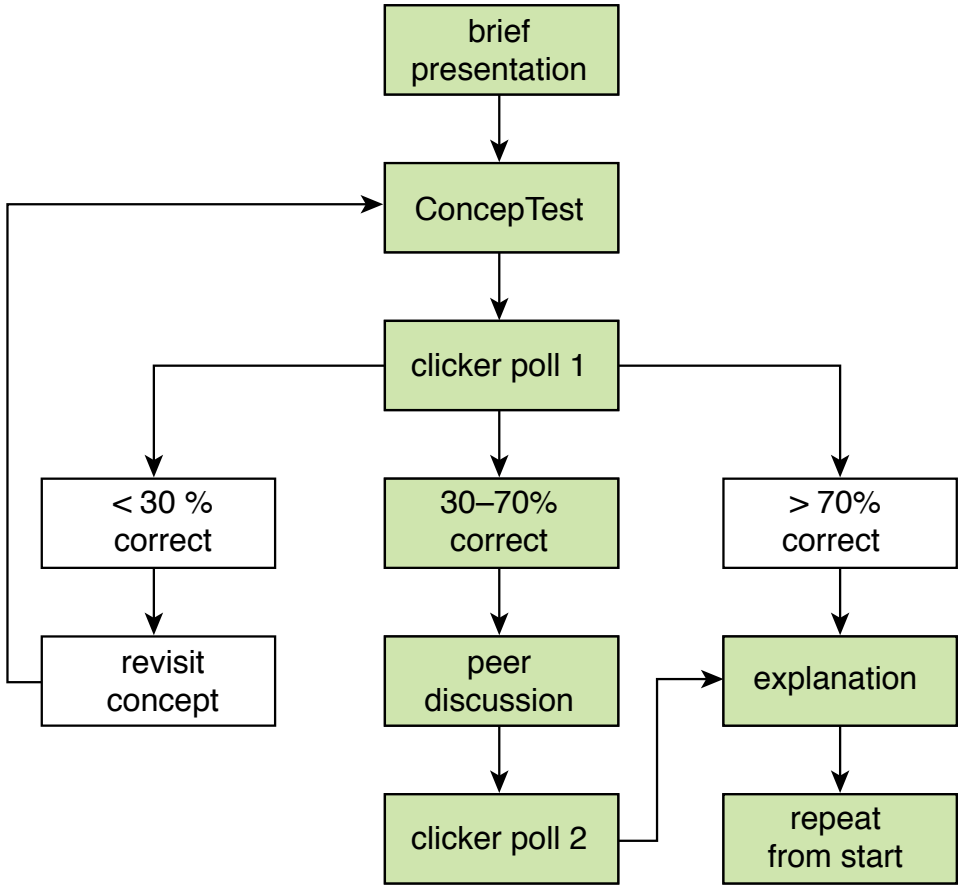


ConcepTests

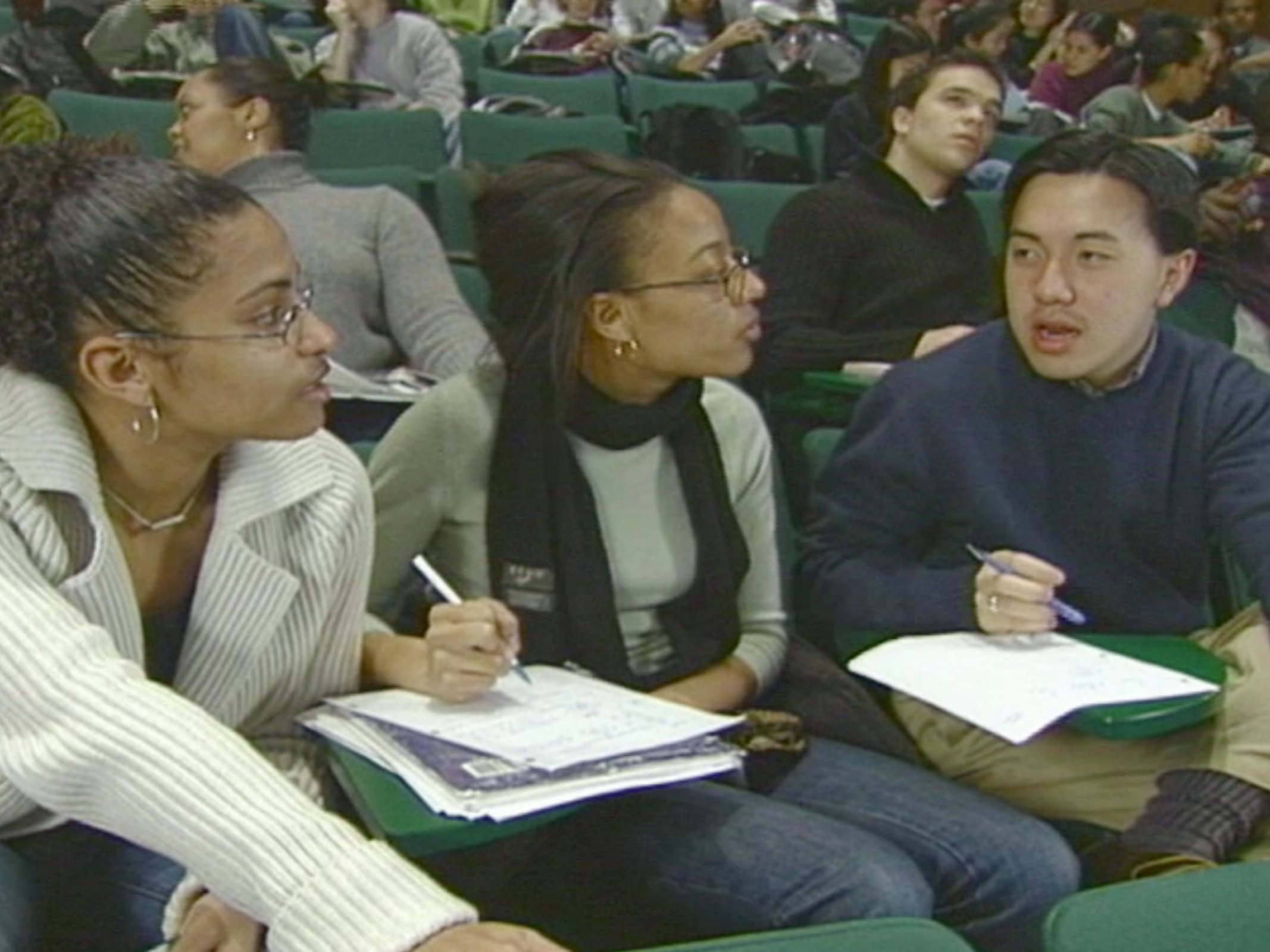
ConcepTest data

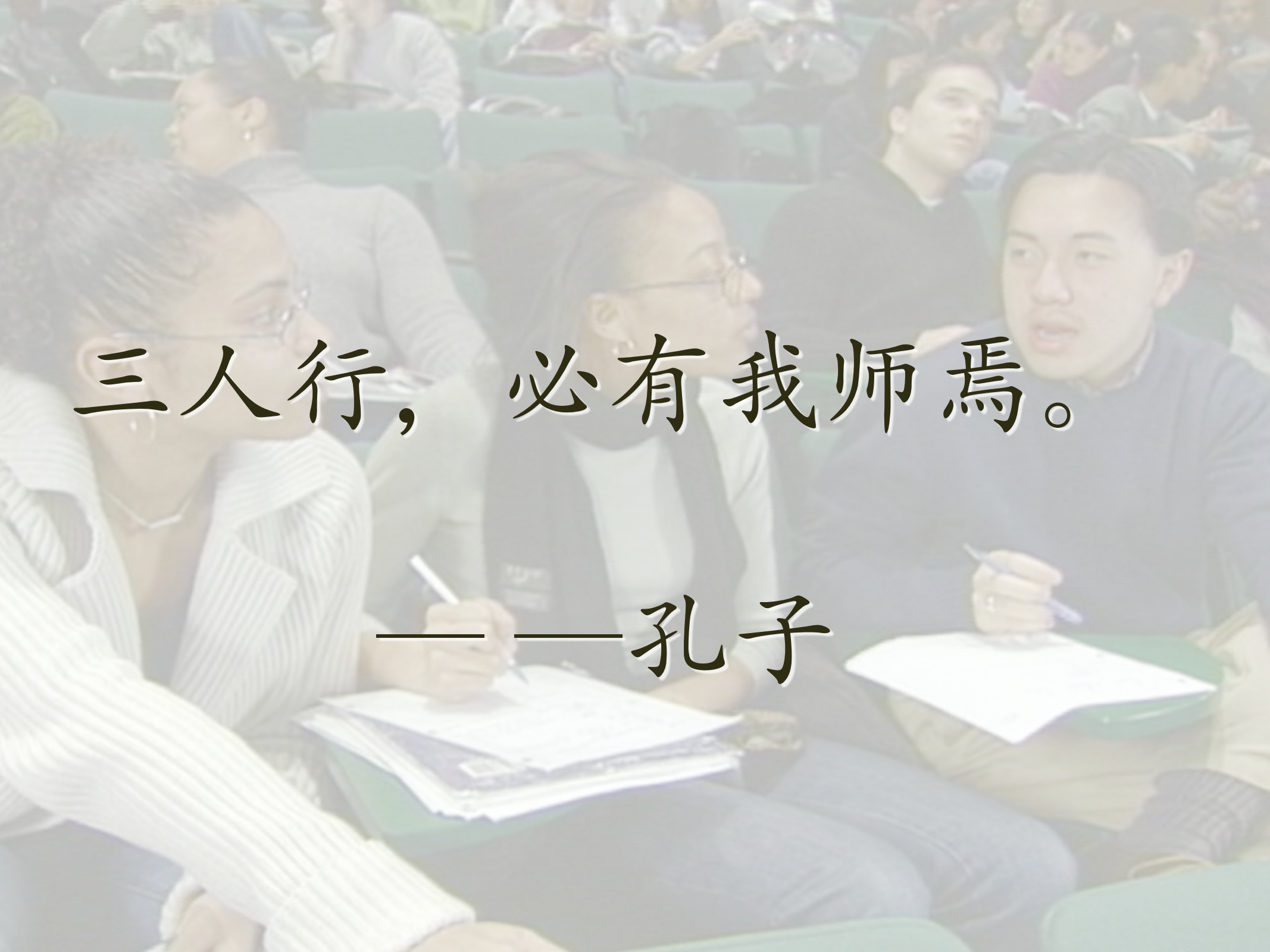


ConcepTests



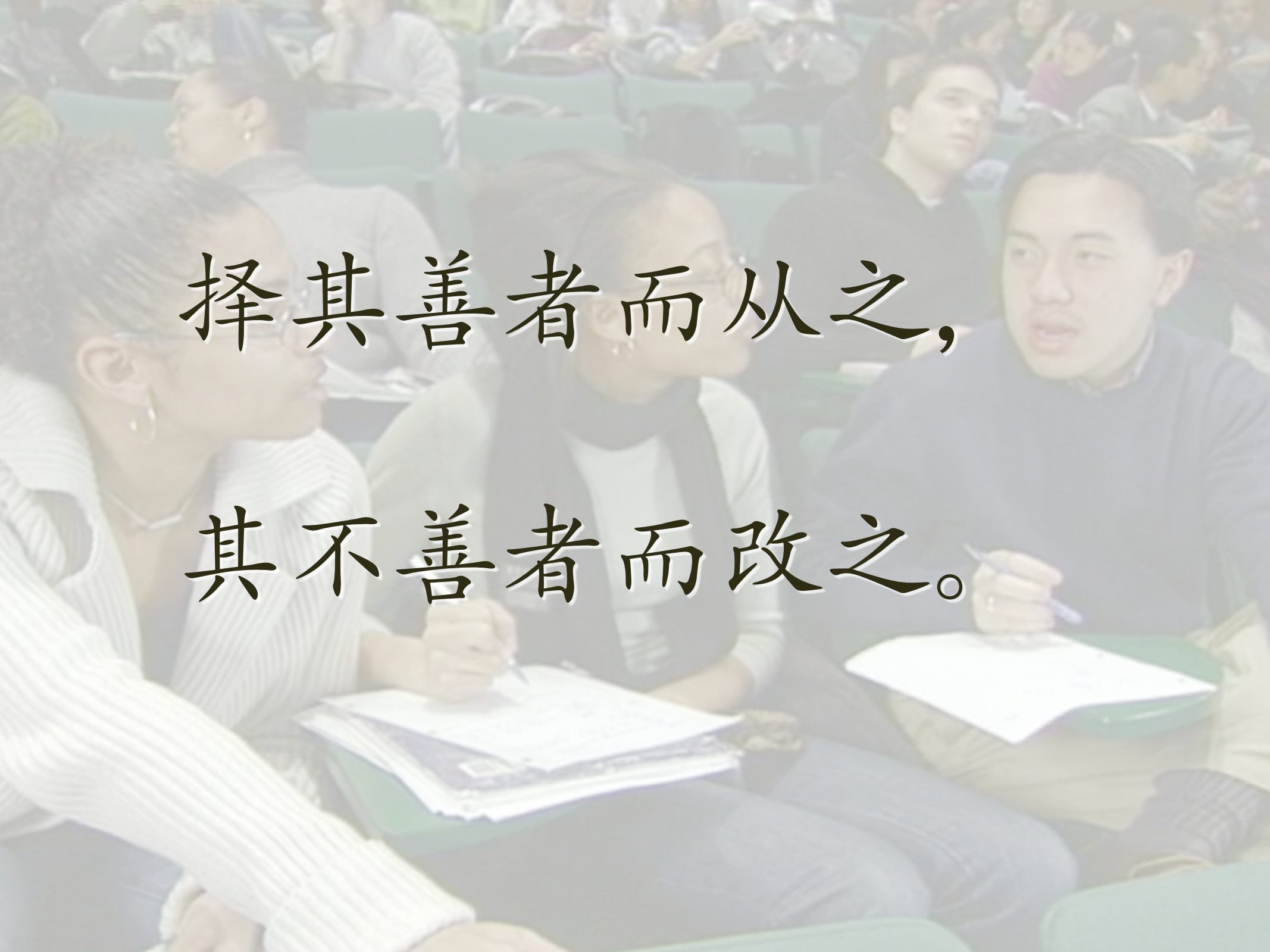
Join now!
PeerInstruction.net





三人行，必有我师焉。

——孔子



择其善者而从之，

其不善者而改之。

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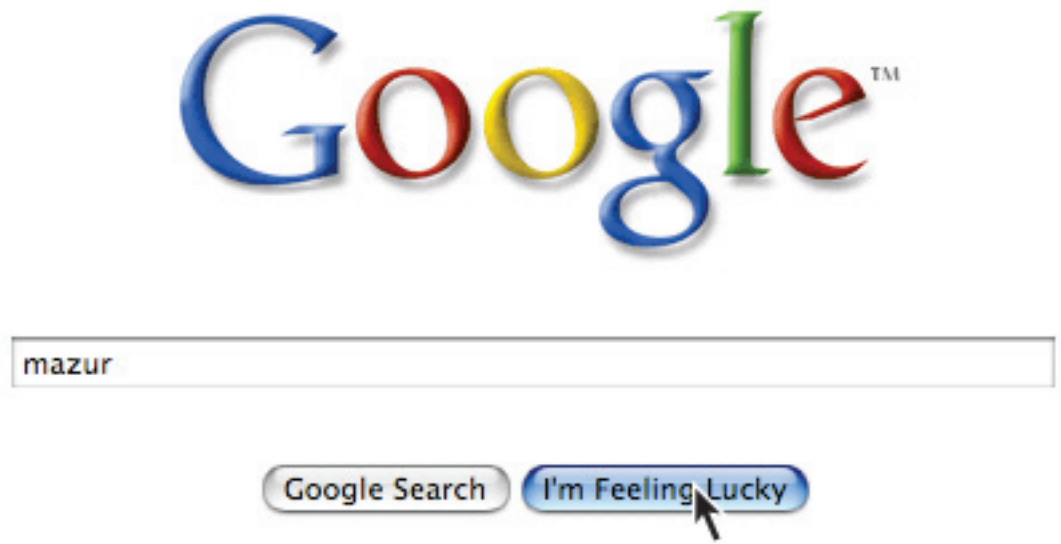
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