Peer Instruction: Why?

16th Annual Health Occupations Educator Institute
Ontario, CA, 3 April 2012

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Program

9:00 Peer Instruction: Why?

10:30 Short assignment/break

11:00 Peer Instruction: How?

12:30 Lunch

1:30 Peer Instruction: ConcepTest Design

2:00 Group work

3:00 Tryout

3:30 Adjourn

Get your clickers ready!

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- only last “click” counts
- display shows recorded answer

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- go to http://rwpoll.com
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rwpoll.com

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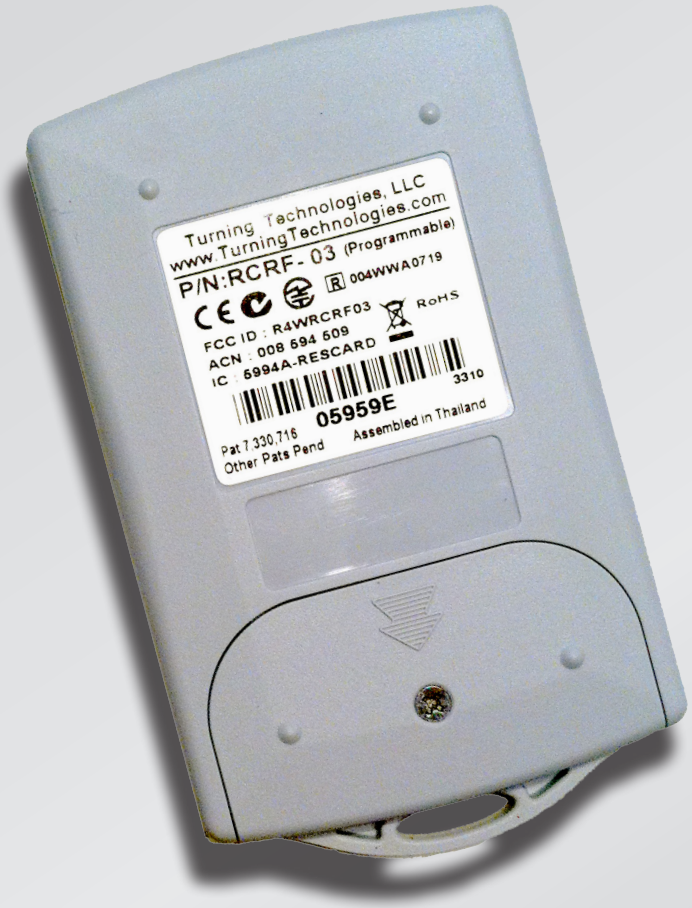

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unique ID on back of clicker

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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 in my classes a few times.
5. I use it regularly in my classes.

Teaching survey

For the next questions,

think of a course you taught recently

(write down the subject of this course)

after K. Trigwell *et al.*, *Higher Ed. Res. & Dev.* 24 (2005) 349

Teaching survey

It is important to present a lot of facts to students so that they know what they have to learn for this subject.

1. Strongly Agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly Disagree

Teaching survey

I set aside some teaching time so that the students can discuss, among themselves, key concepts and ideas in this subject.

1. Strongly Agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly Disagree

Teaching survey

Lecturing is the best way for me cover the amount of material I need to cover in this subject.

1. Strongly Agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly Disagree

Teaching survey

In teaching sessions for this subject, I deliberately provoke debate and discussion.

1. Strongly Agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly Disagree

Teaching survey

I structure my teaching in this subject to help students to pass the formal assessment items.

1. Strongly Agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly Disagree

Teaching survey

A lot of teaching time in this subject should be used to question students' ideas.

1. Strongly Agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly Disagree

Teaching survey

In this subject my teaching focuses on the good presentation of information to students.

1. Strongly Agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly Disagree

Teaching survey

I see teaching as helping students develop new ways of thinking in this subject.

1. Strongly Agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly Disagree

Teaching survey

In this subject, I provide the students with the information they will need to pass the formal assessments.

1. Strongly Agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly Disagree

Teaching survey

Teaching in this subject should help students question their own understanding of the subject matter.

1. Strongly Agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly Disagree

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.

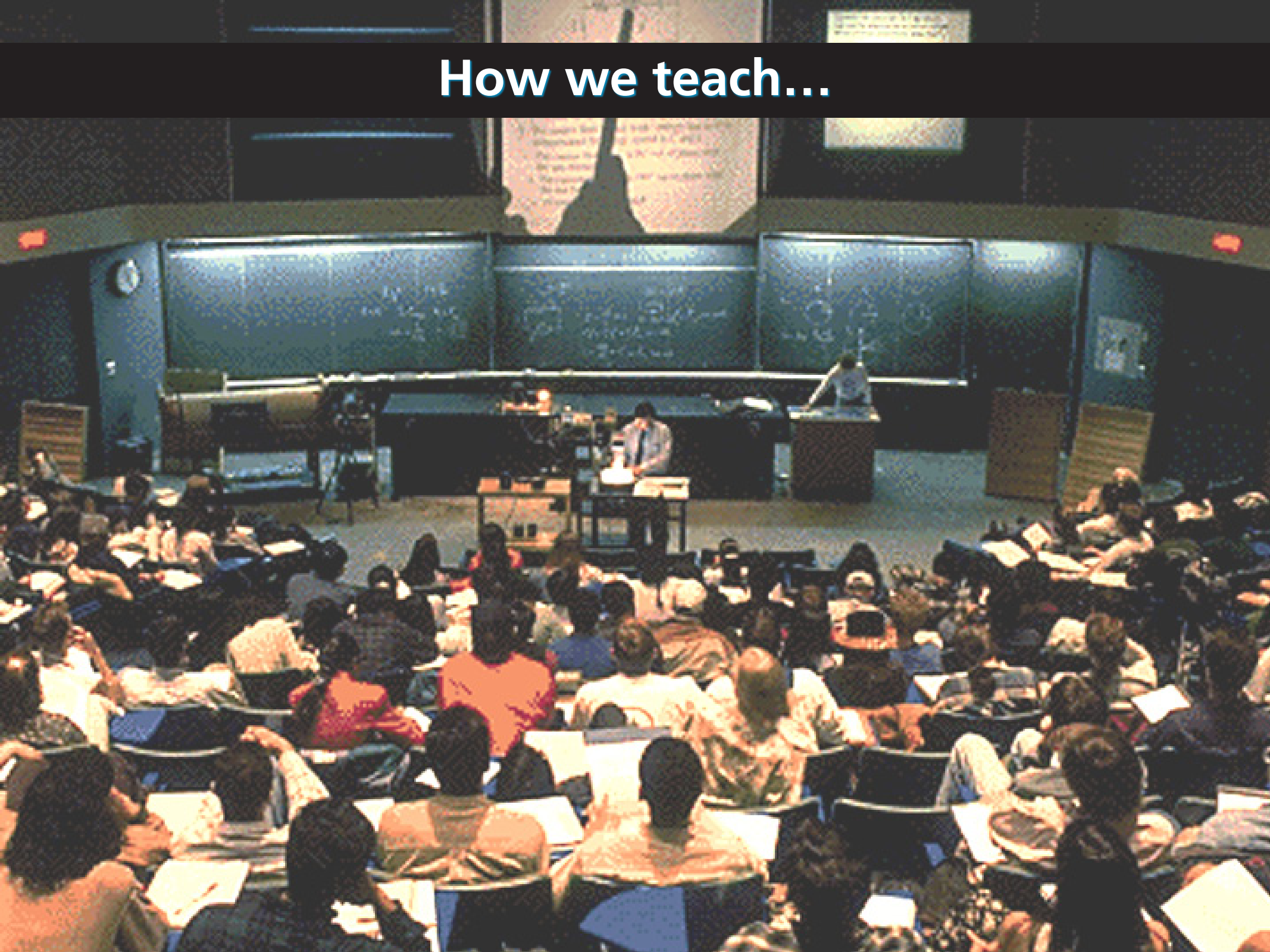
***How* did you become good at this?**

How do we learn?

Became good at it by:

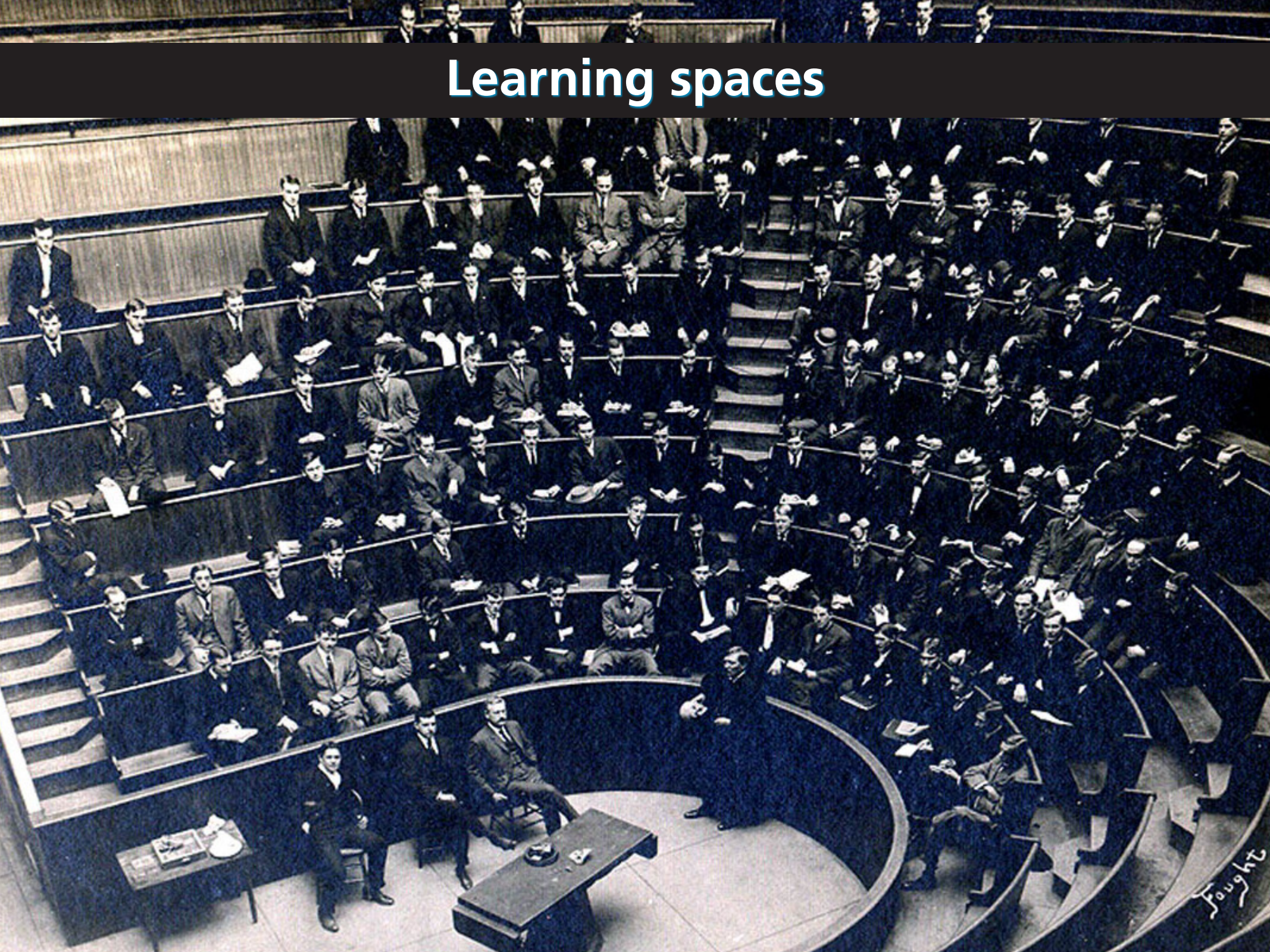
1. trial and error
2. lectures
3. practicing
4. apprenticeship
5. other

How we teach…

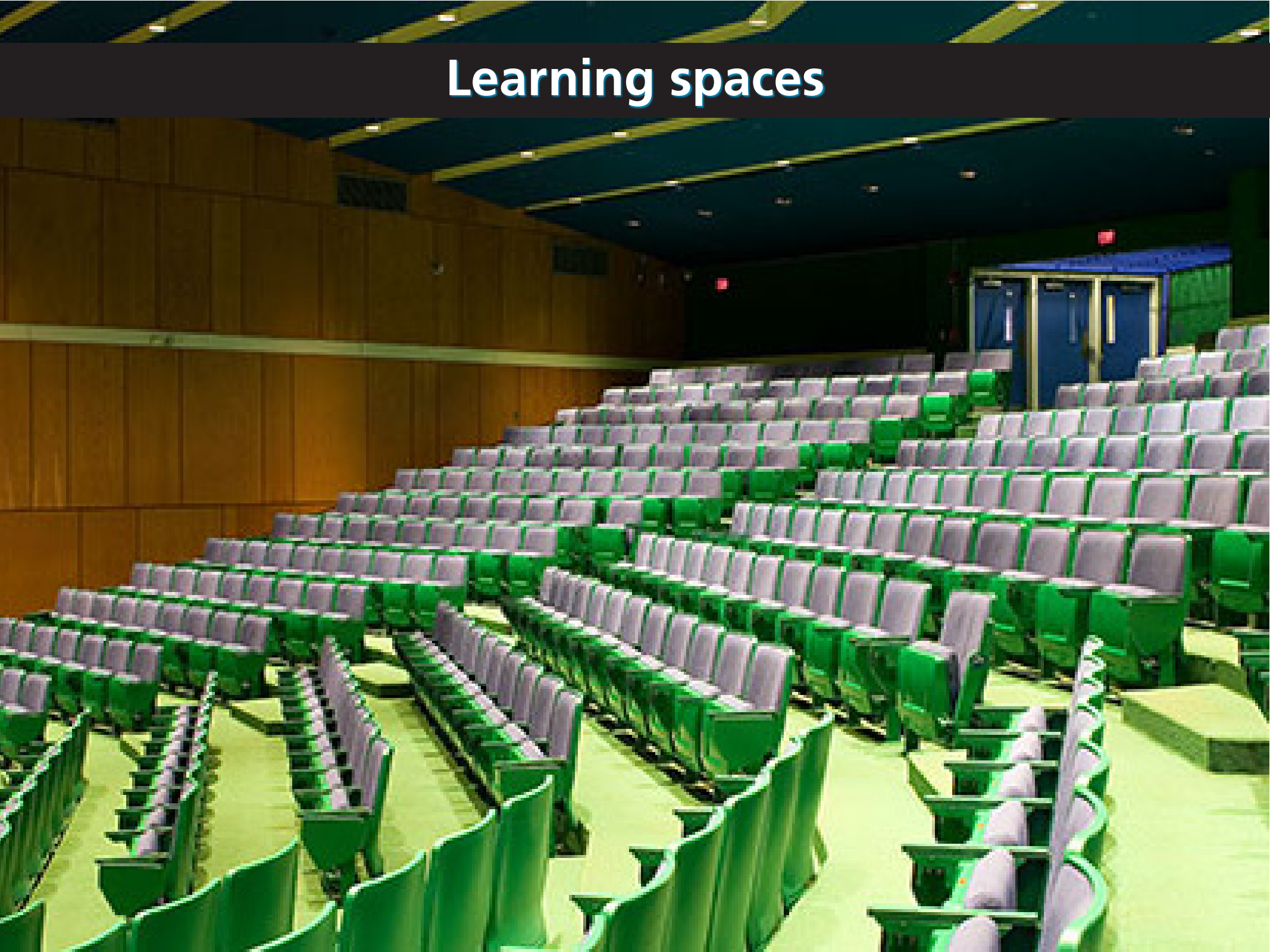


Learning spaces

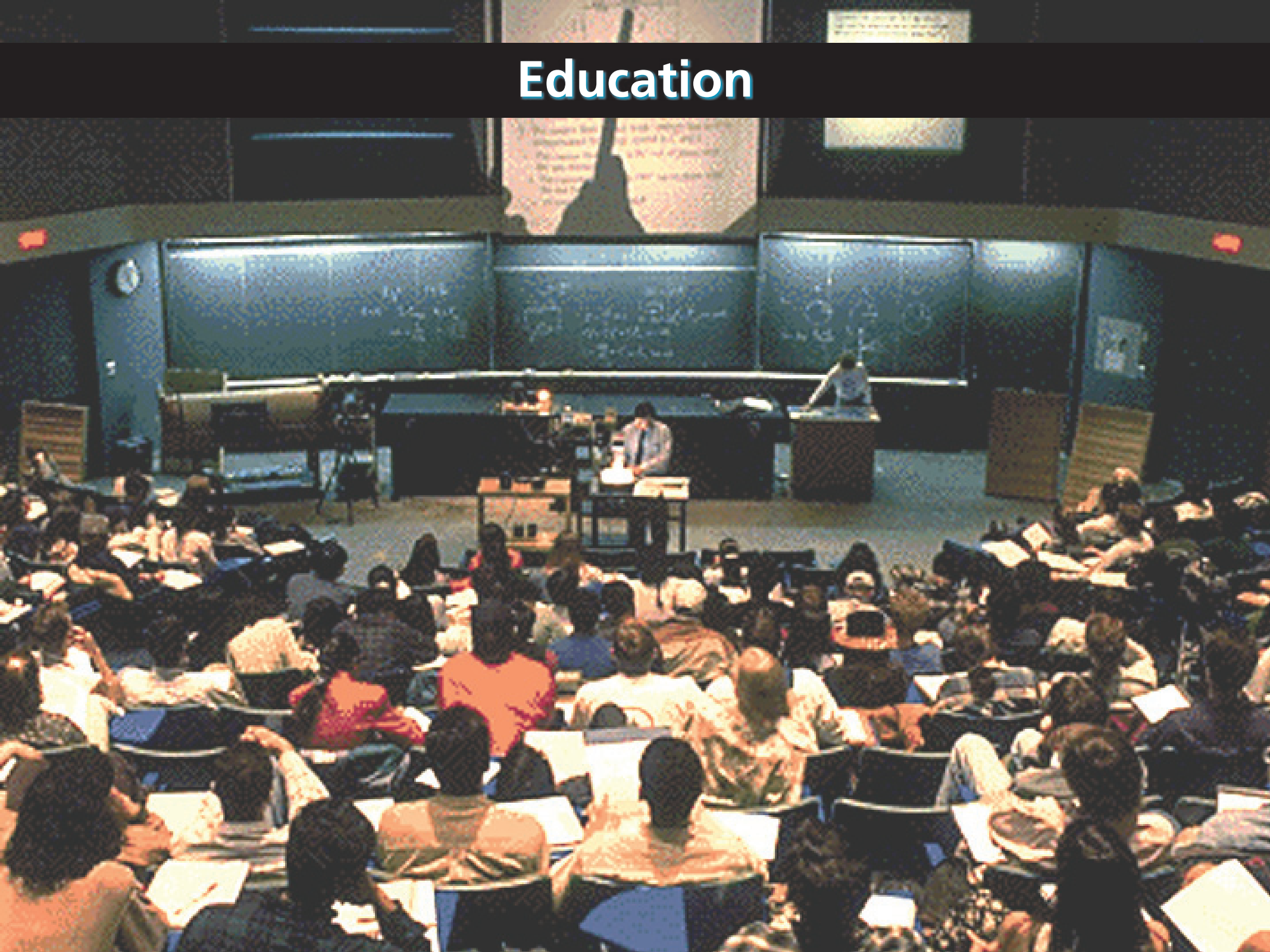
Learning spaces



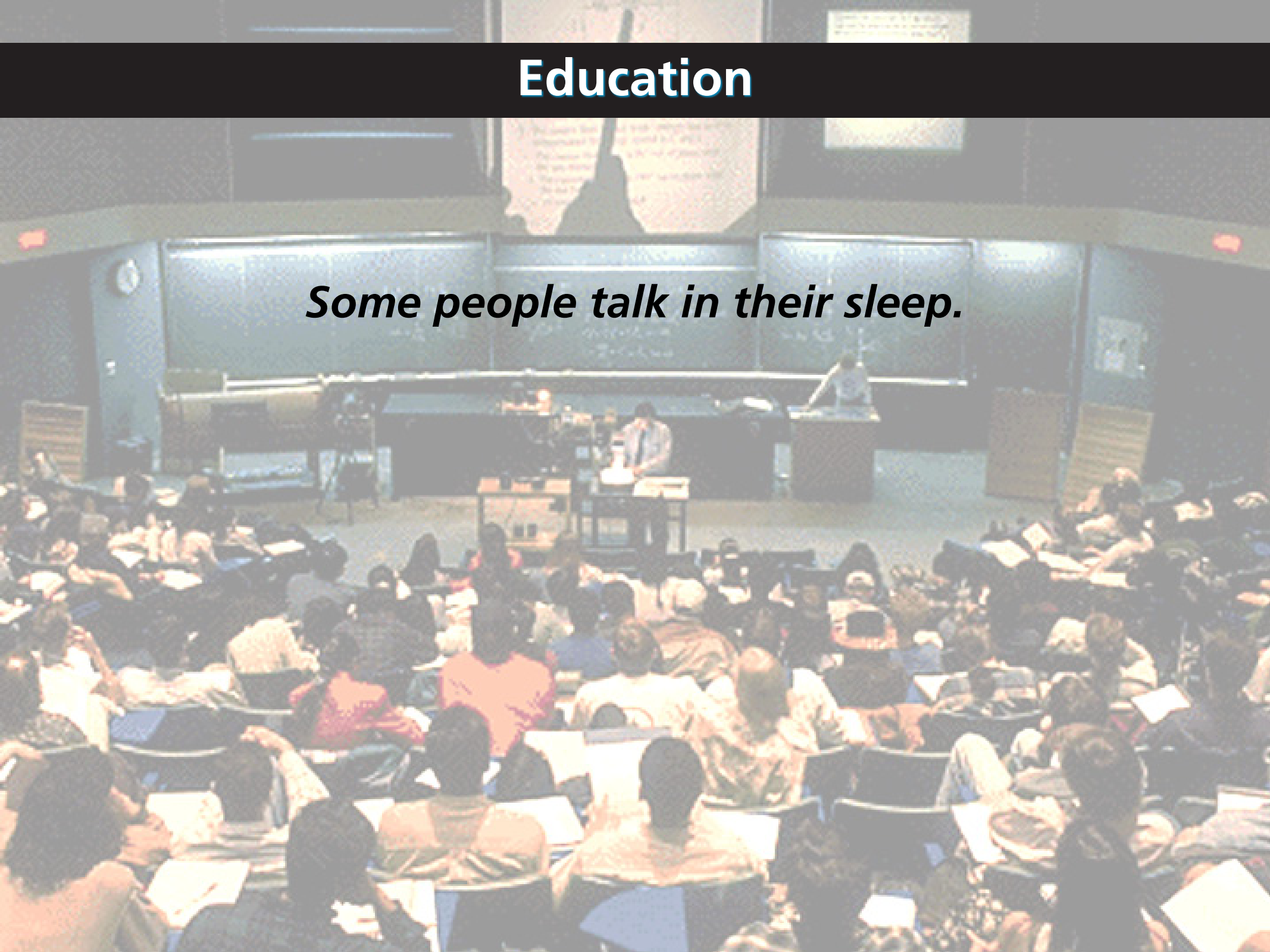
Learning spaces



Education



Education



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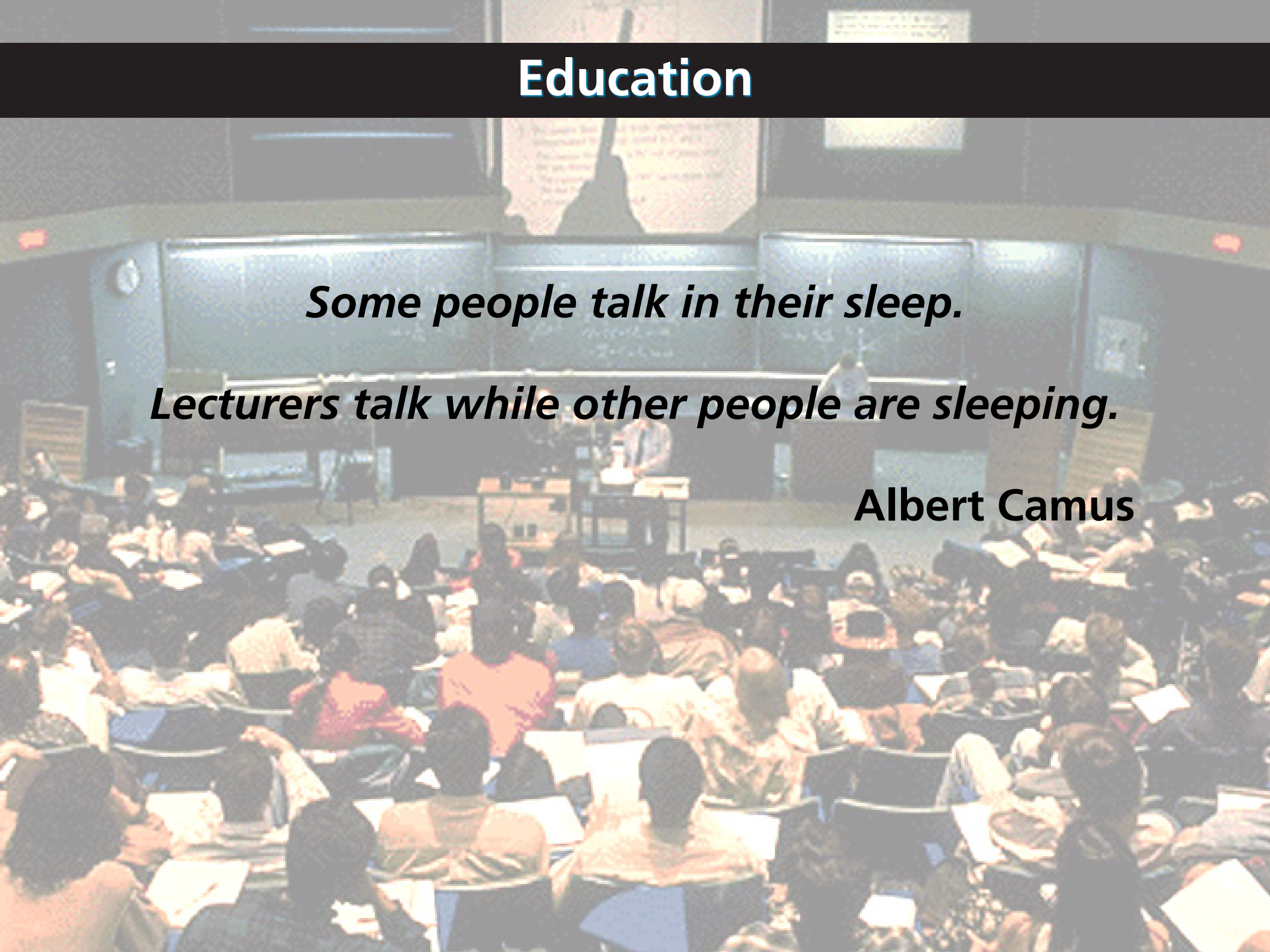
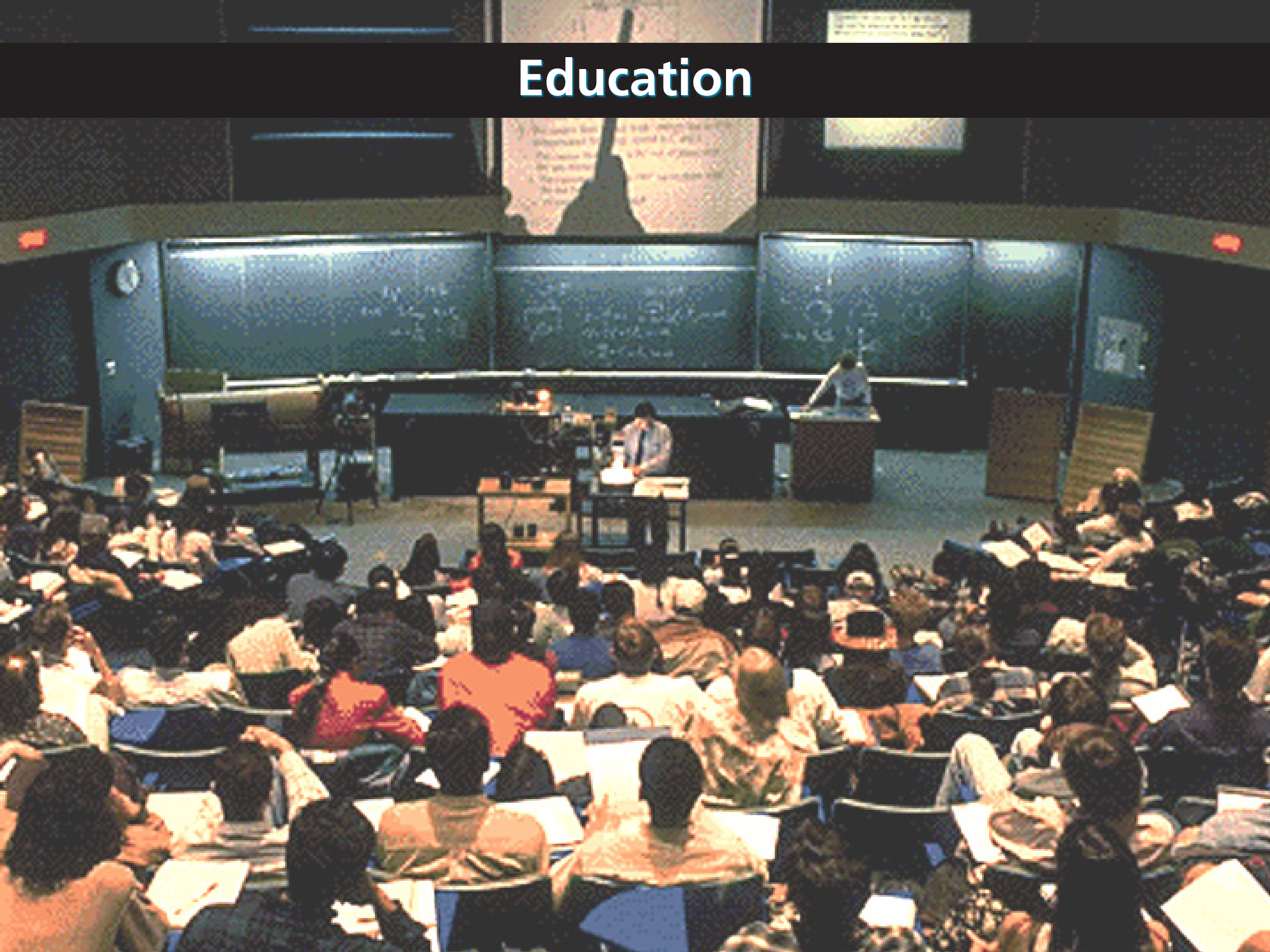


Some people talk in their sleep.

Lecturers talk while other people are sleeping.

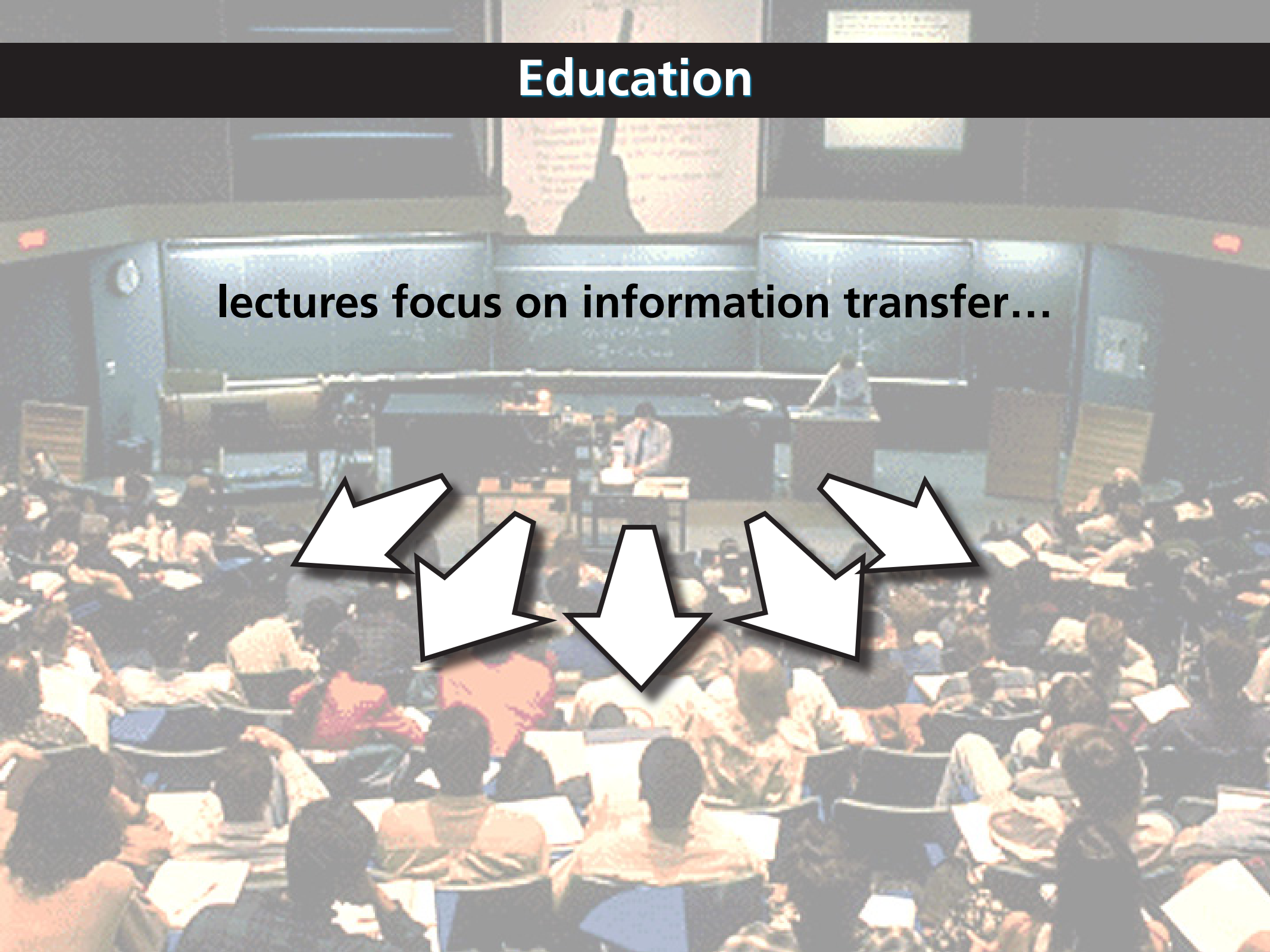
Albert Camus

Education



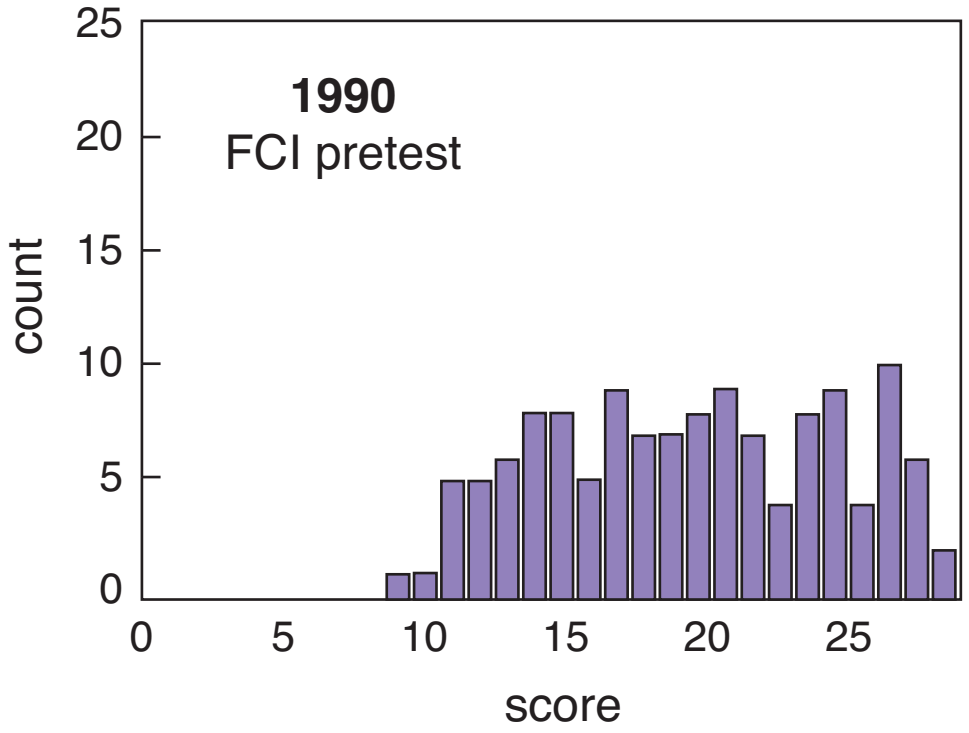
Education

lectures focus on information transfer…



Education

education is not just information transfer



Education

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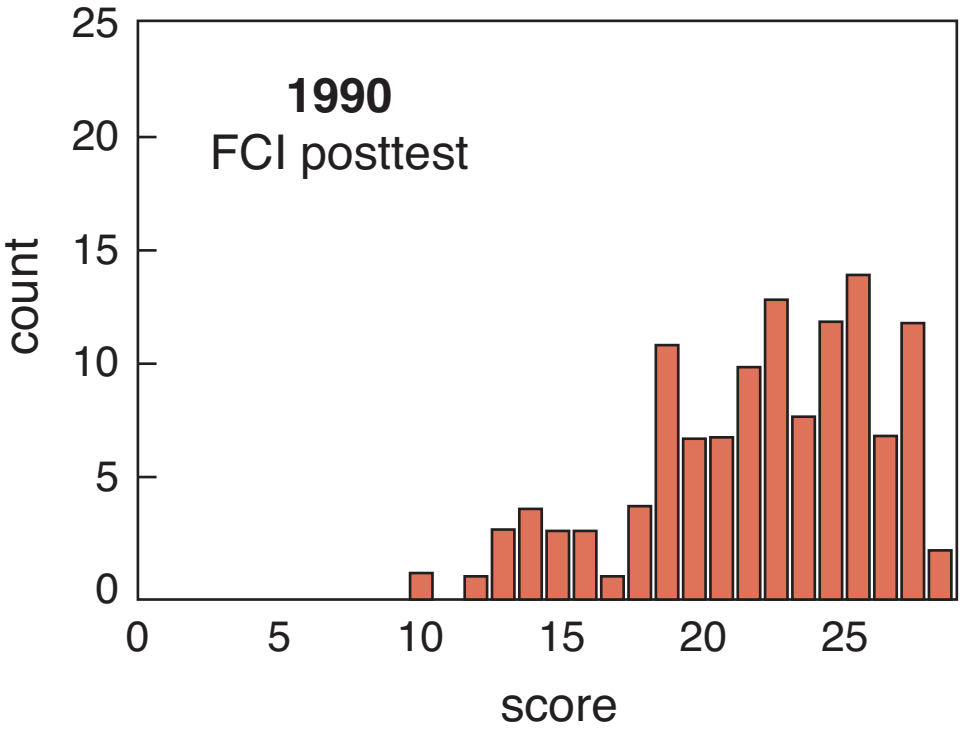
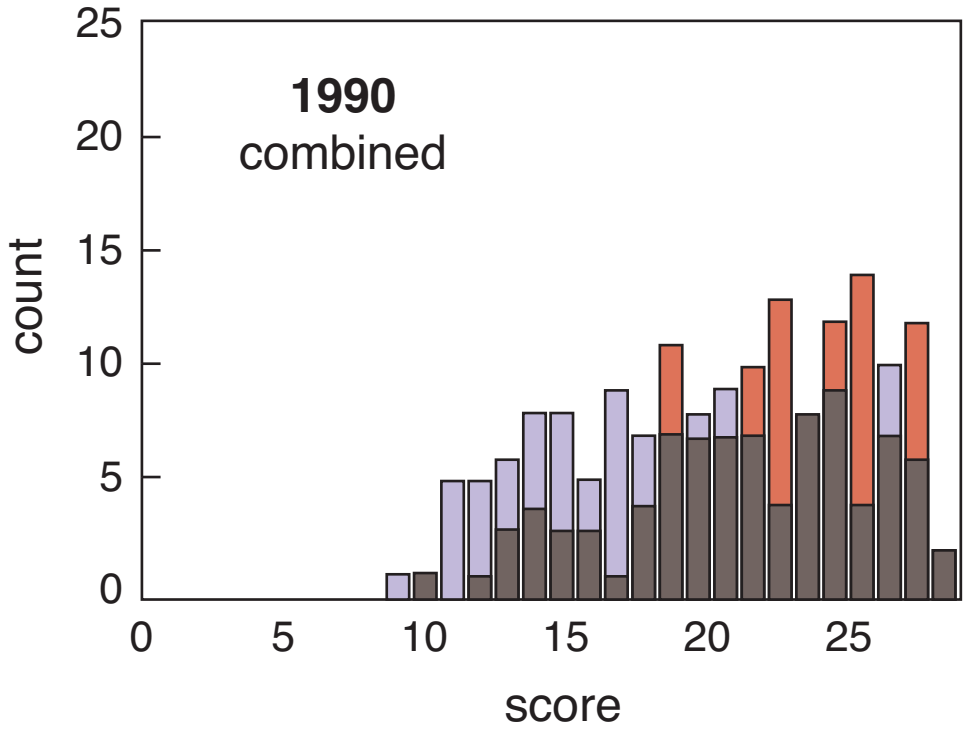
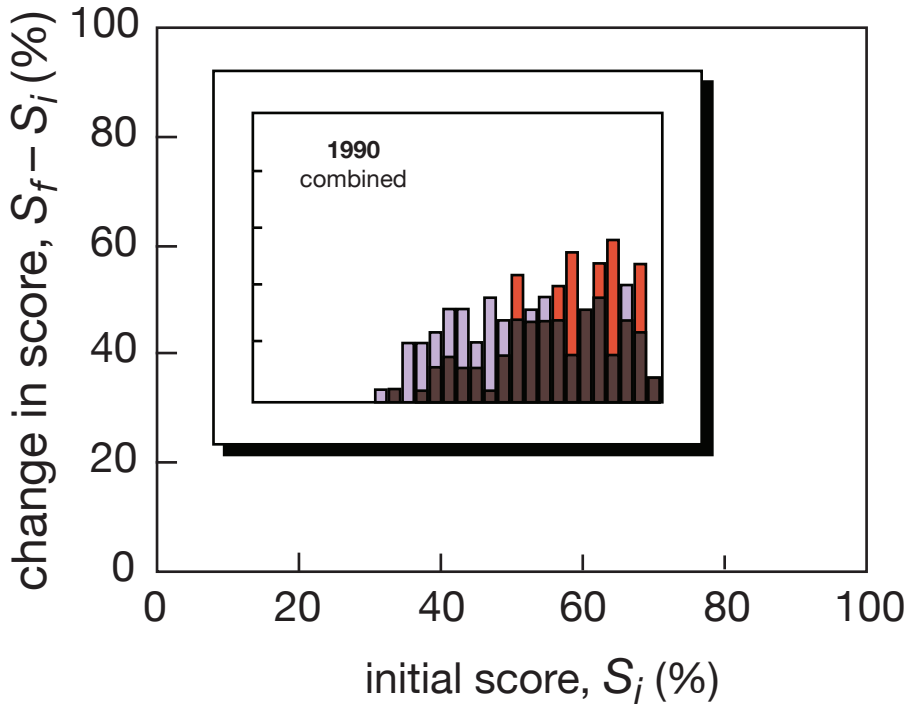


Education

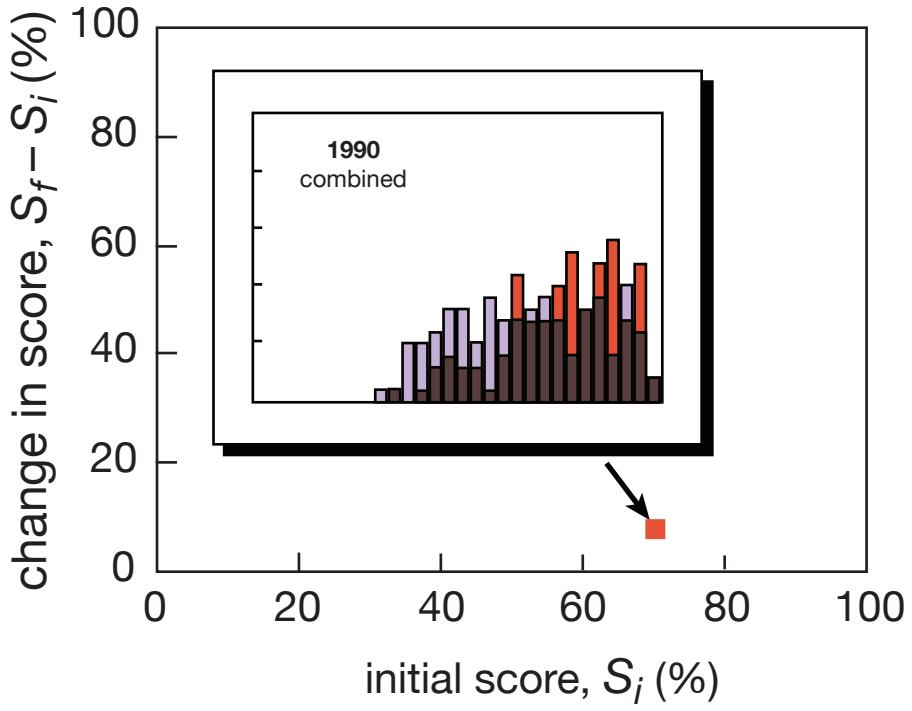
education is not just information transfer



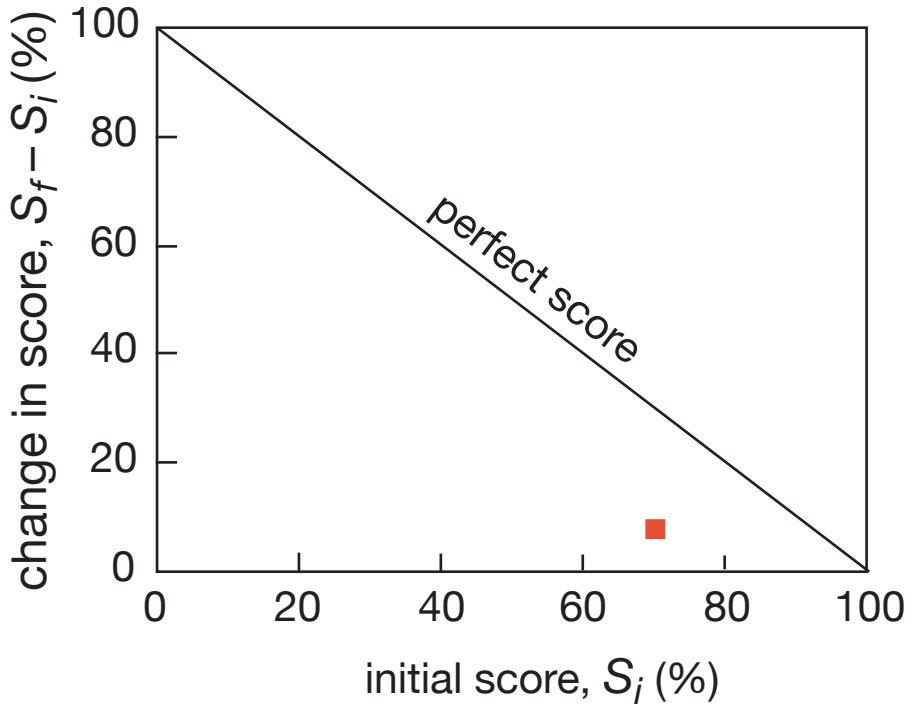
Education


1990
combined
change in score, $S_f - S_i$ (%)
initial score, S_i (%)
0
20
40
60
80
100

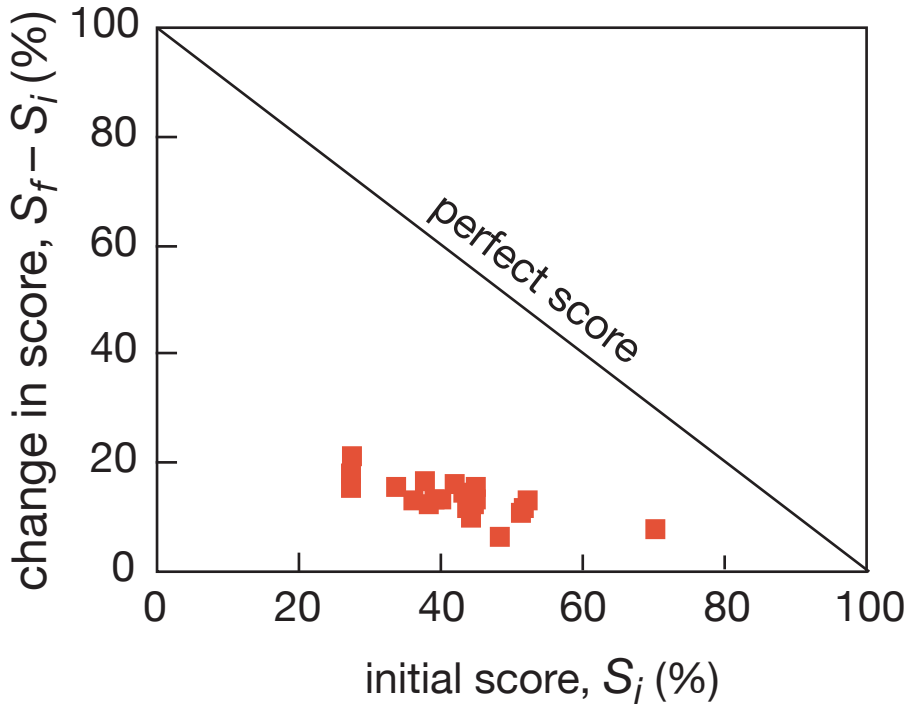
Education


1990
combined
change in score, $S_f - S_i$ (%)
initial score, S_i (%)
0
20
40
60
80
100

Education


change in score, $S_f - S_i$ (%)
100
80
60
40
20
0
0
20
40
60
80
100
initial score, S_i (%)
perfect score

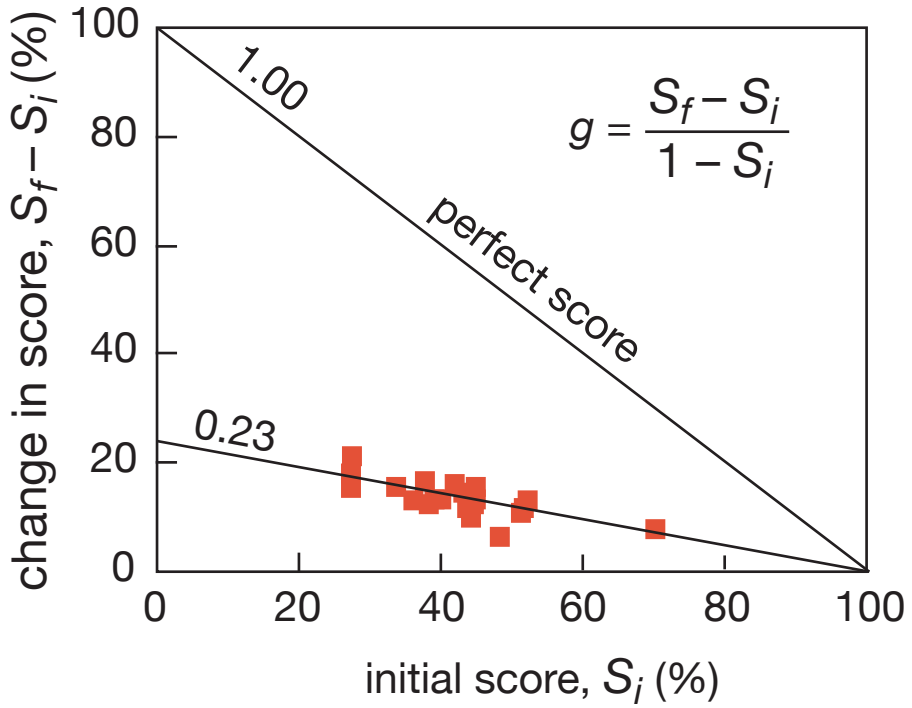
Education



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

Education

only one quarter of maximum gain realized



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


So what should we do?

Peer Instruction

Give students more responsibility for gathering information…

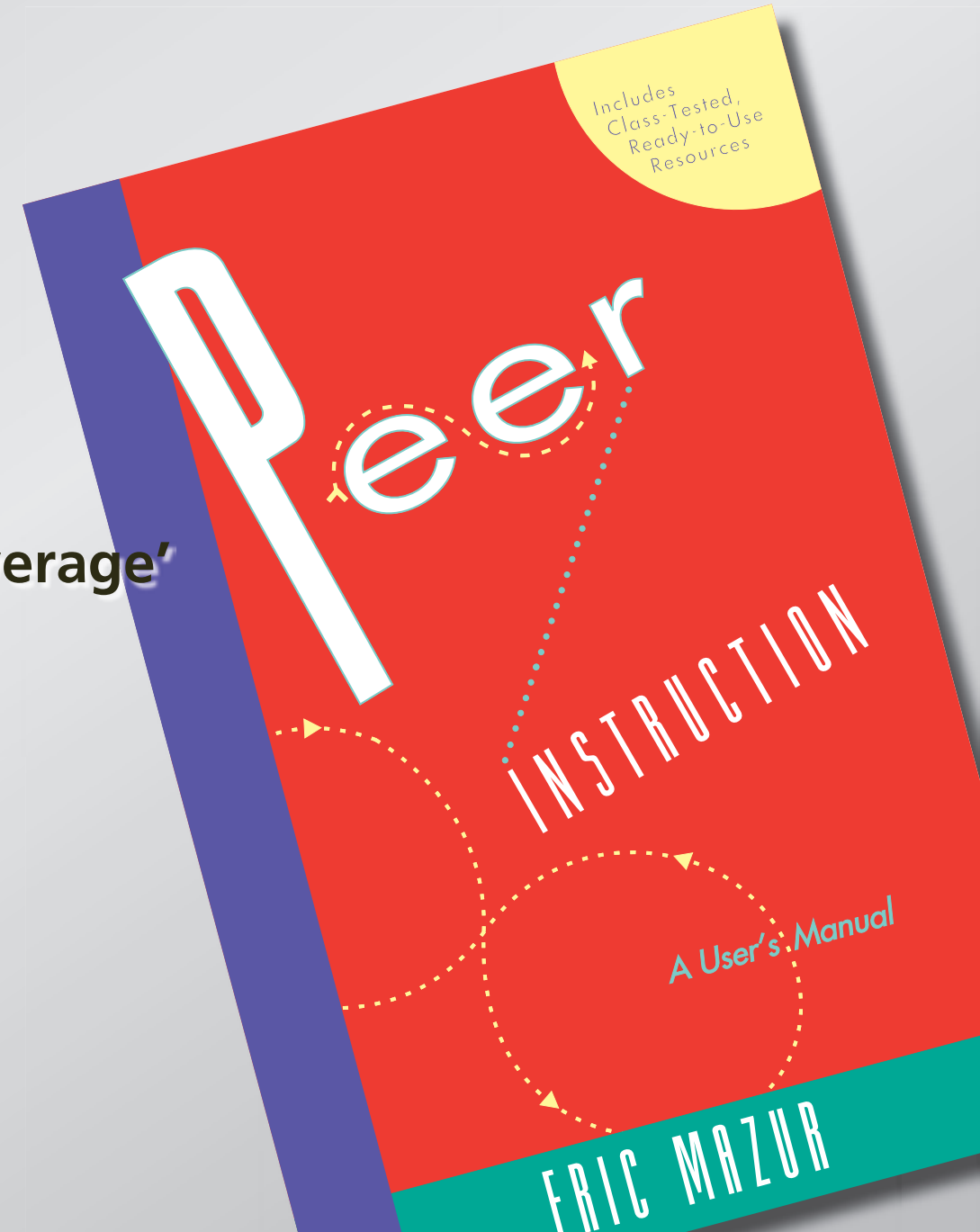
Peer Instruction

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

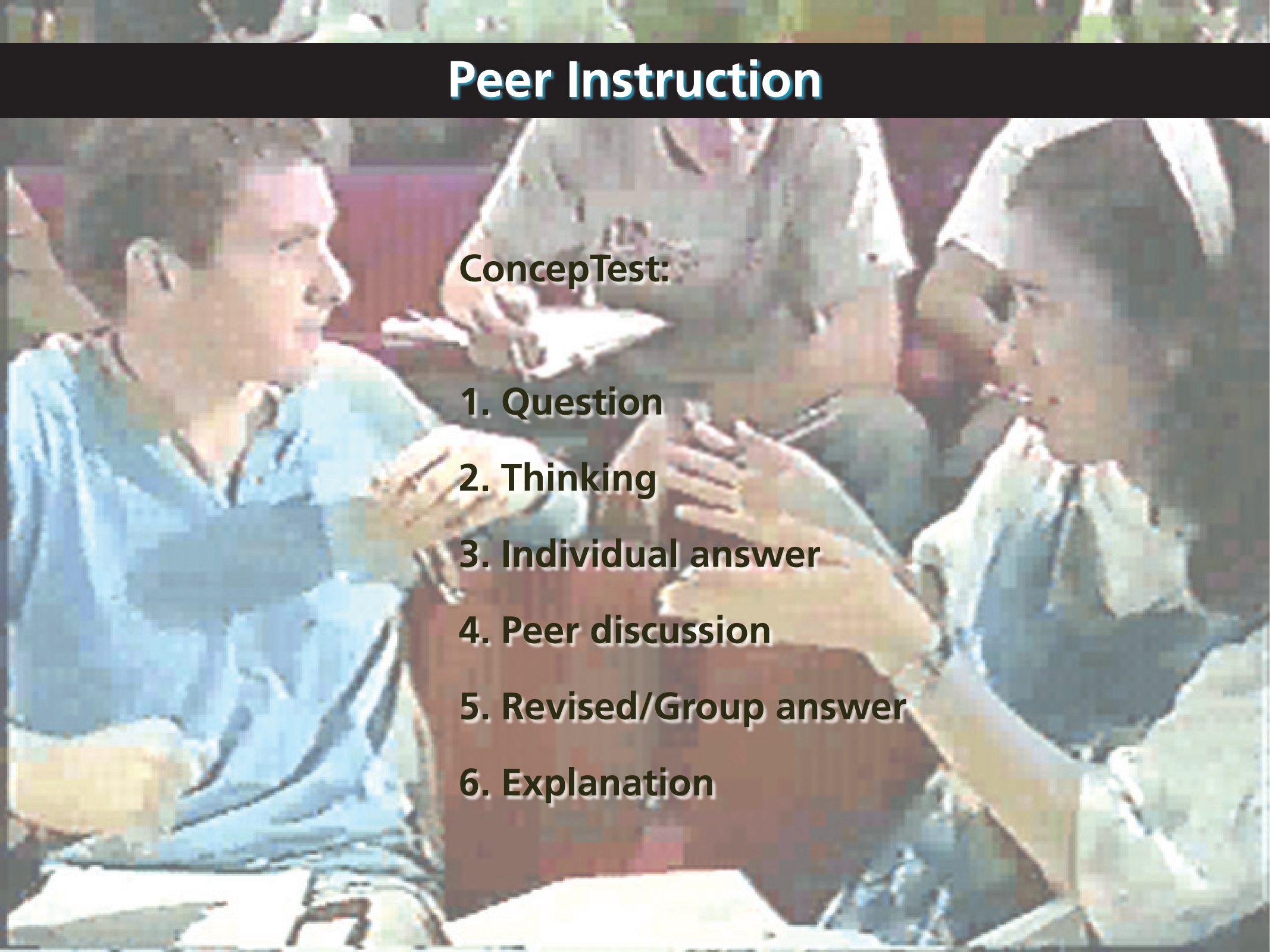
Peer Instruction

Main features:

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



Peer Instruction



ConcepTest:

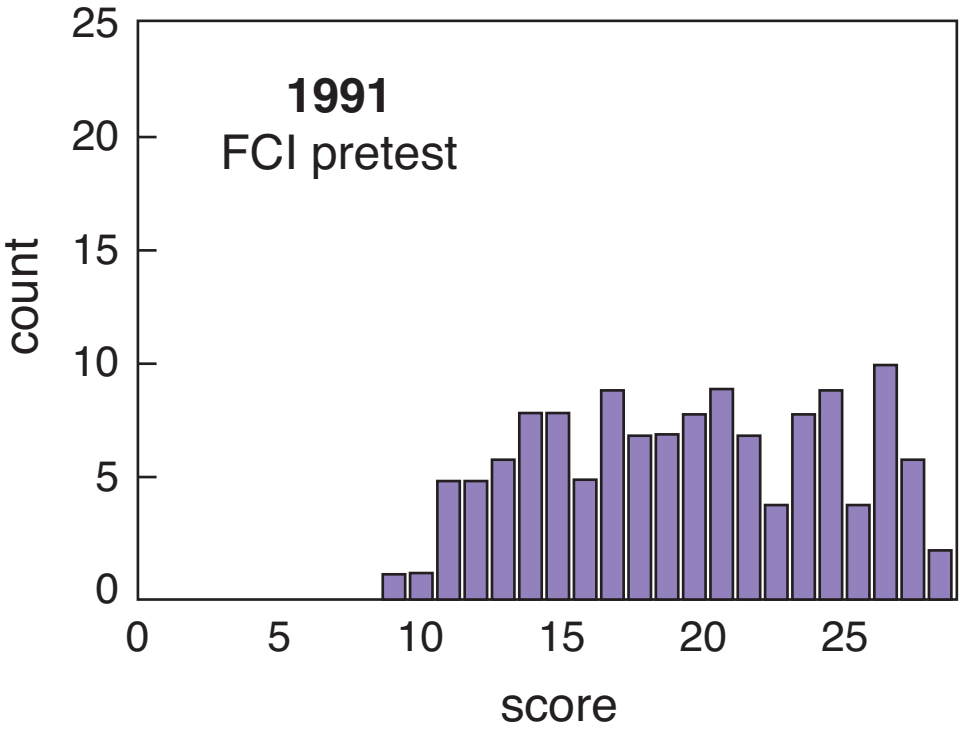
1. Question
2. Thinking
3. Individual answer
4. Peer discussion
5. Revised/Group answer
6. Explanation

Results

is it any good?

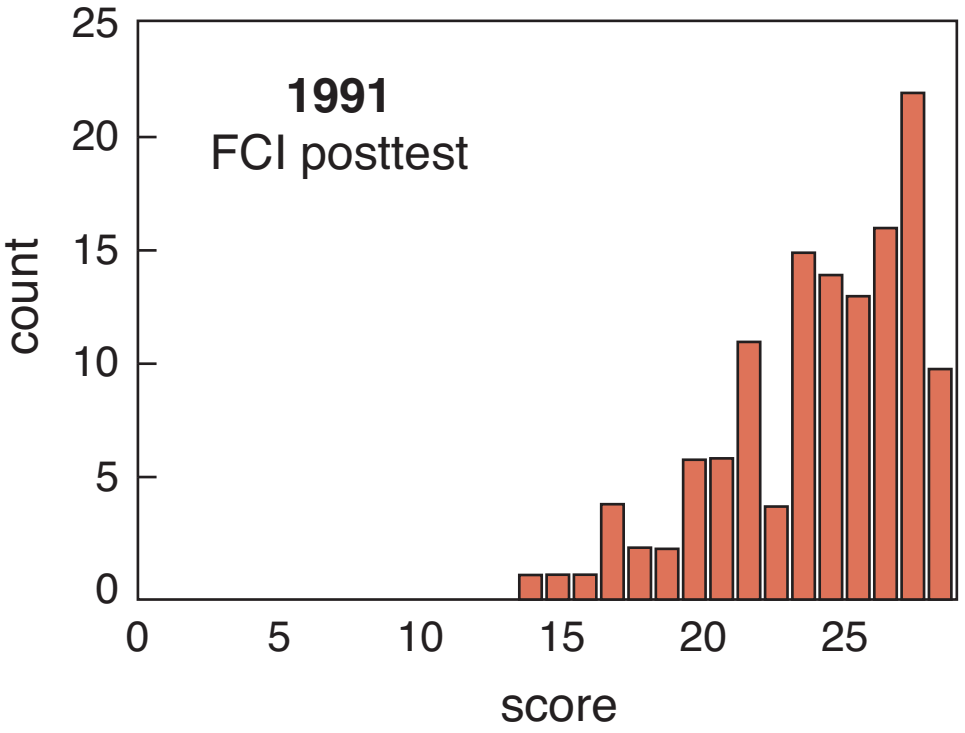
Results

first year of implementing PI



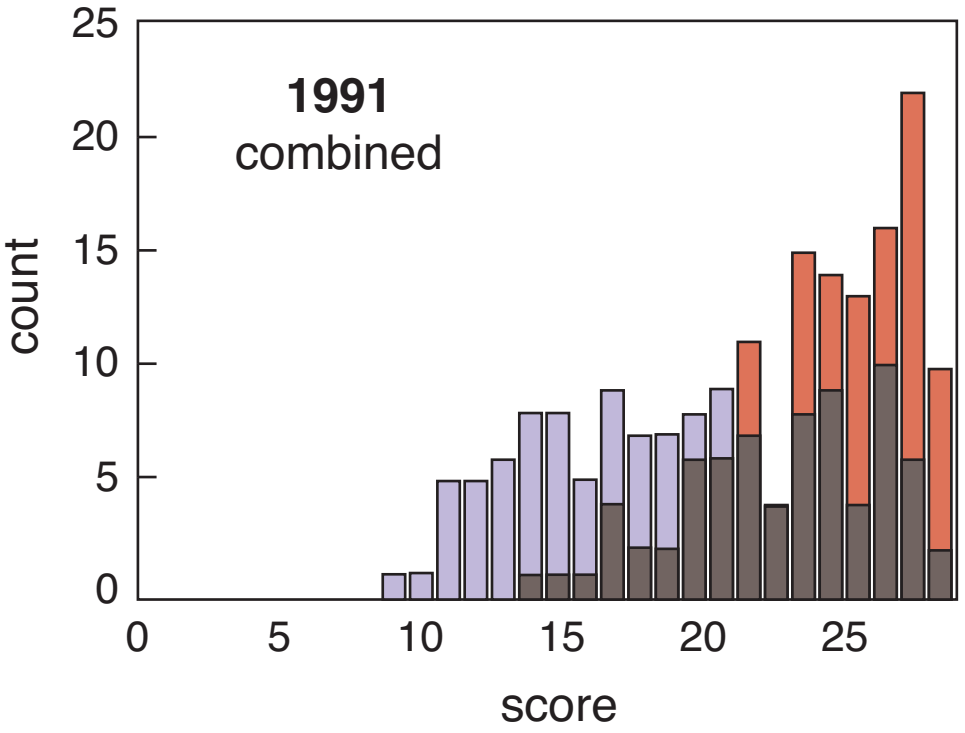
Results

first year of implementing PI

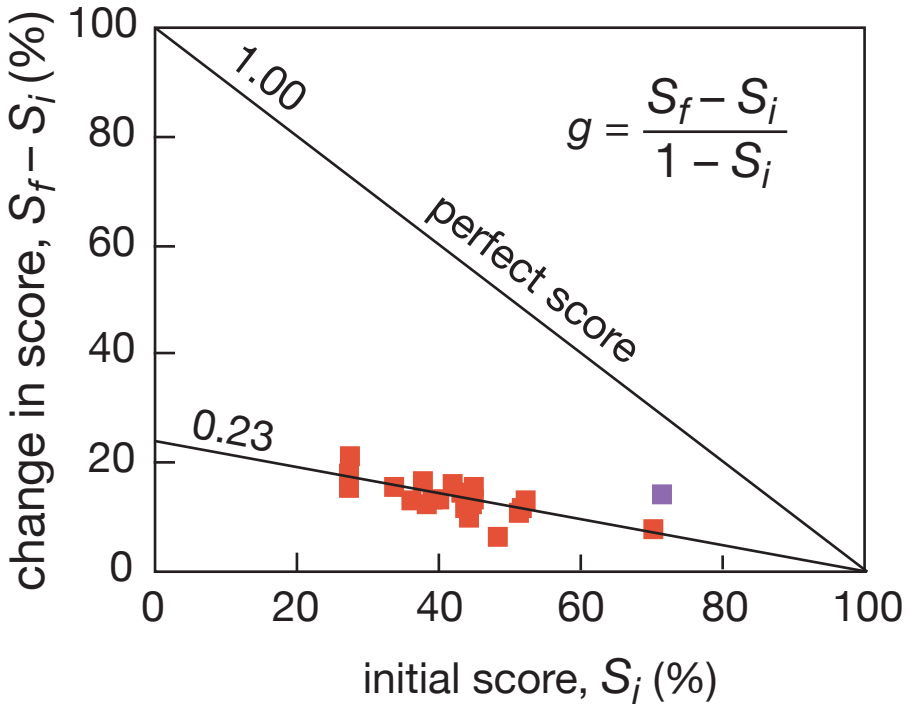


Results

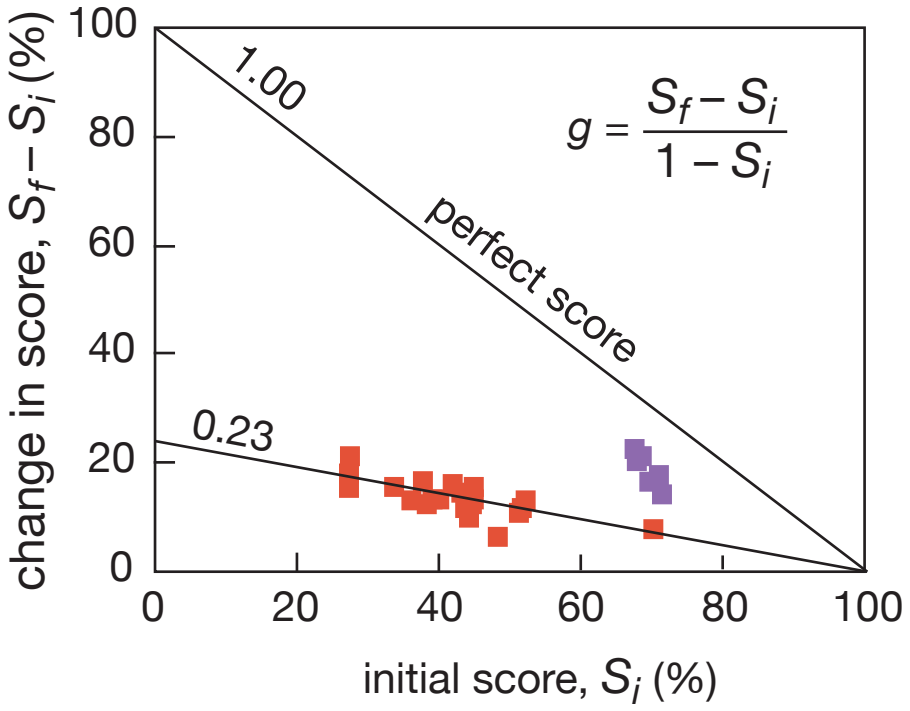
first year of implementing PI



Results


change in score, $S_f - S_i$ (%)
100
80
60
40
20
0
0
20
40
60
80
100
initial score, S_i (%)
1.00
perfect score
0.23
$g = \frac{S_f - S_i}{1 - S_i}$

Results


change in score, $S_f - S_i$ (%)
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80
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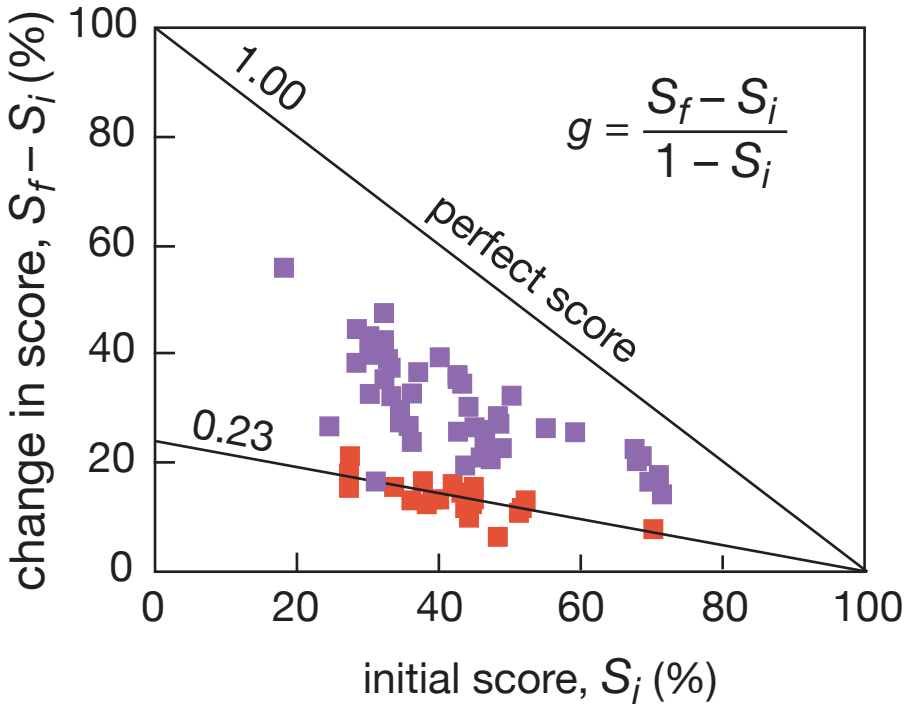
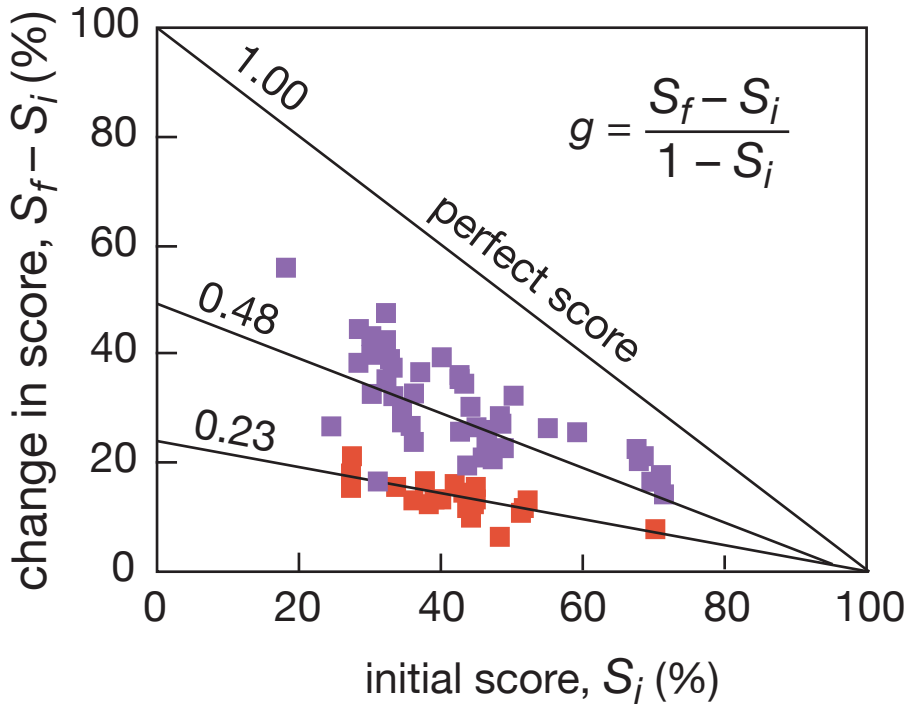
20
0
0
20
40
60
80
100
initial score, S_i (%)
1.00
perfect score
$g = \frac{S_f - S_i}{1 - S_i}$
0.23

Results



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

Results

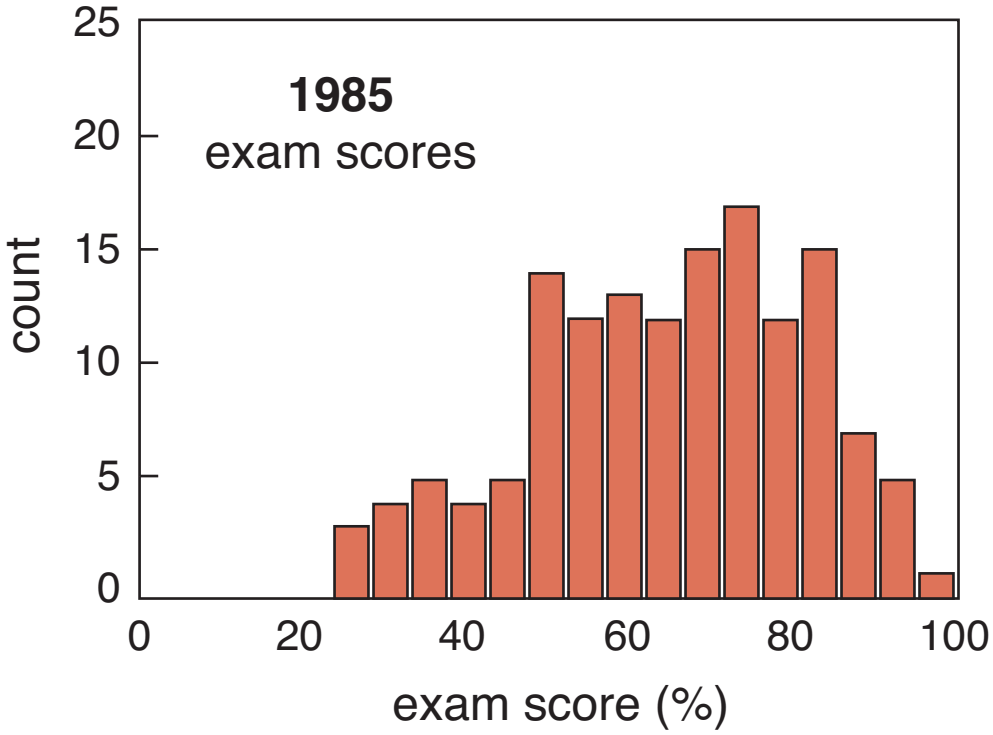


R.R. Hake, *Am. J. Phys.* 66, 64 (1998)

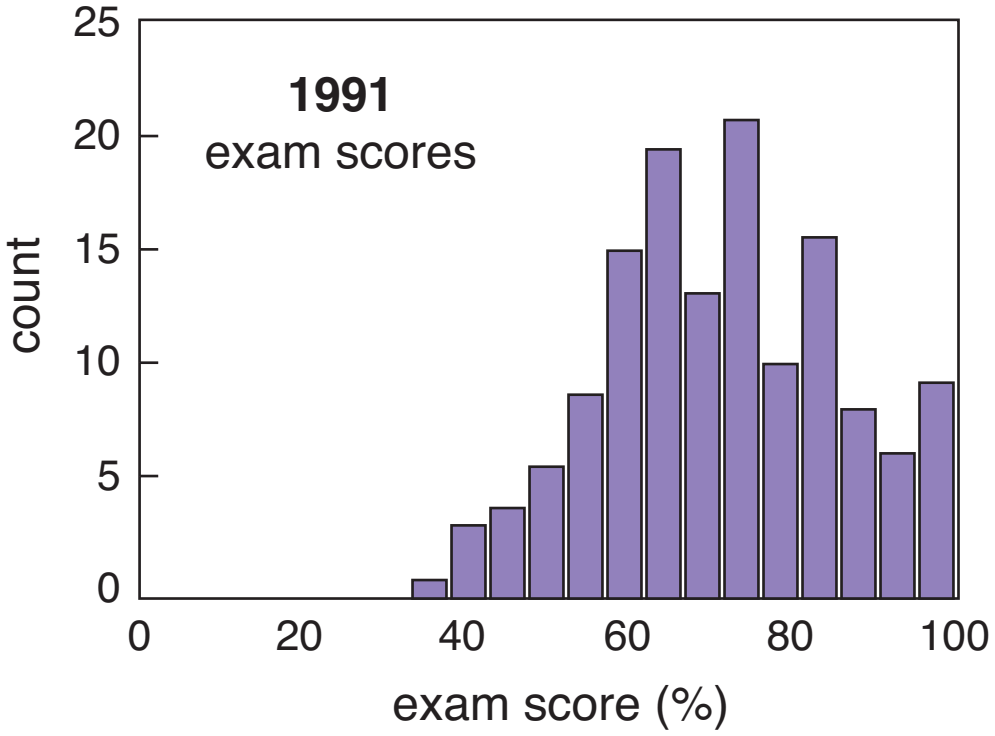
Results

what about problem solving?

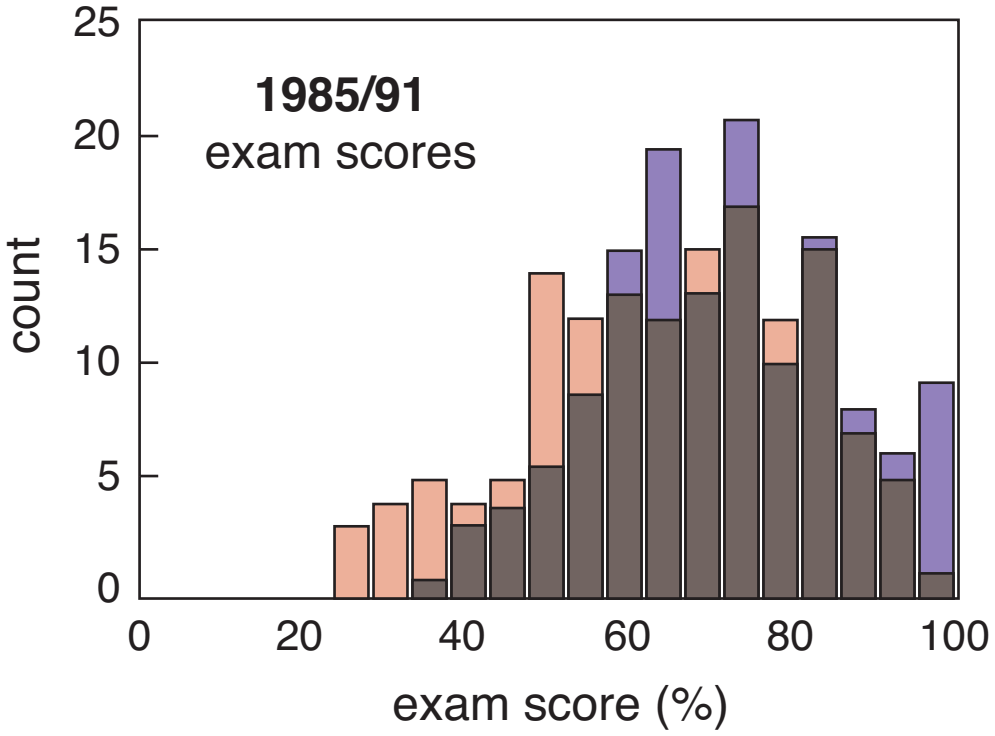
Results


1985
exam scores
count
25
20
15
10
5
0
0
20
40
60
80
100
exam score (%)

Results


1991
exam scores
count
25
20
15
10
5
0
0
20
40
60
80
100
exam score (%)

Results


1985/91
exam scores
count
25
20
15
10
5
0
0
20
40
60
80
100
exam score (%)

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!)

Summary

Traditional indicators of success misleading

Summary

Traditional indicators of success misleading

Education is no longer about information

Resources

“Use of clickers to promote acquisition of advanced reasoning skills“ G.A. DeBourgh, *Nurse Education in Practice* (2007)

“Using clickers for Clinical Reasoning and Problem Solving“ J.S. Russell et al., *Nurse Educator* (2011)

Quick survey…

After this introduction to Peer Instruction,

please rate your agreement with the following questions

Survey

Interactive teaching requires significantly more instructor preparation time than traditional lecture.

1. Strongly Agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly Disagree

Survey

Interactive teaching requires clickers.

1. Strongly Agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly Disagree

Survey

If I give my students a pre-class (reading) assignment, most of them will complete it before coming to class.

1. Strongly Agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly Disagree

Survey

It is difficult to see how to apply interactive teaching techniques in my courses.

1. Strongly Agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly Disagree

Survey

I am worried that interactive teaching will negatively affect my end-of-course evaluations.

1. Strongly Agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly Disagree

Funding:

National Science Foundation

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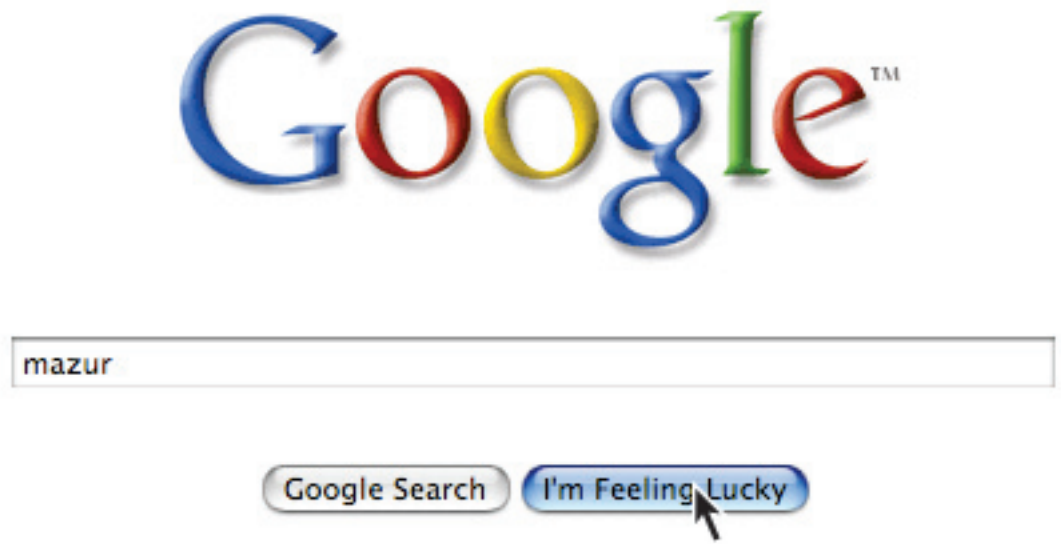
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Assignment

Before breaking up:

1. write down your most burning question
2. discuss questions
3. select two most important questions
4. hand questions to me (selected 2 on top)

Peer Instruction: How?

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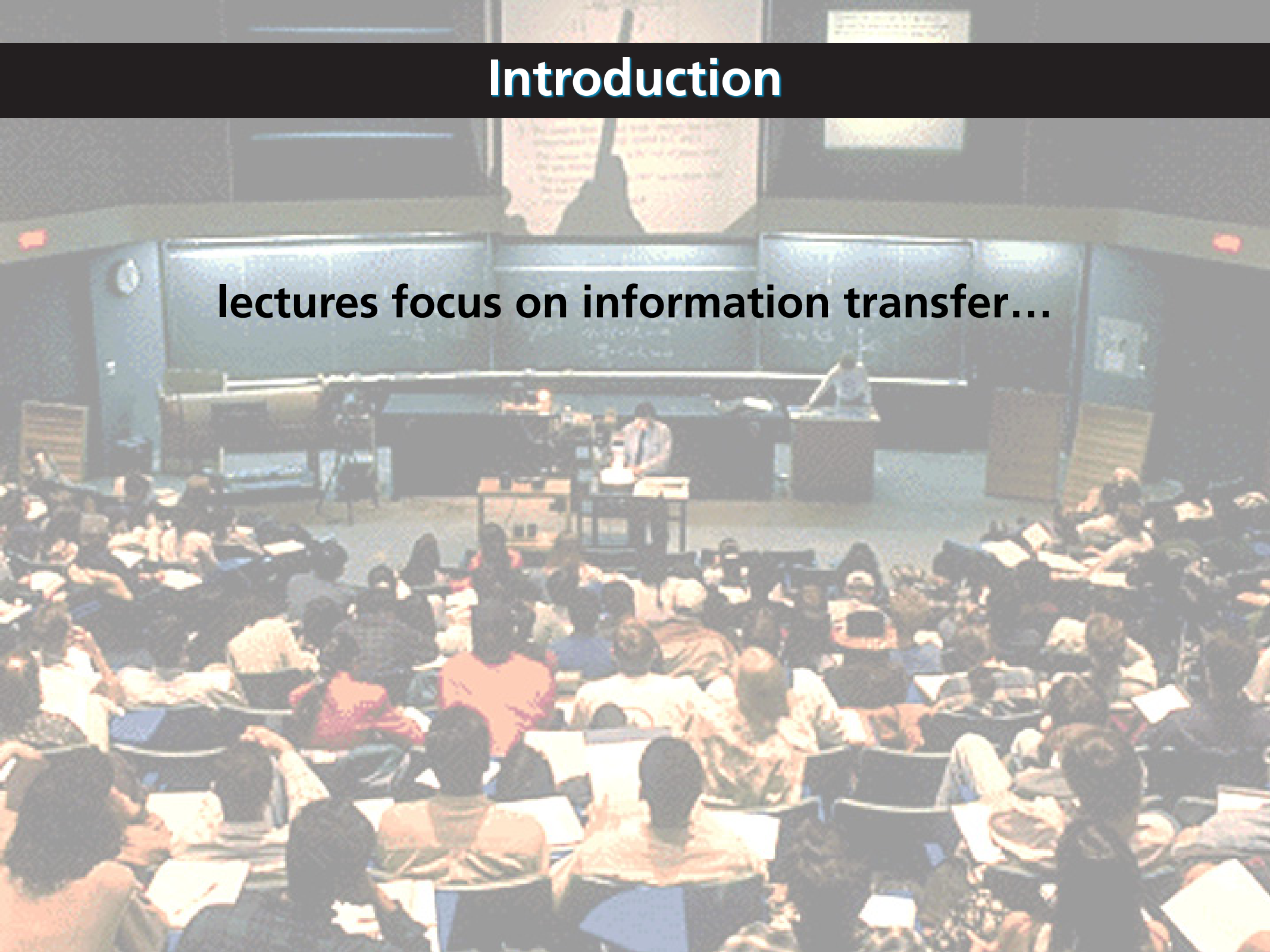
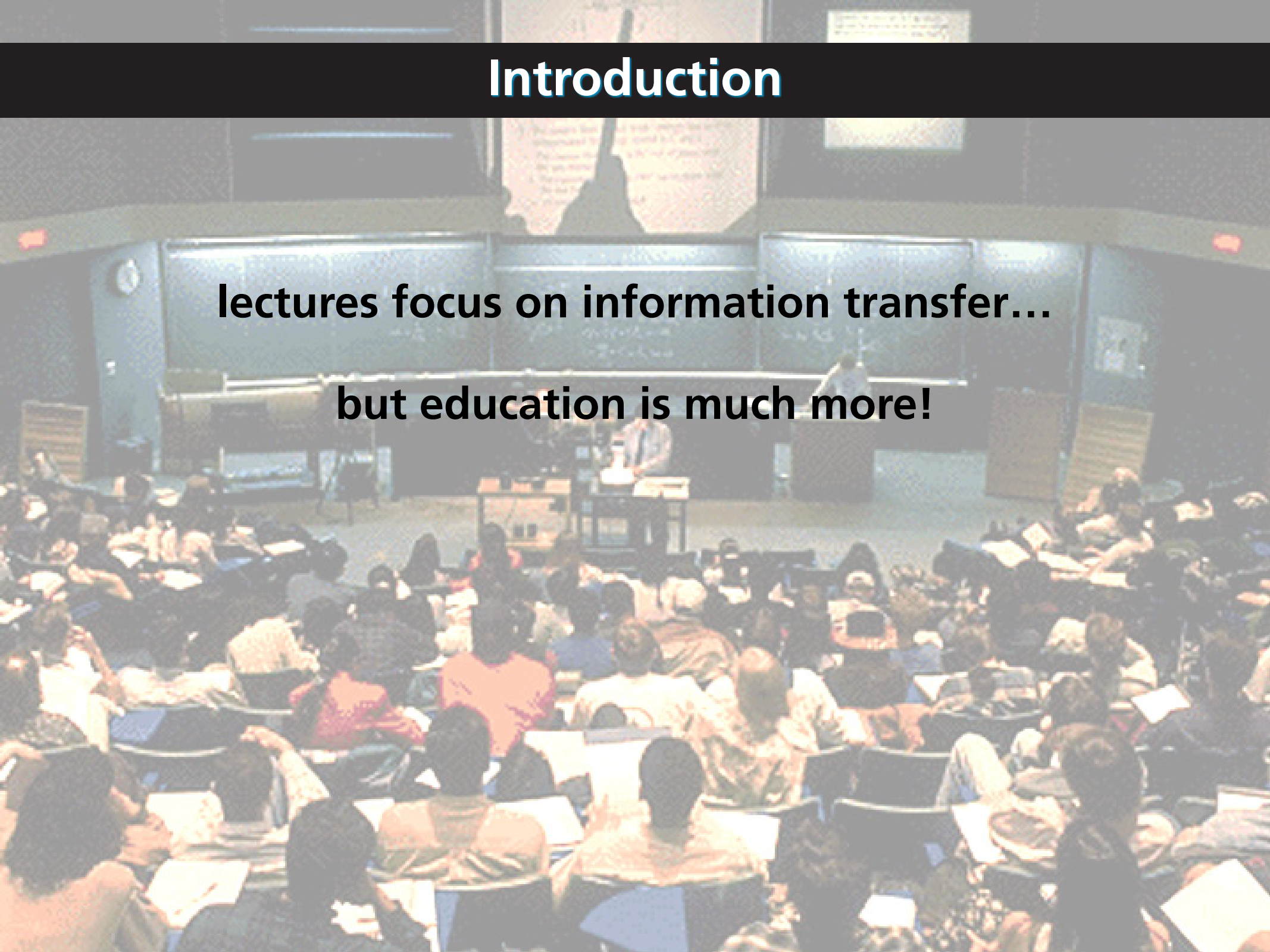
Introduction



lectures focus on information transfer…

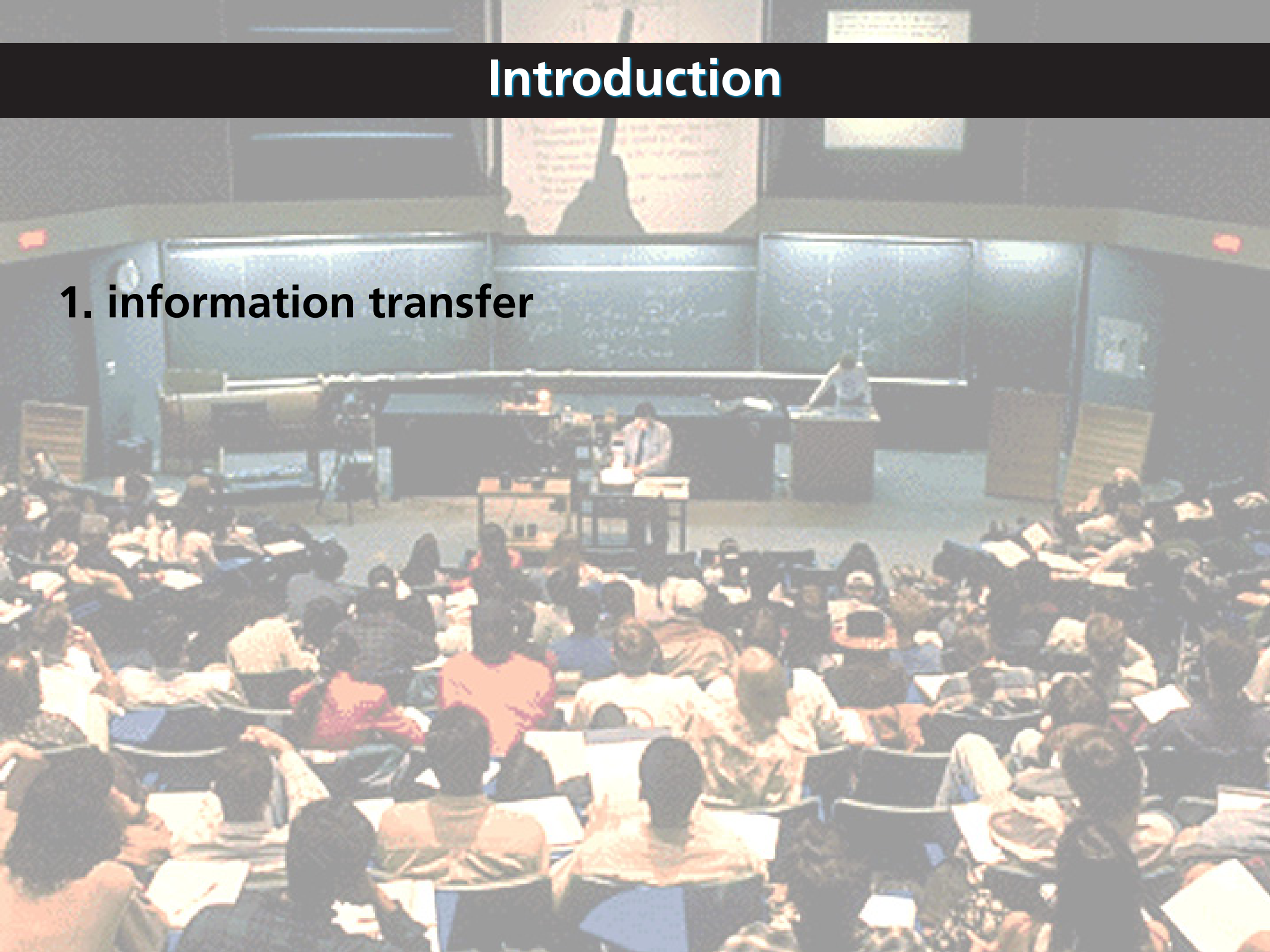
Introduction



lectures focus on information transfer…

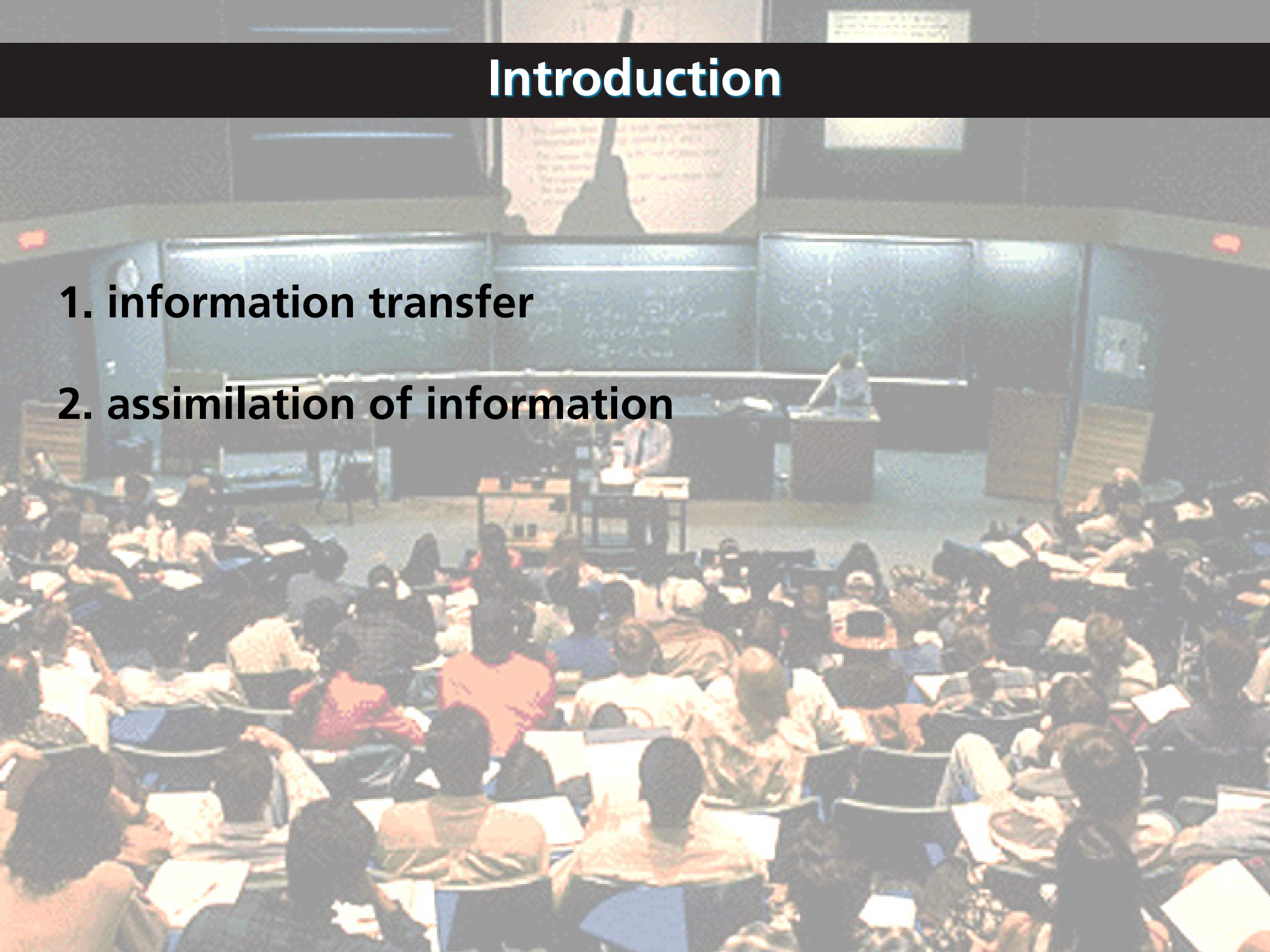
but education is much more!

Introduction



1. information transfer

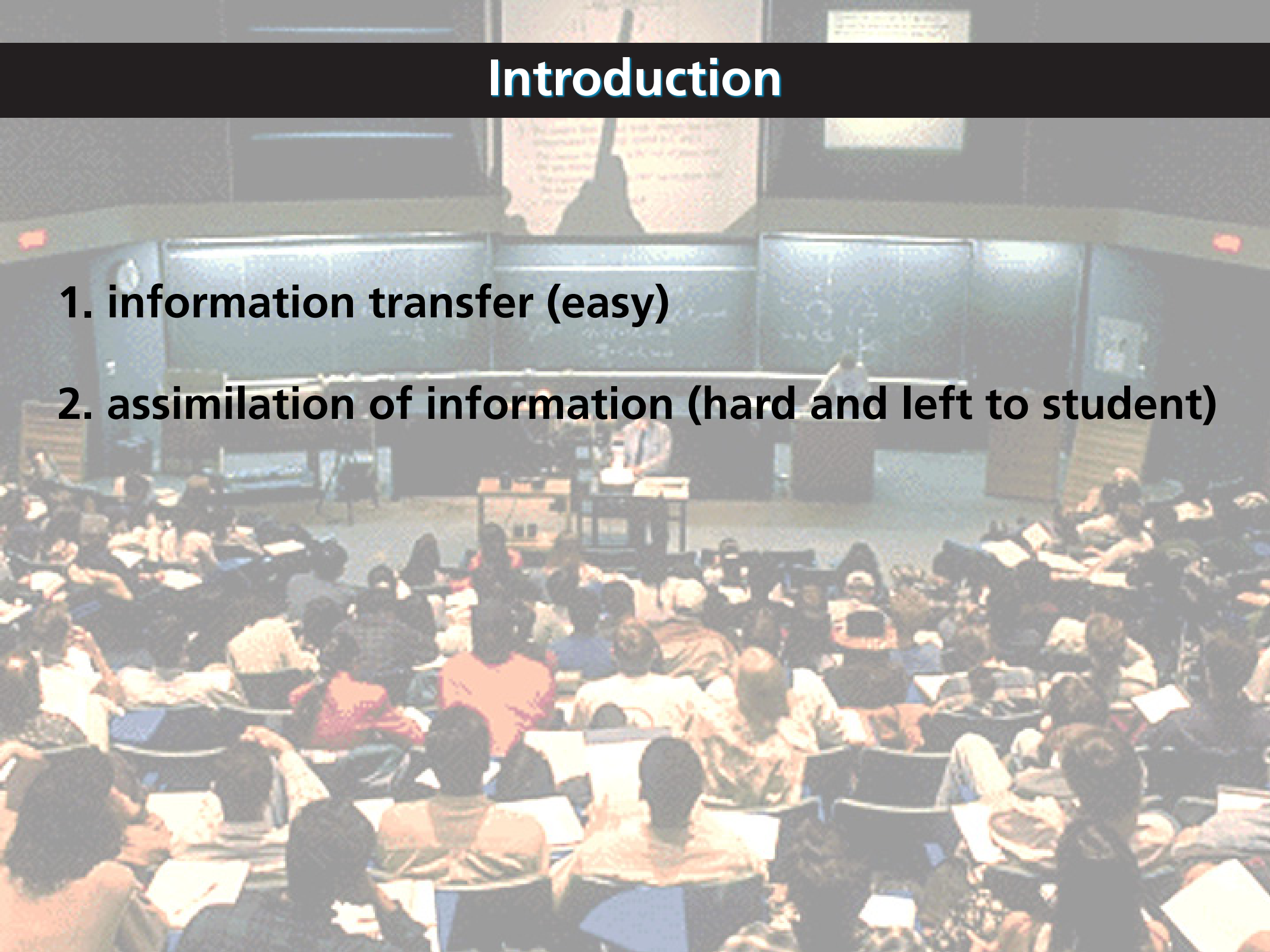
Introduction



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

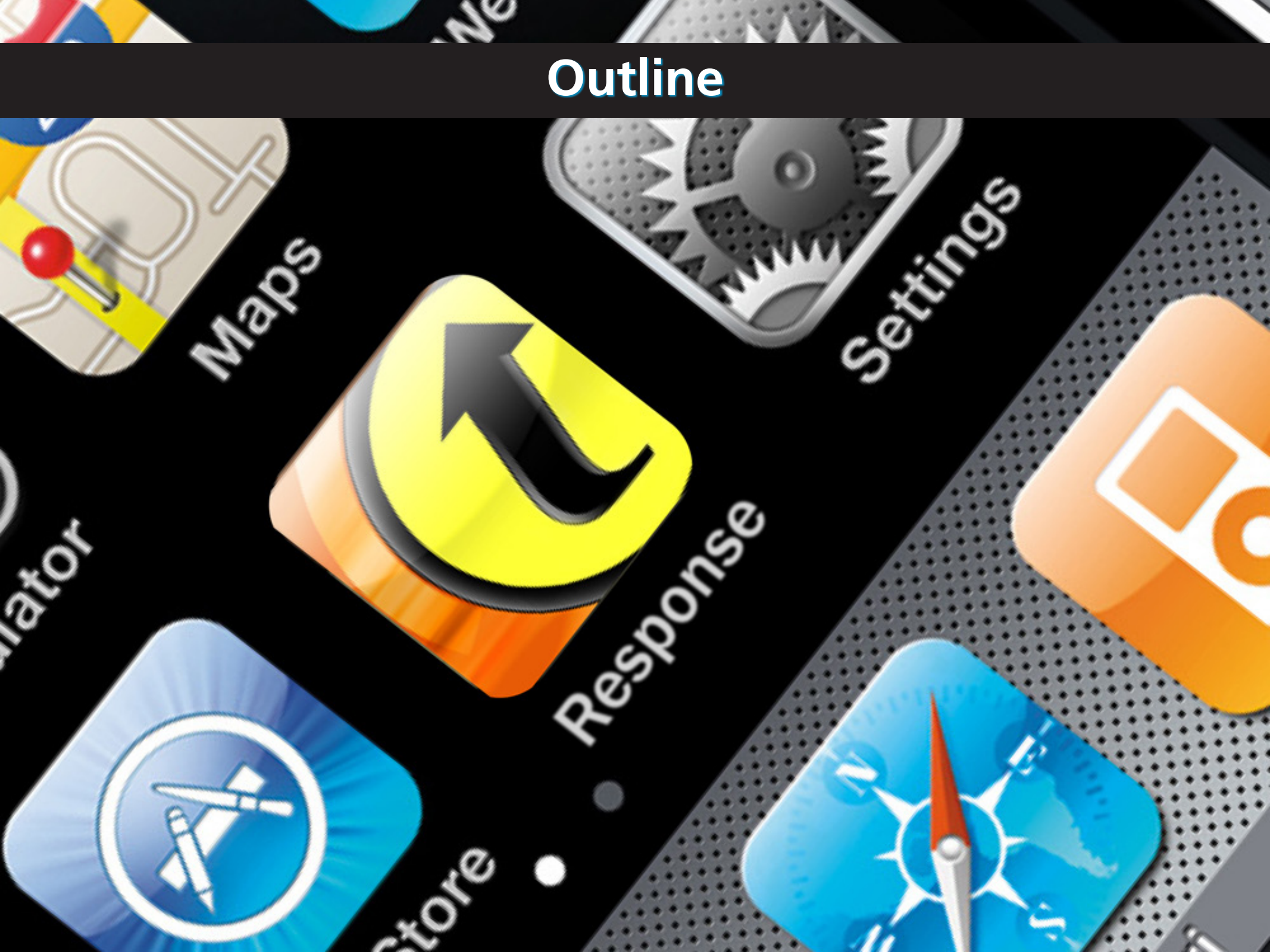
How to move information transfer out of classroom?

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

PI & JiTT Overview

Students do not come to class prepared, because…

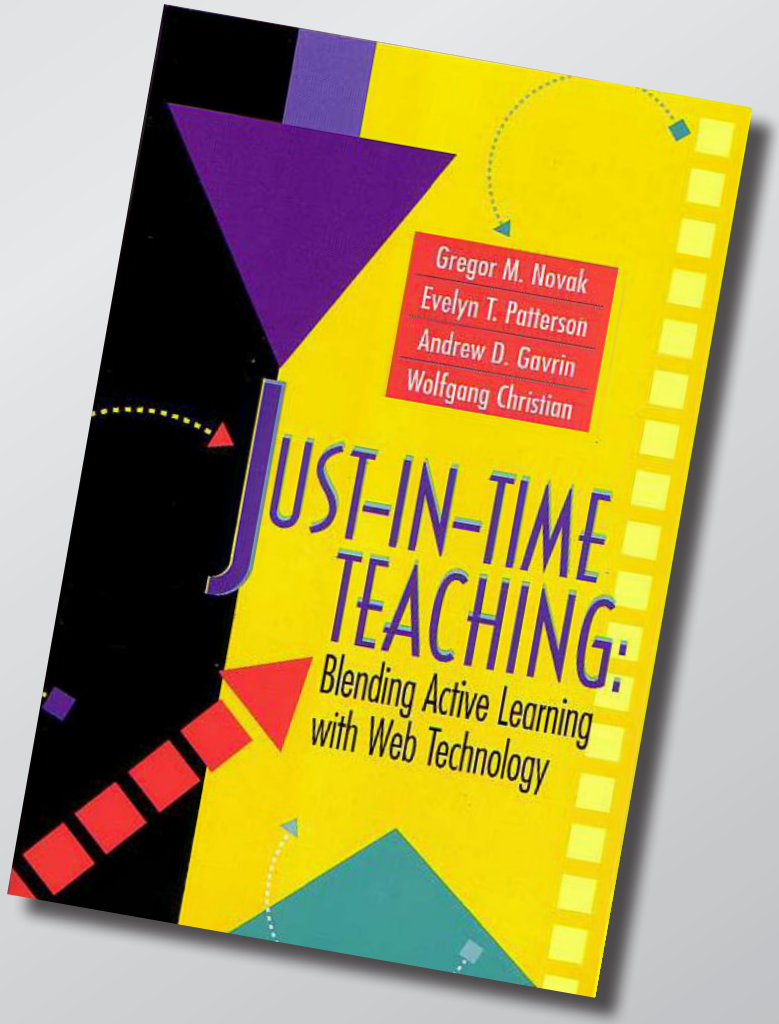
1. they don't have time.
2. they are not motivated to learn.
3. their instructors take away the incentive.
4. they do not have the requisite skills.
5. of some other reason.
6. They do come prepared in my class!

(select what you consider to be the main reason)

PI & JiTT Overview

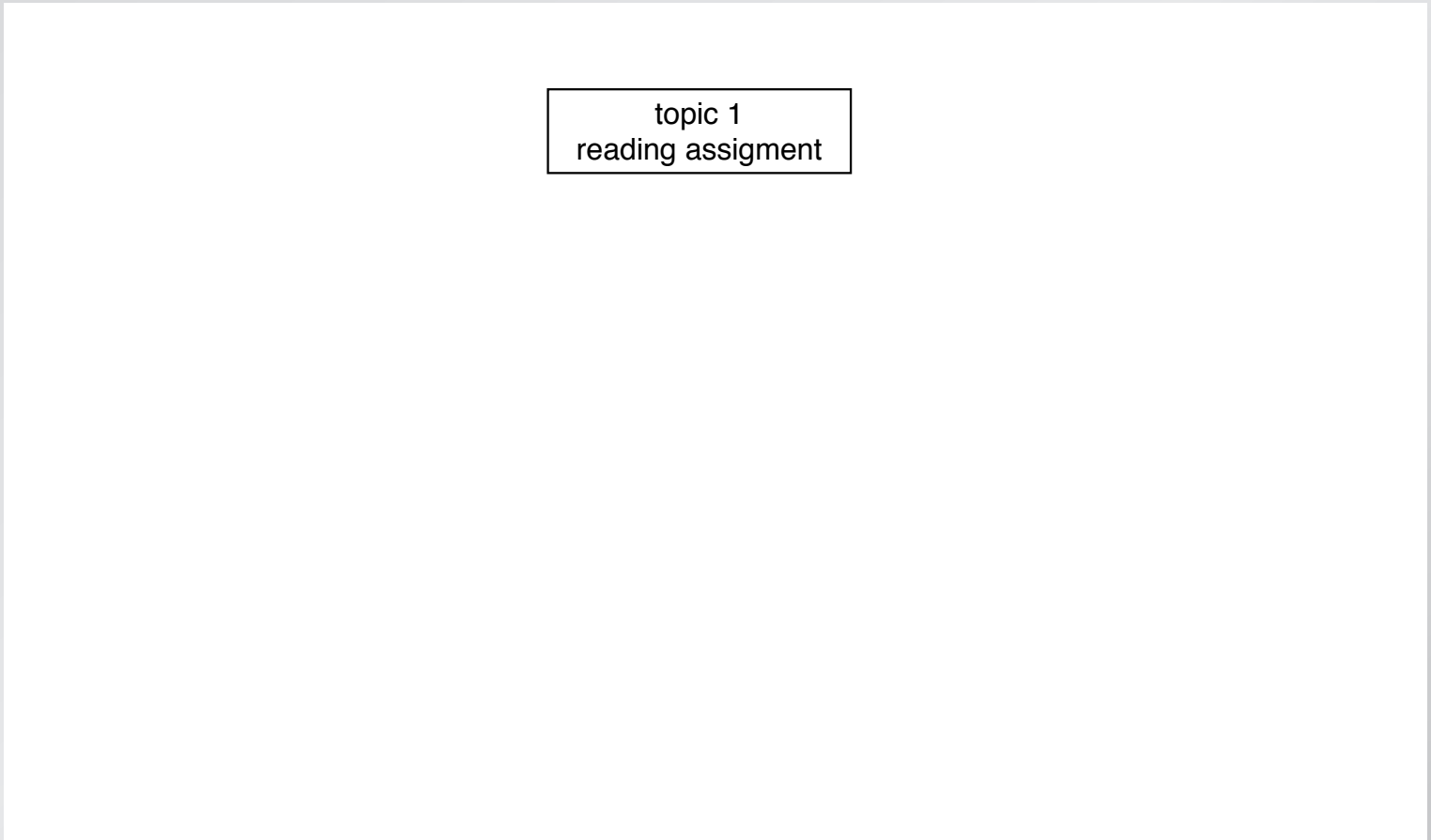
Just-in-time-Teaching (JiTT)

www.jitt.org



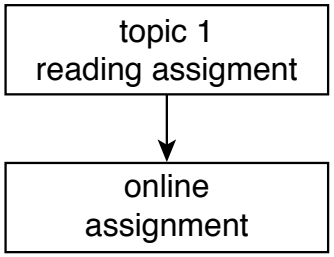
PI & JiTT Overview

JiTT workflow



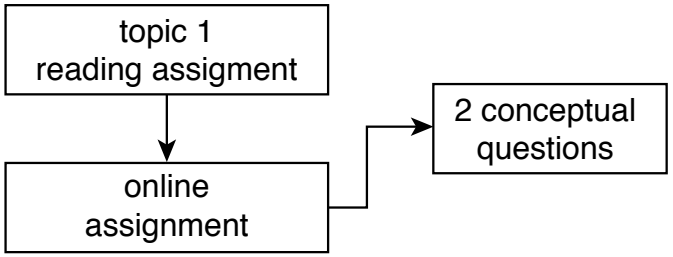
PI & JiTT Overview

JiTT workflow



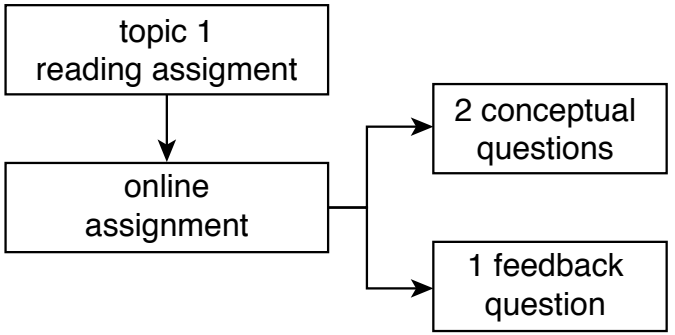
PI & JiTT Overview

JiTT workflow



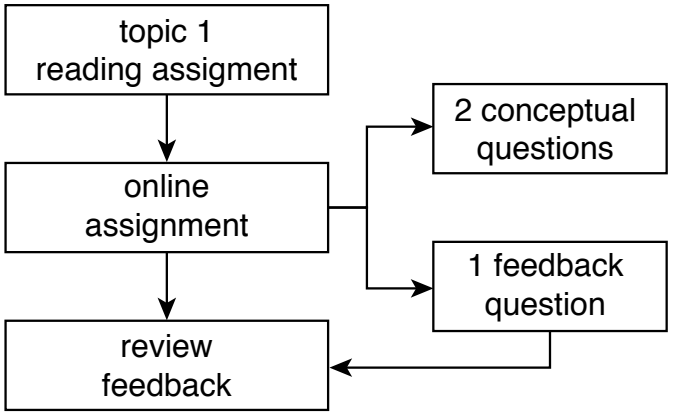
PI & JiTT Overview

JiTT workflow



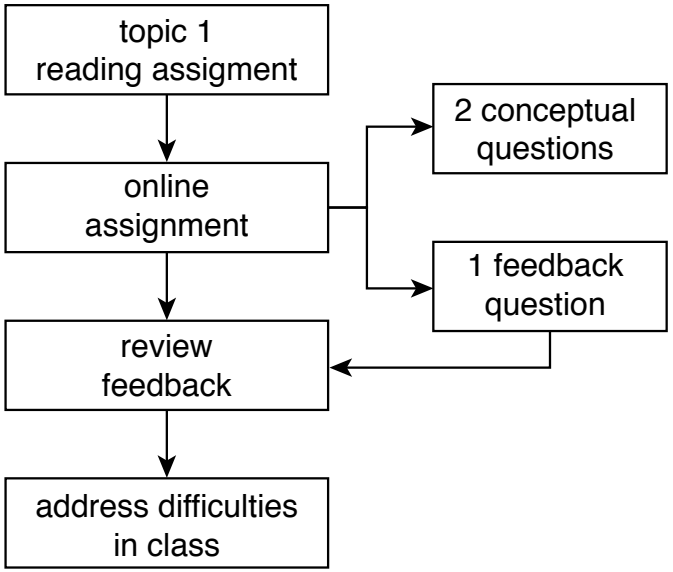
PI & JiTT Overview

JiTT workflow



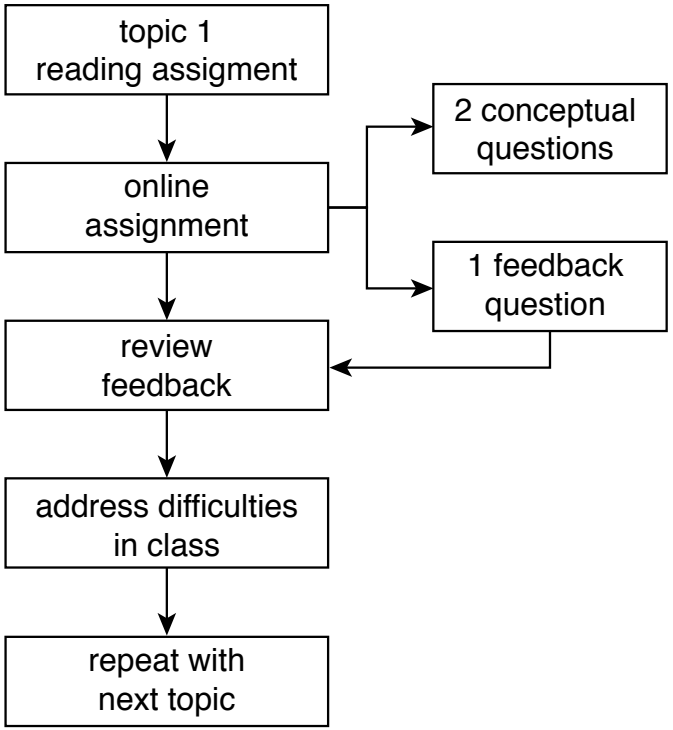
PI & JiTT Overview

JiTT workflow



PI & JiTT Overview

JiTT workflow



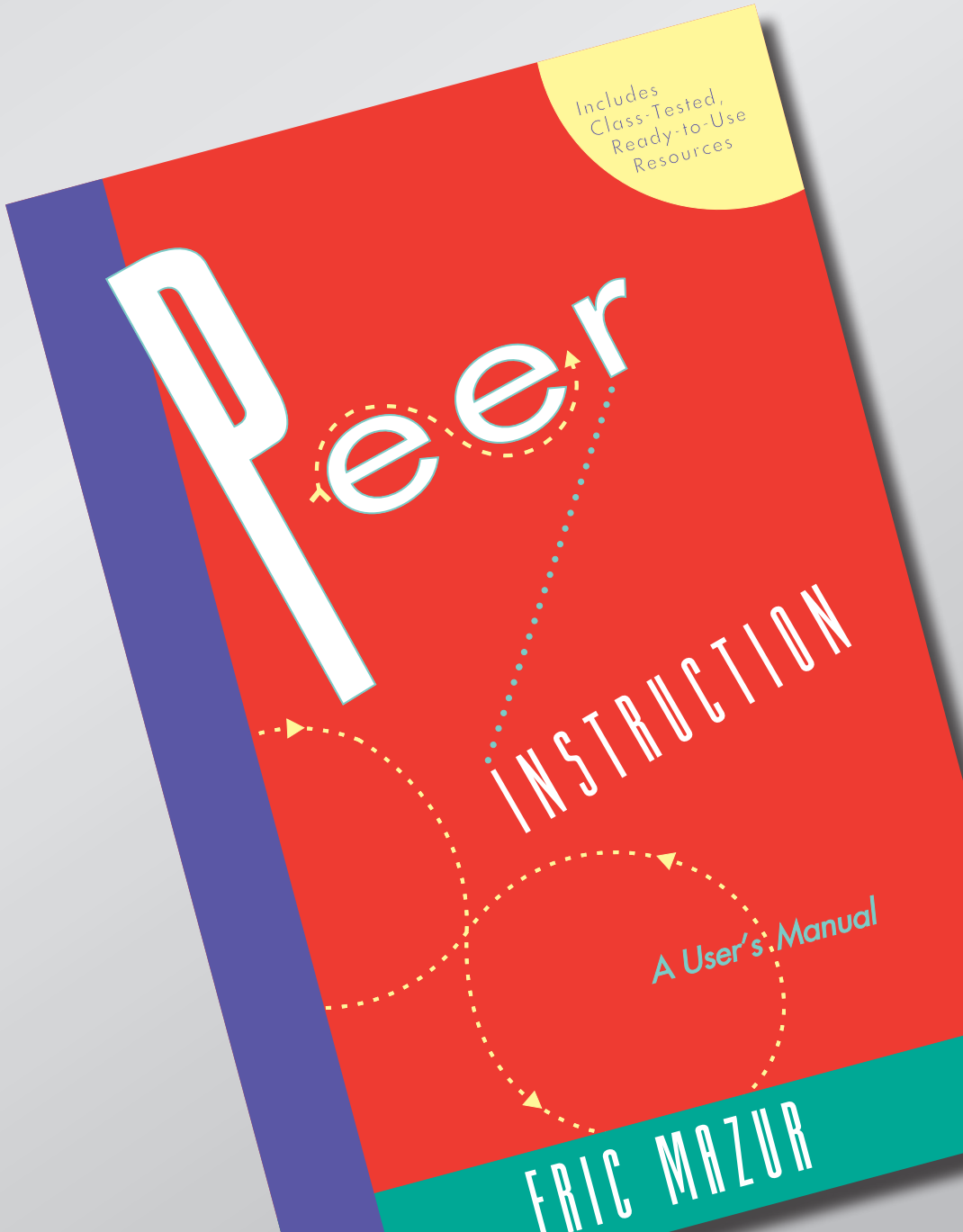
PI & JiTT Overview

JiTT:

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

PI & JiTT Overview

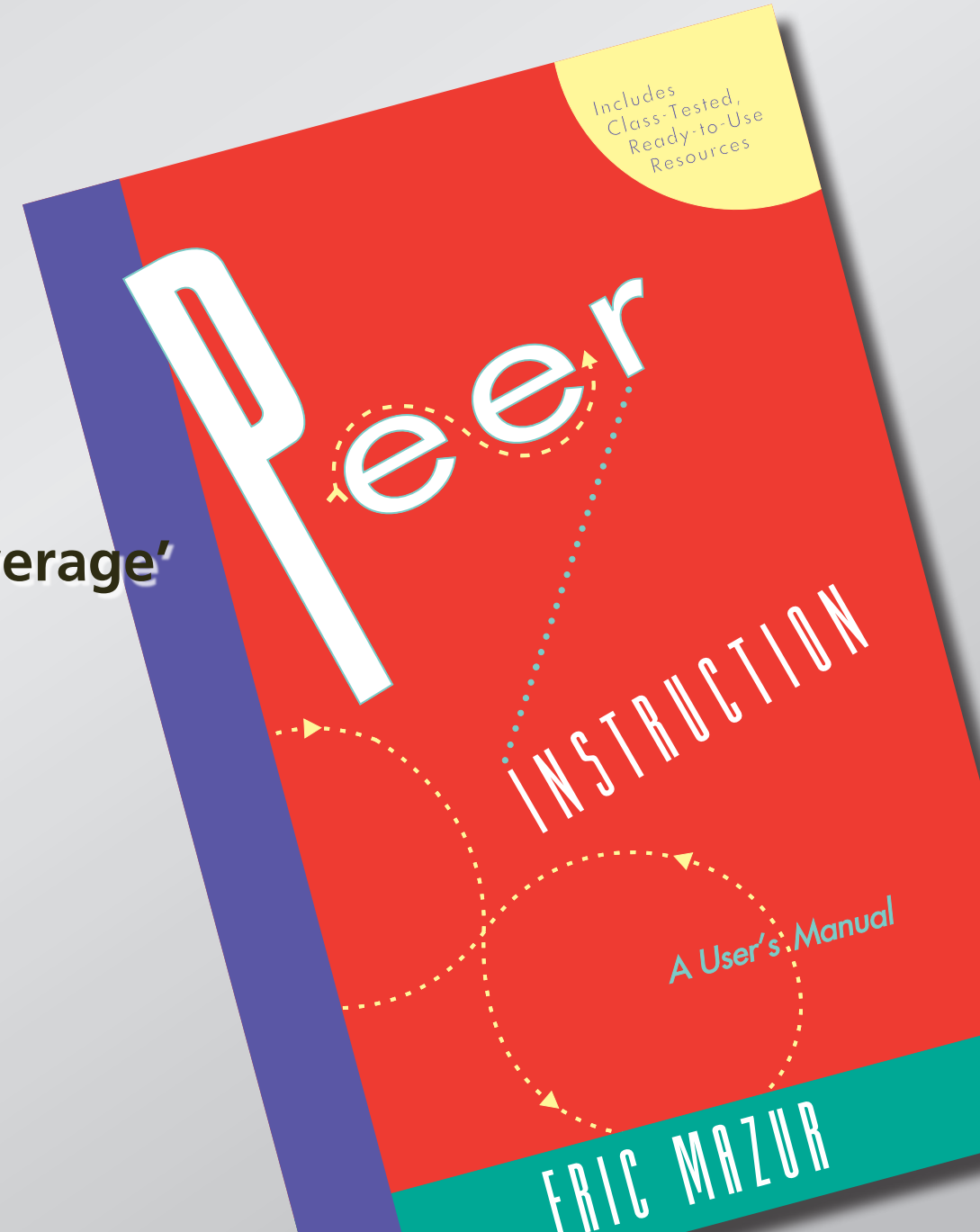
Peer Instruction (PI)



PI & JiTT Overview

Main features:

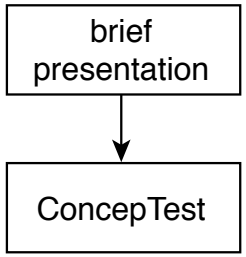
- **pre-class reading**
- **in-class: depth, not 'coverage'**
- **ConcepTests**



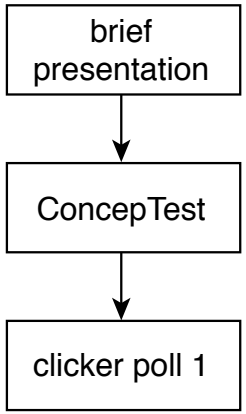
PI & JiTT Overview

brief
presentation

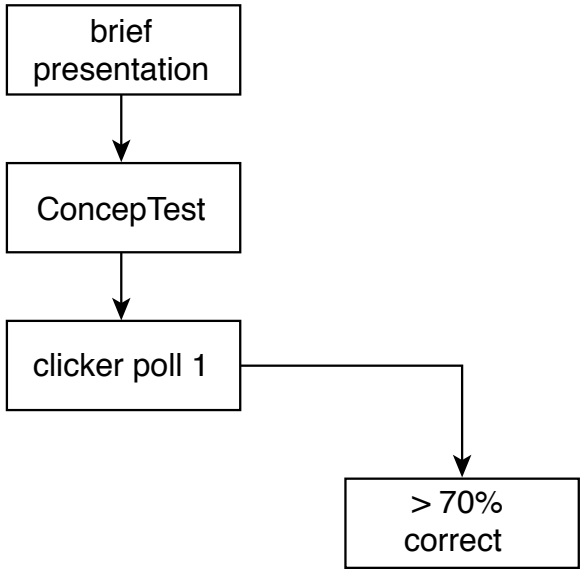
PI & JiTT Overview



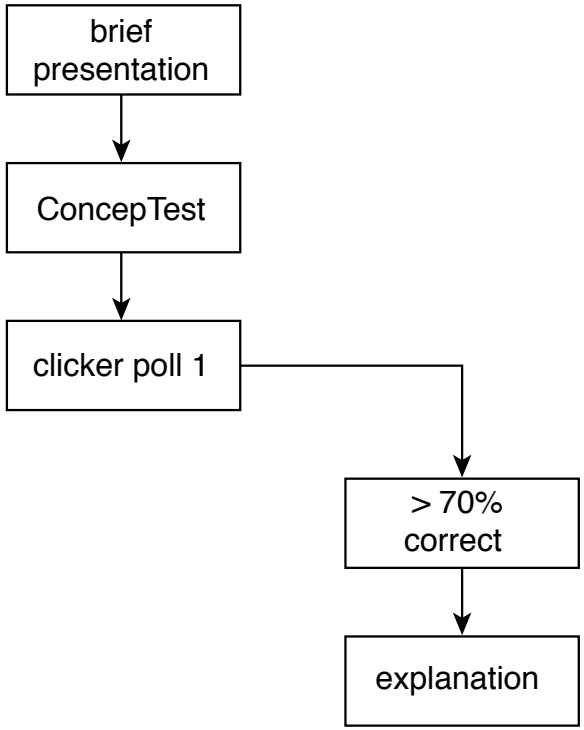
PI & JiTT Overview



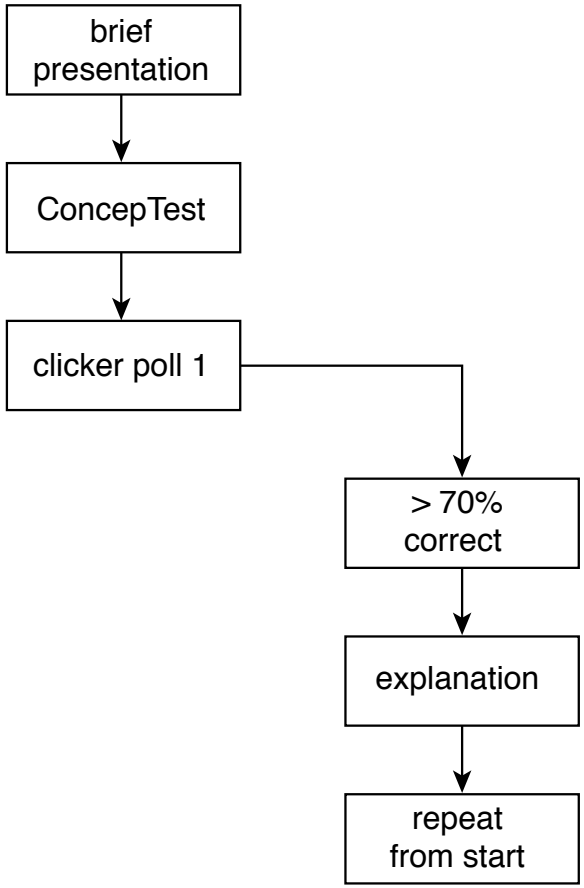
PI & JiTT Overview



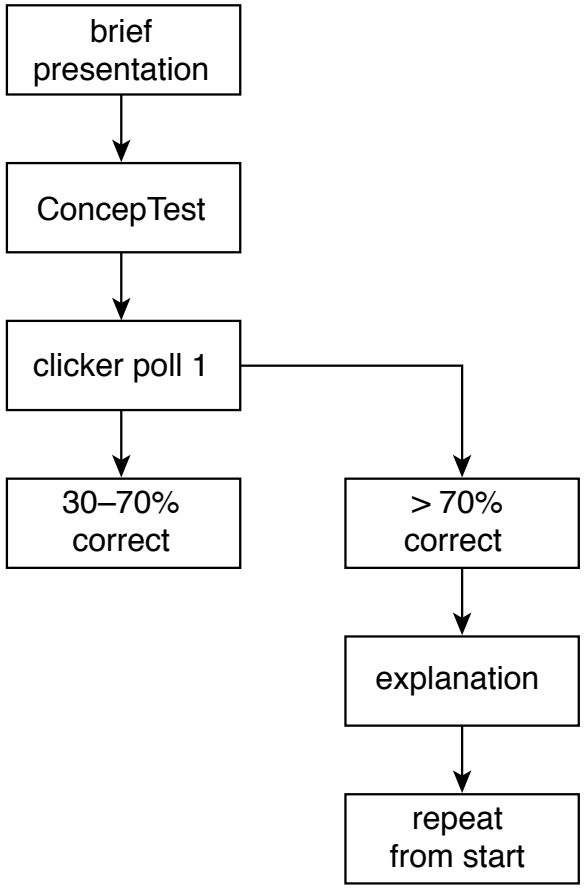
PI & JiTT Overview



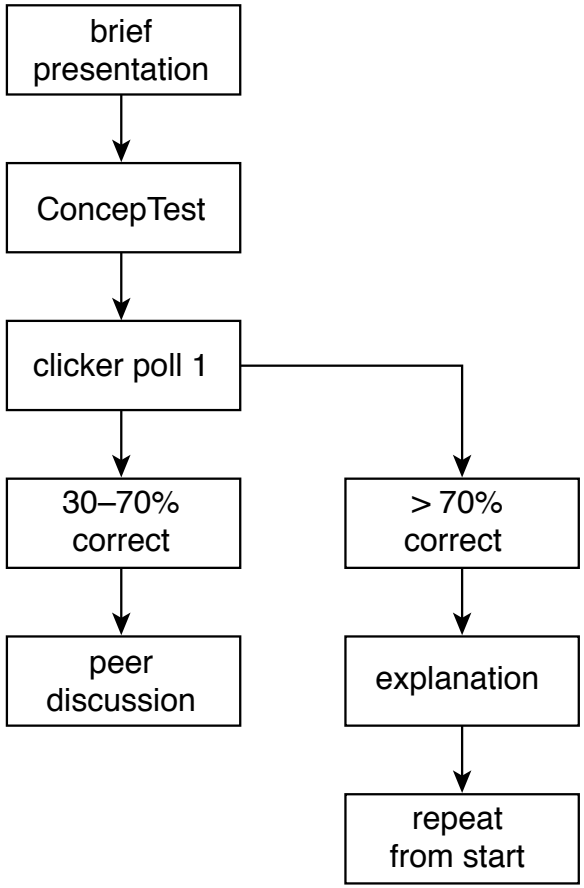
PI & JiTT Overview



PI & JiTT Overview



PI & JiTT Overview



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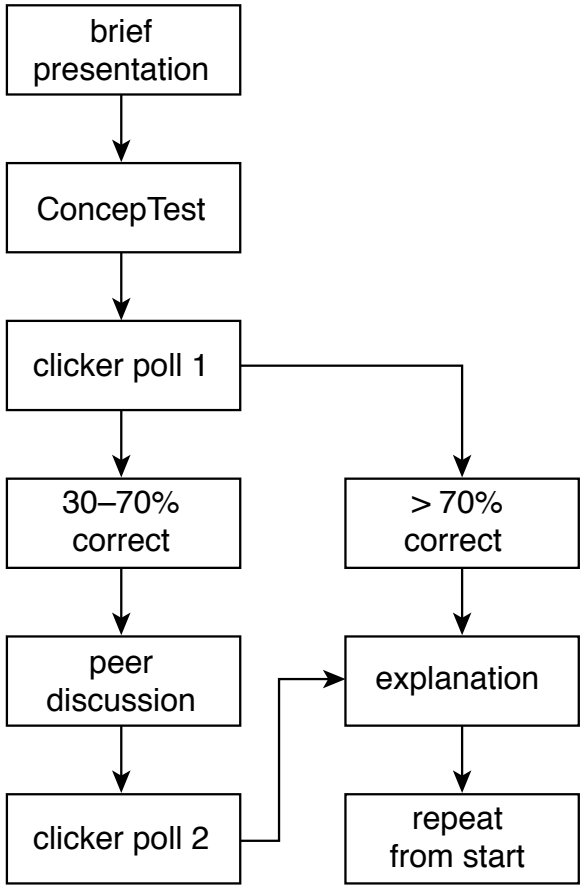
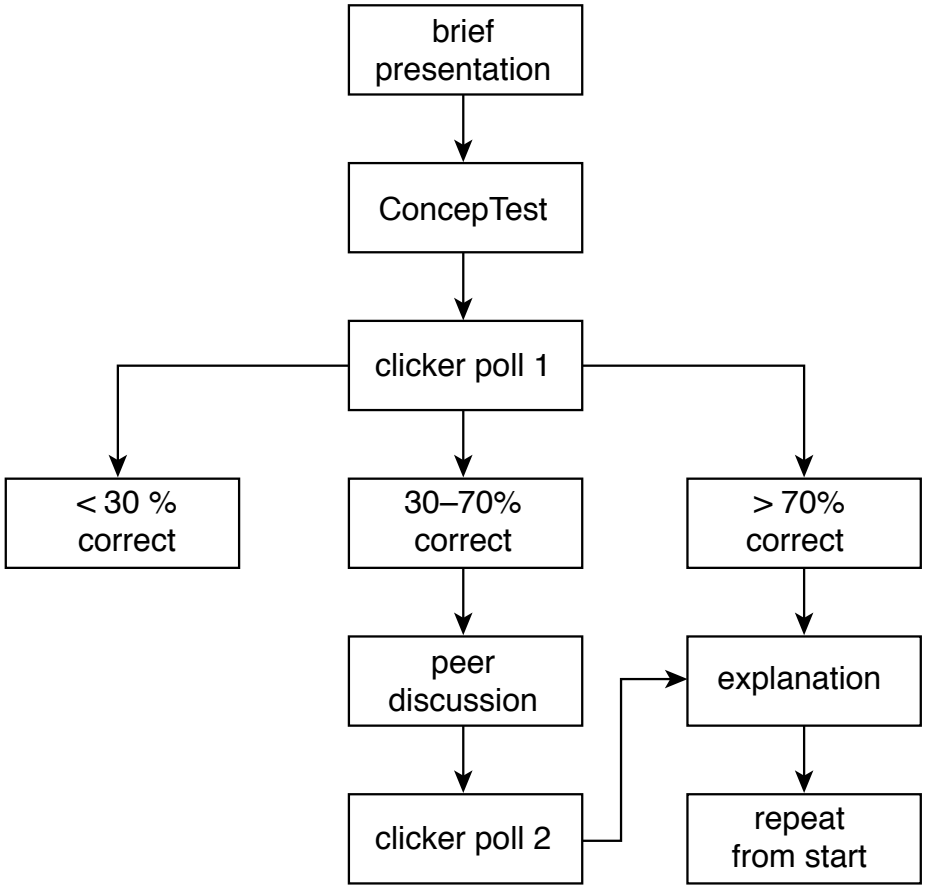
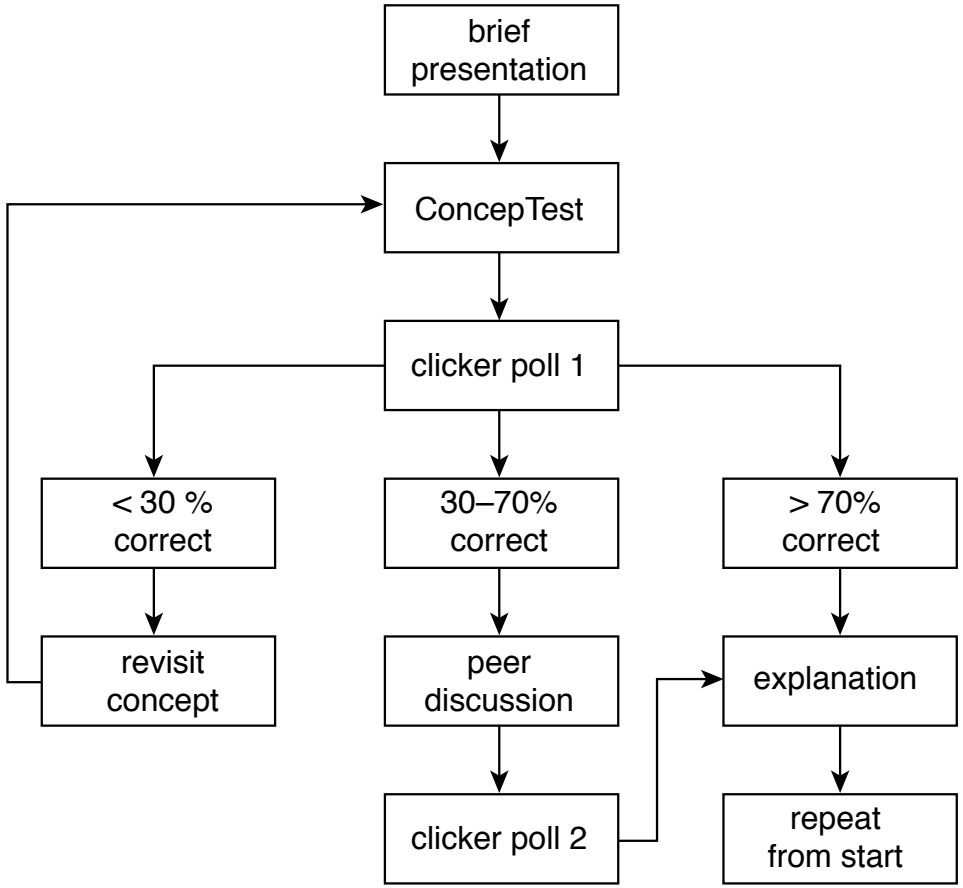


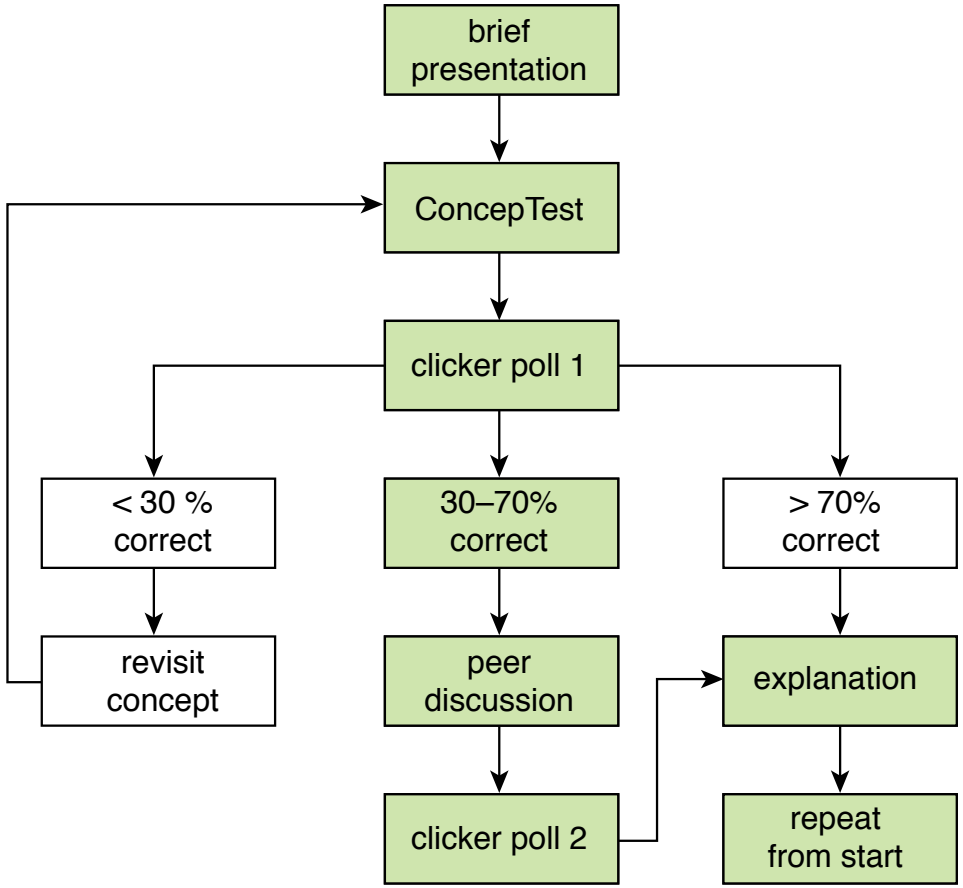
PI & JiTT Overview



PI & JiTT Overview



PI & JiTT Overview



PI & JiTT Overview

PI:

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

PI & JiTT Overview

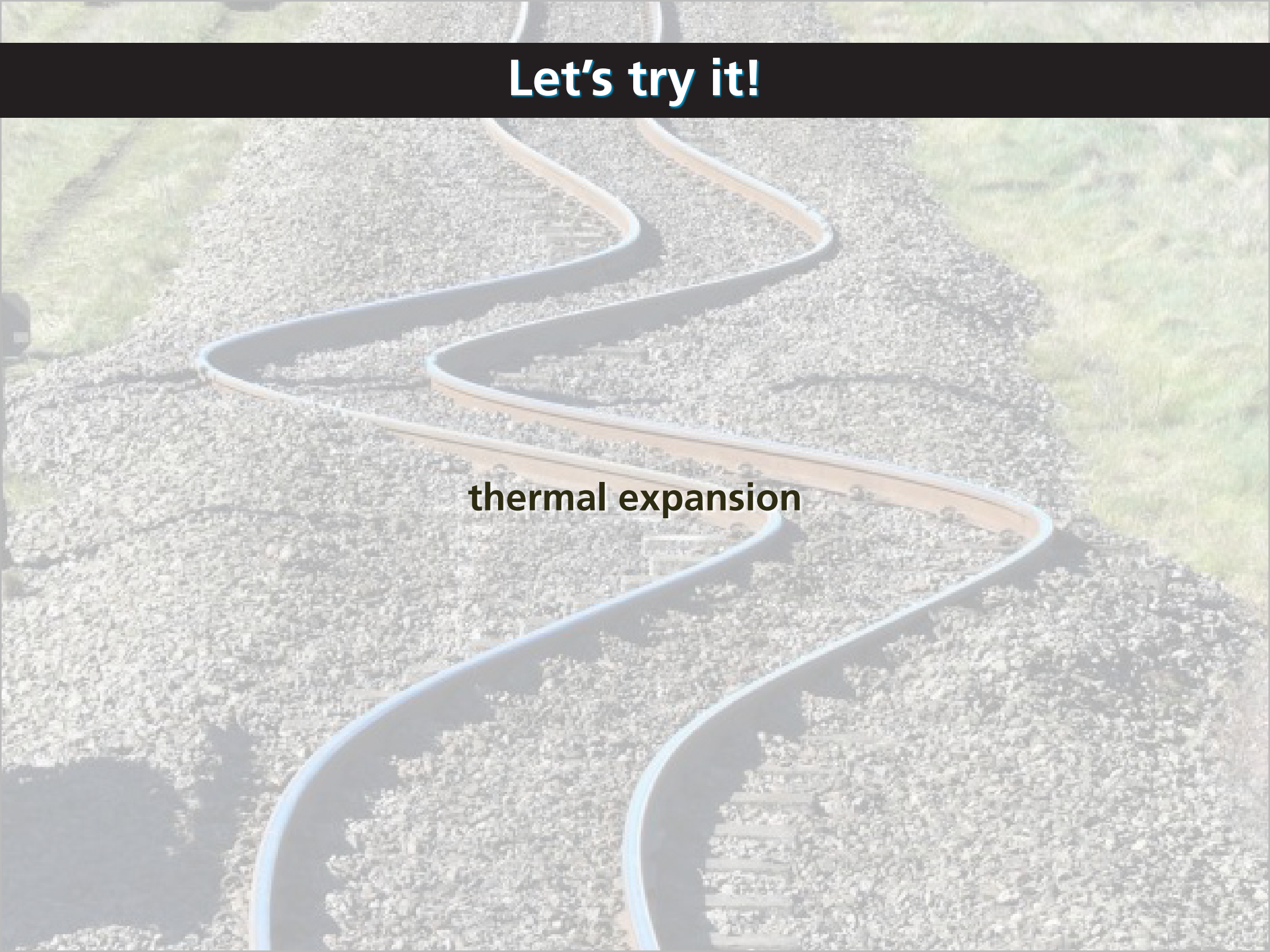
“Students tend to form homogeneous groups.

How do I promote fruitful discussion?”

PI & JiTT Overview

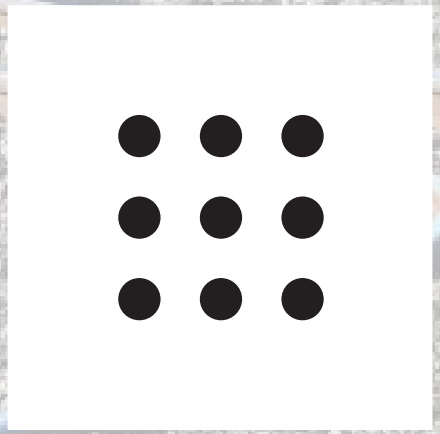
find someone with a *different* answer

Let's try it!



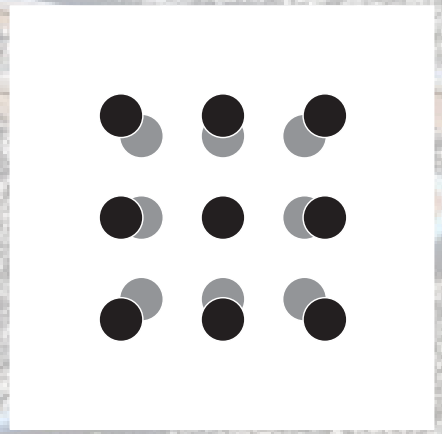
Let's try it!

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



Let's try it!

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

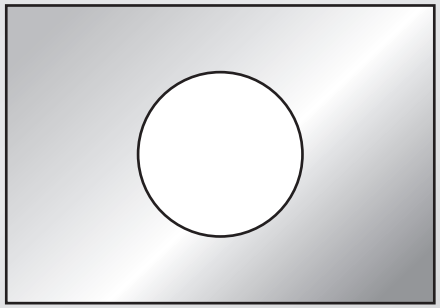


Let's try it!

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

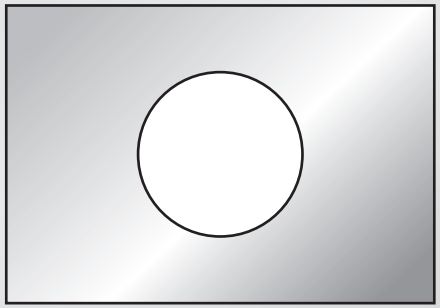
Let's try it!

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.

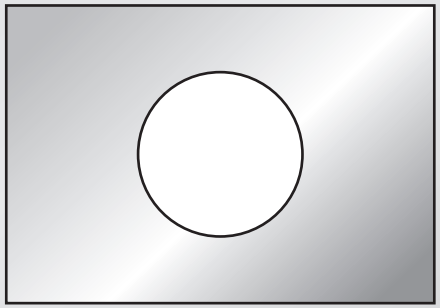
When the plate is uniformly heated, the diameter of the hole

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!

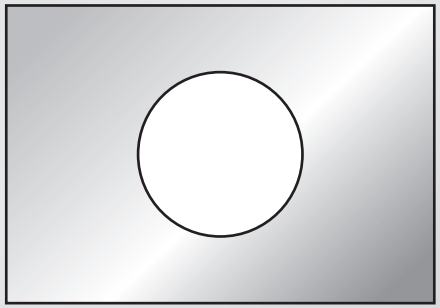
Before I tell you the answer, let's analyze what happened.

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.

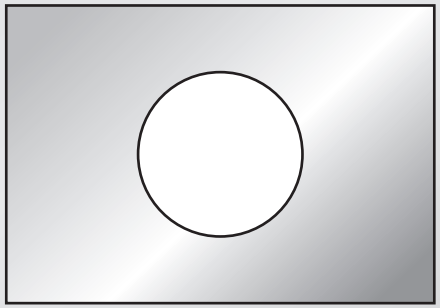


When the plate is uniformly heated, the diameter of the hole

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

Let's try it!

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

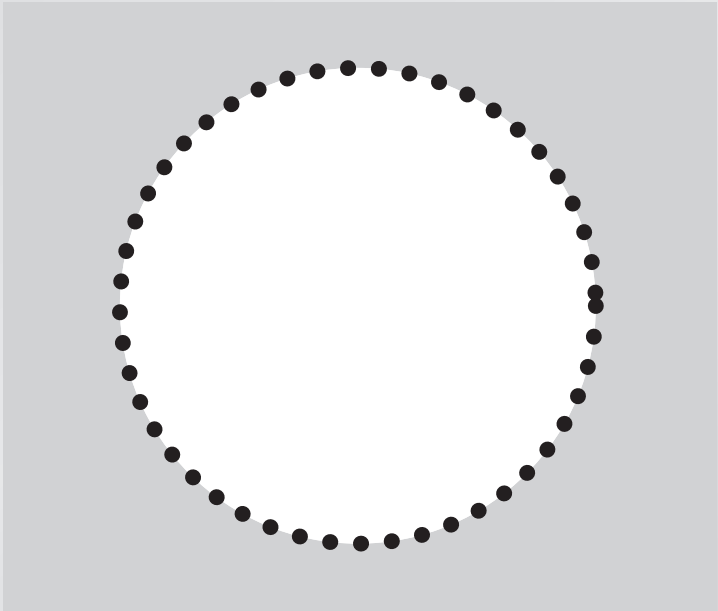


When the plate is uniformly heated, the diameter of the hole

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

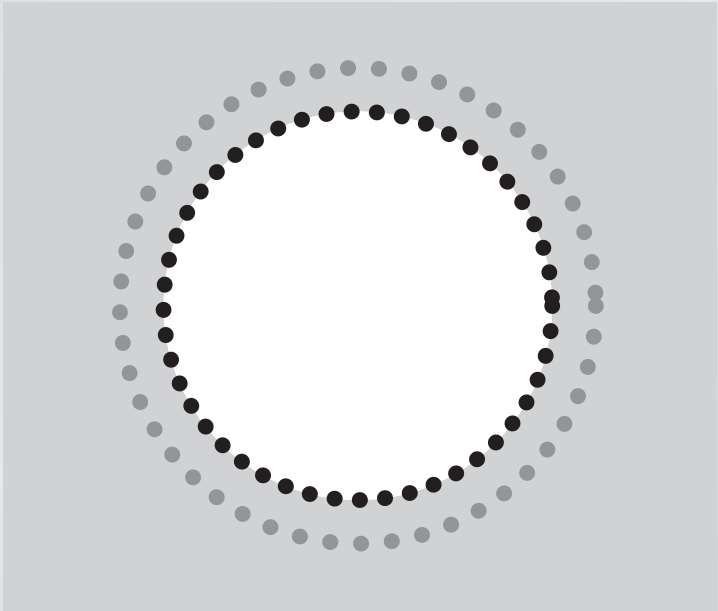
Let's try it!

consider the atoms at the rim of the hole



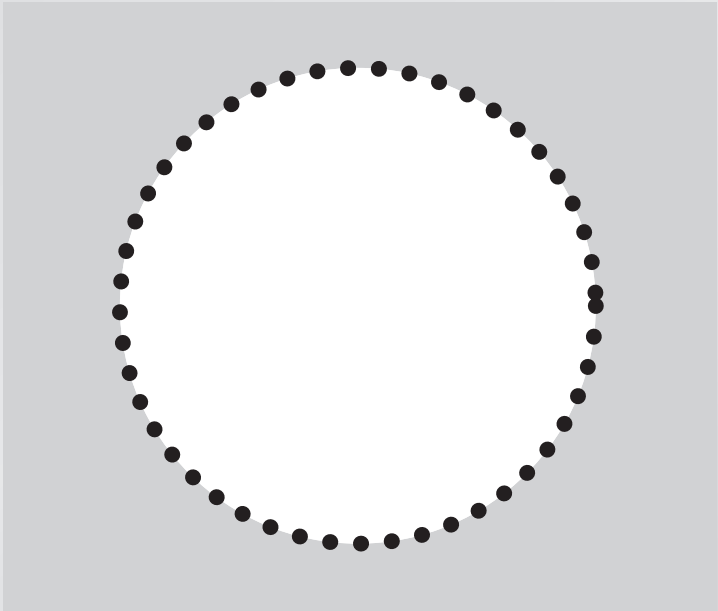
Let's try it!

consider the atoms at the rim of the hole



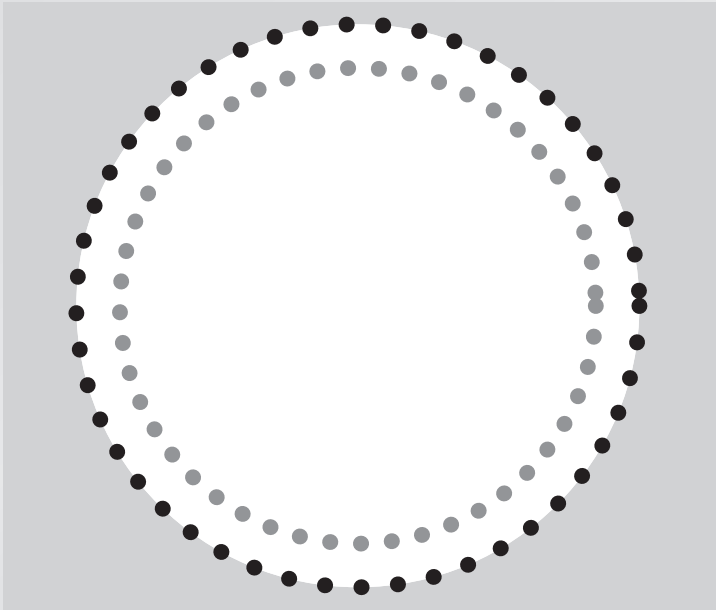
Let's try it!

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!

consider the atoms at the rim of the hole

you won't forget this

PI & JiTT Overview

“Can this method be used in my class,

where questions don’t necessarily have right answers?”

Let's try it!

You are a triage nurse in a pediatric urgent care clinic and the following patients are waiting.

Let's try it!

You are a triage nurse in a pediatric urgent care clinic and the following patients are waiting.

1. 3-yr old F with a FUO and *T* = 40 °C who is riding a tricycle in the waiting room

Let's try it!

You are a triage nurse in a pediatric urgent care clinic and the following patients are waiting.

1. 3-yr old F with a FUO and *T* = 40 °C who is riding a tricycle in the waiting room

2. 6-wk old term M, cc: fussy breast, *T* = 38.6 °C

Let's try it!

You are a triage nurse in a pediatric urgent care clinic and the following patients are waiting.

1. 3-yr old F with a FUO and *T* = 40 °C who is riding a tricycle in the waiting room

2. 6-wk old term M, cc: fussy breast, *T* = 38.6 °C

3. 14-yr old M with hx of epilepsy who had a seizure at home lasting 5 minutes about half hour ago

Let's try it!

You are a triage nurse in a pediatric urgent care clinic and the following patients are waiting.

1. 3-yr old F with a FUO and *T* = 40 °C who is riding a tricycle in the waiting room

2. 6-wk old term M, cc: fussy breast, *T* = 38.6 °C

3. 14-yr old M with hx of epilepsy who had a seizure at home lasting 5 minutes about half hour ago

Whom would you triage first?

Let's try it!

You are a triage nurse in a pediatric urgent care clinic and the following patients are waiting.

1. 3-yr old F with a FUO and *T* = 40 °C who is riding a tricycle in the waiting room

2. 6-wk old term M c/c: fussy breast, *T* = 38.6 °C

3. 14-yr old M with hx of epilepsy who had a seizure at home lasting 5 minutes about half hour ago

you got all engaged!

Whom would you triage first?

PI & JiTT Overview

Don’t need a correct answer!

Outline

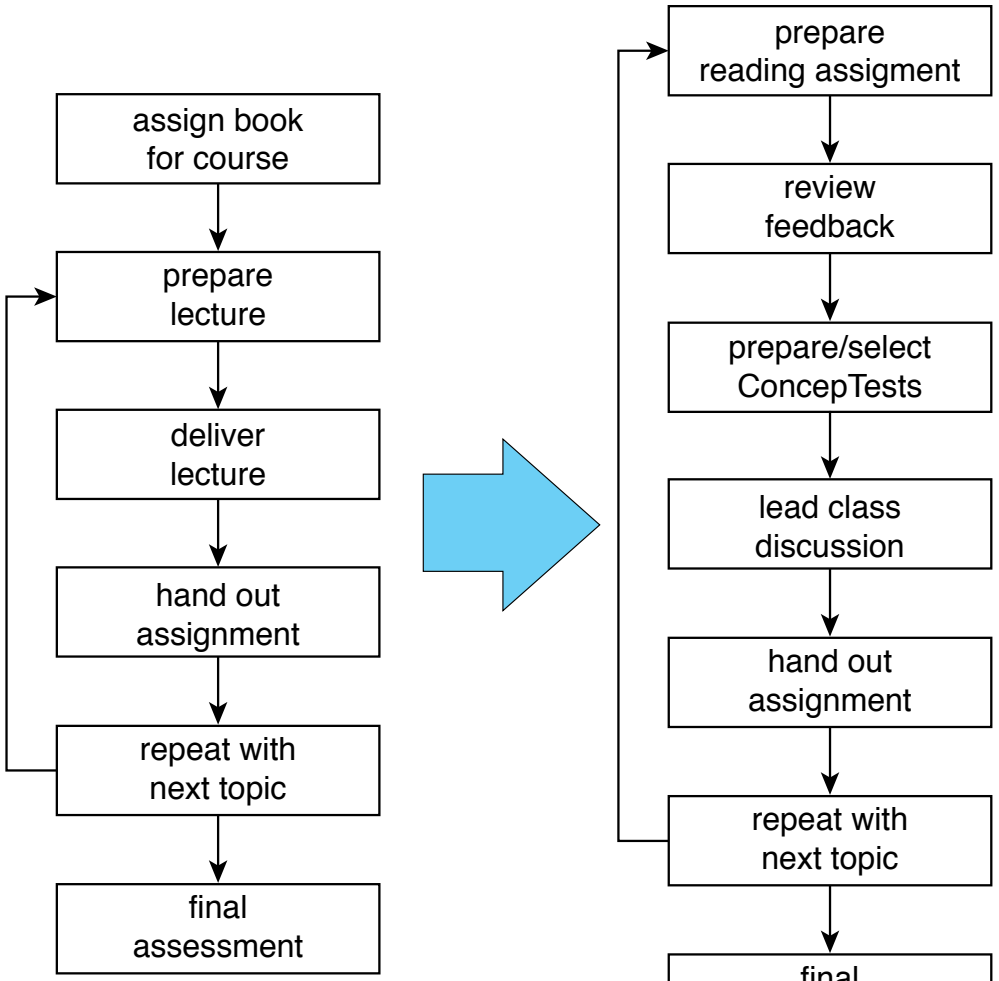
- PI & JiTT Overview
- **Implementing PI & JiTT**
- ConcepTests

Implementing PI & JiTT

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

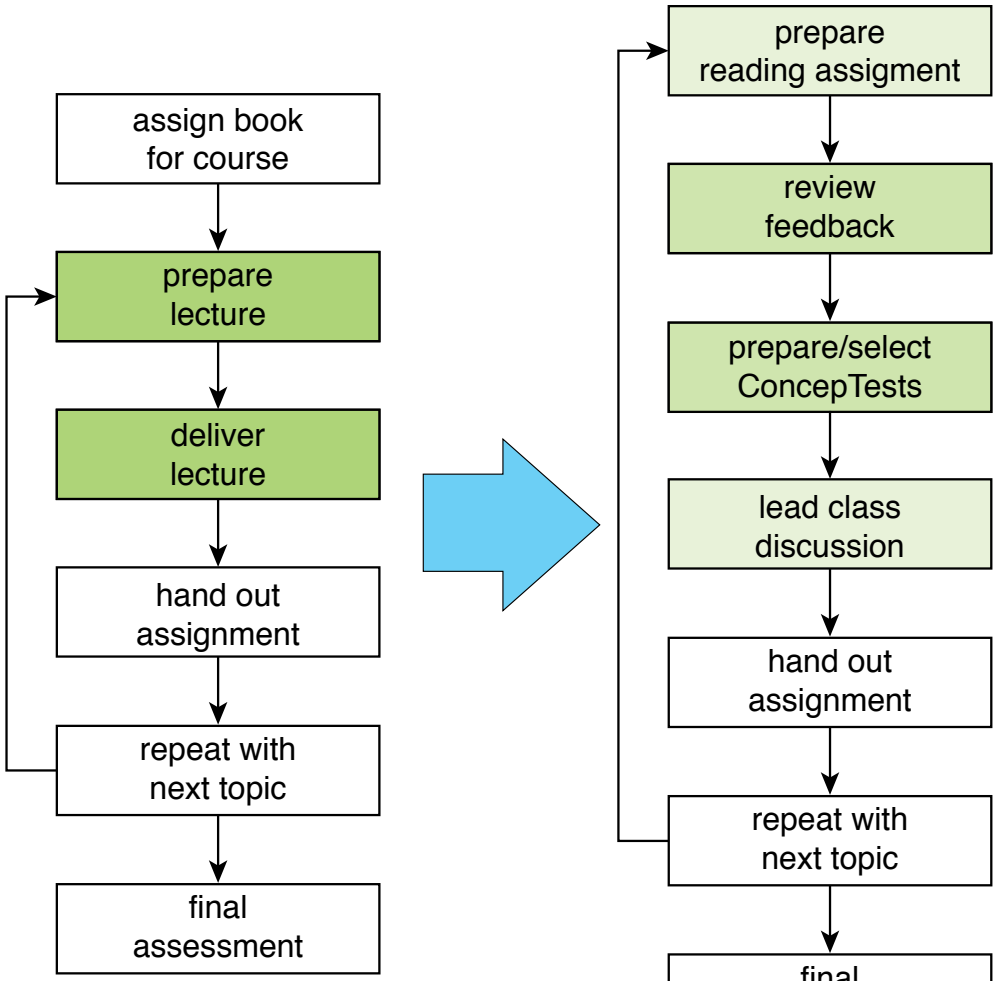
Implementing PI & JiTT

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

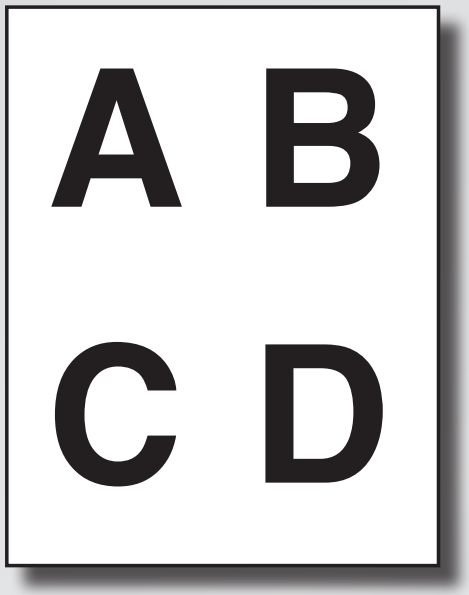
“How do I make sure all topics can be covered using this method?”

Implementing PI & JiTT

"Do I need clickers?"

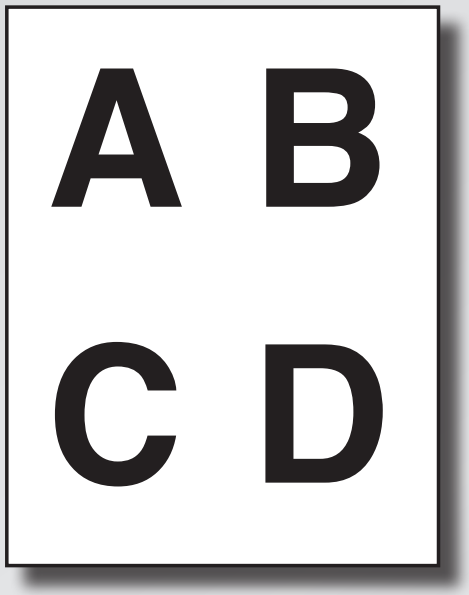
Implementing PI & JiTT

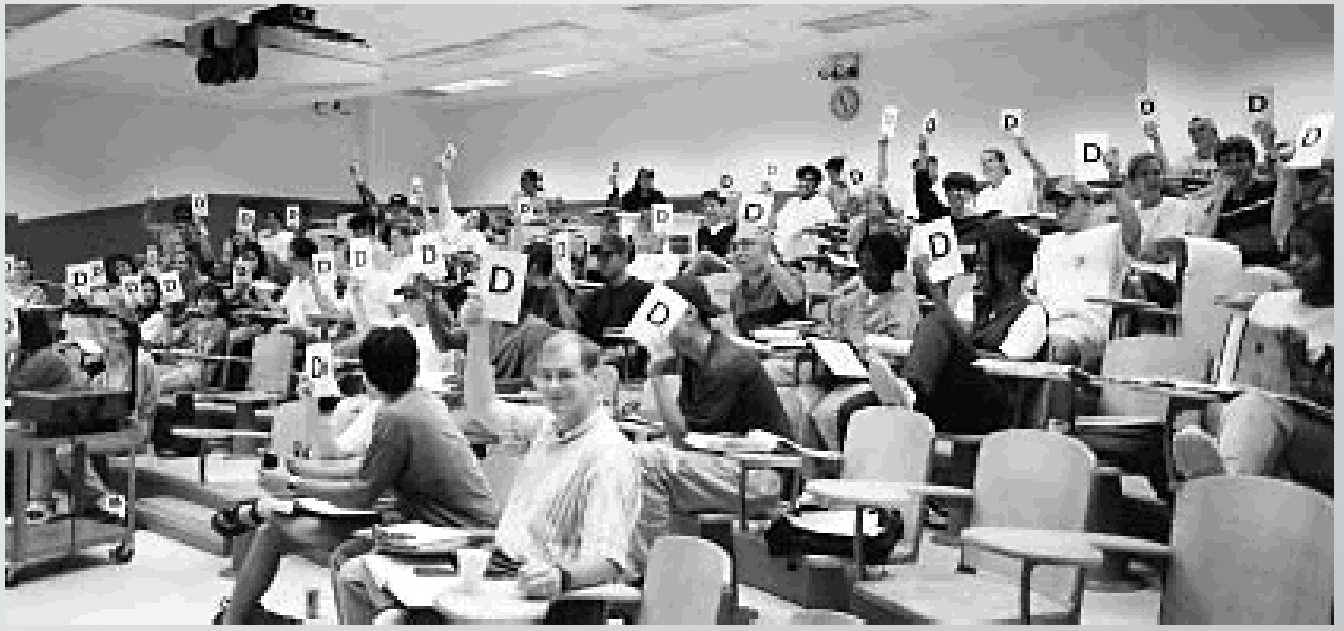
Flashcards: simple and effective



Implementing PI & JiTT

Flashcards: simple and effective





Meltzer and Mannivanan, South Eastern Louisiana University

Implementing PI & JiTT

The first priority action for a patient experiencing asthma exacerbation is:

Implementing PI & JiTT

The first priority action for a patient experiencing asthma exacerbation is:

1. auscultate breathing sounds
2. position to reduce work of breathing
3. administer bronchodilators via O_2-driven nebulizer
4. determine history of last attack and Rx

Implementing PI & JiTT

The first priority action for a patient experiencing asthma exacerbation is:

you got all fired up!

1. auscultate breathing sounds
2. position to reduce work of breathing
3. administer bronchodilators via O_2-driven nebulizer
4. determine history of last attack and Rx

Implementing PI & JiTT

The first priority action for a patient experiencing asthma exacerbation is:

1. auscultate breathing sounds
2. position to reduce work of breathing
3. administer bronchodilators via O_2-driven nebulizer
4. determine history of last attack and Rx

you got all fired up!

without clickers

Implementing PI & JiTT

You all got fired up!

Implementing PI & JiTT

You all got fired up!

(WITHOUT CLICKERS!)

Implementing PI & JiTT

Research: same learning gains with and without clickers!

Clickers or Flashcards: Is There Really a Difference?
N. Lasry, *The Physics Teacher* 46 (2008) 242

Implementing PI & JiTT

It's not the technology, but the pedagogy!

Implementing PI & JiTT

It's not the technology, but the pedagogy!

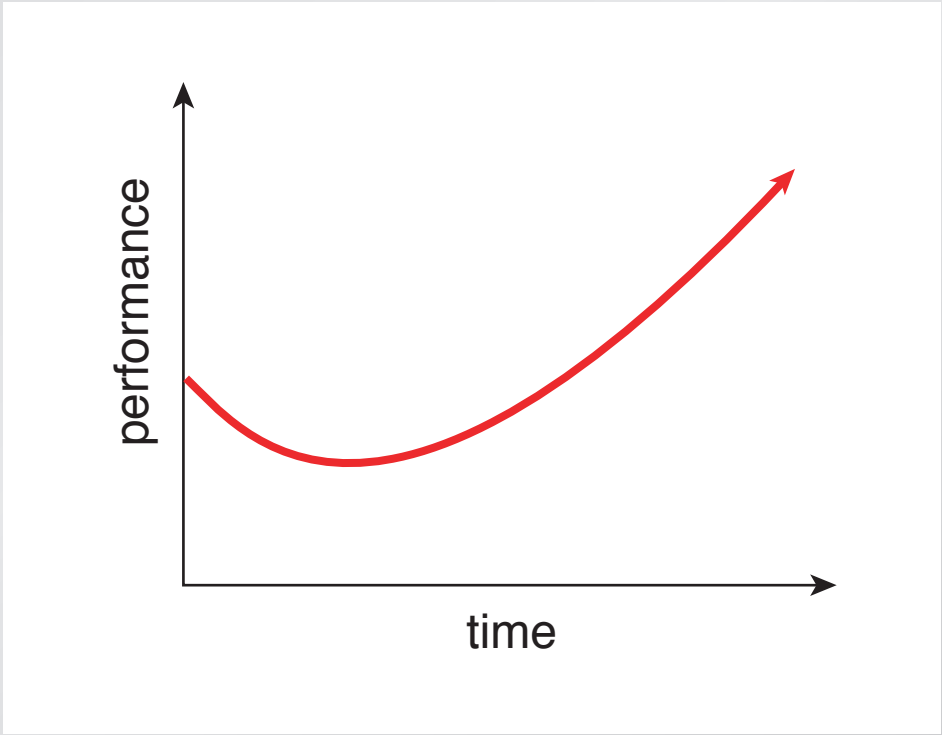
(but clickers do offer advantages)

Implementing PI & JiTT

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

Implementing PI & JiTT

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



Implementing PI & JiTT

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.

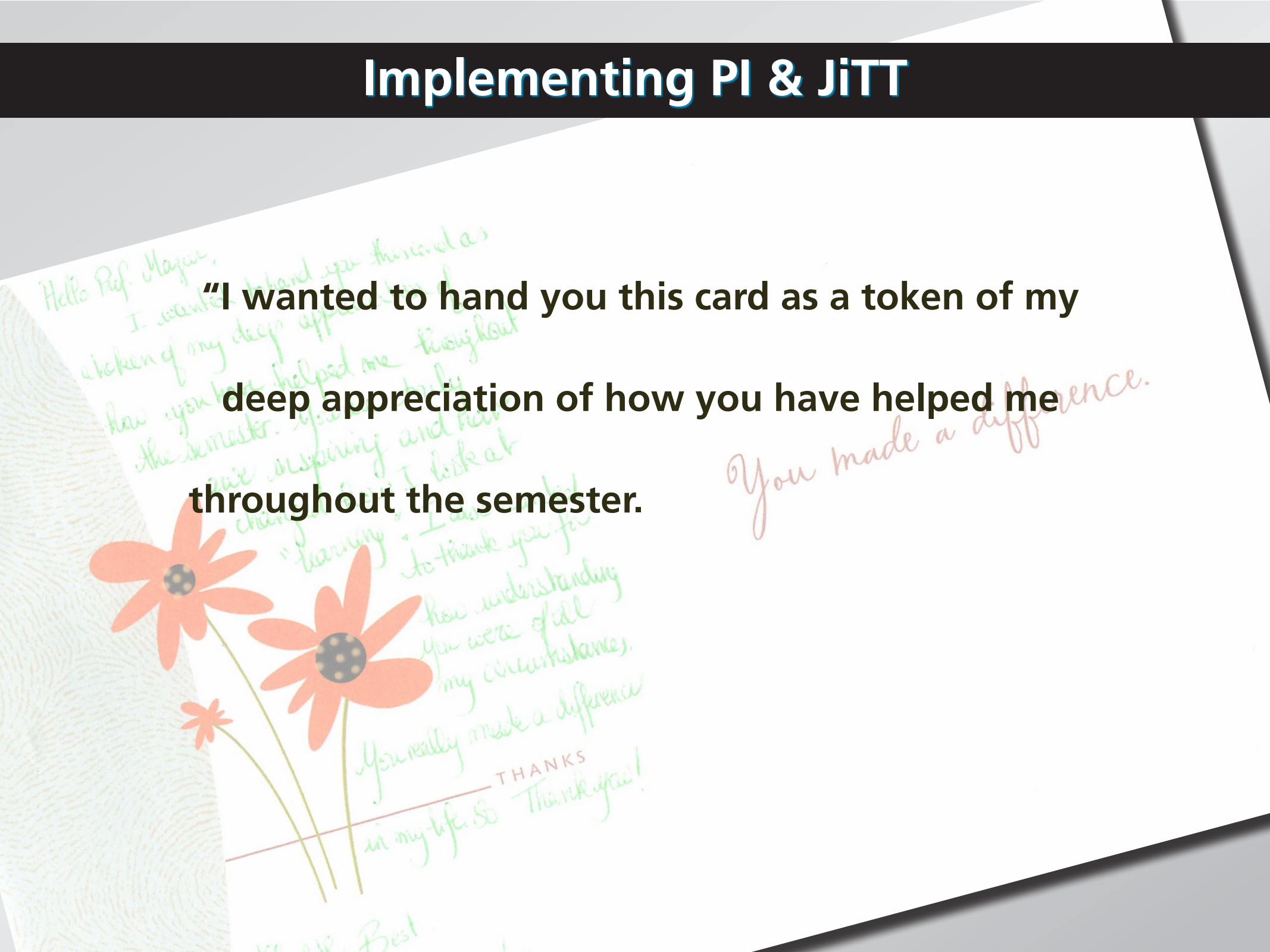
Implementing PI & JiTT

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!

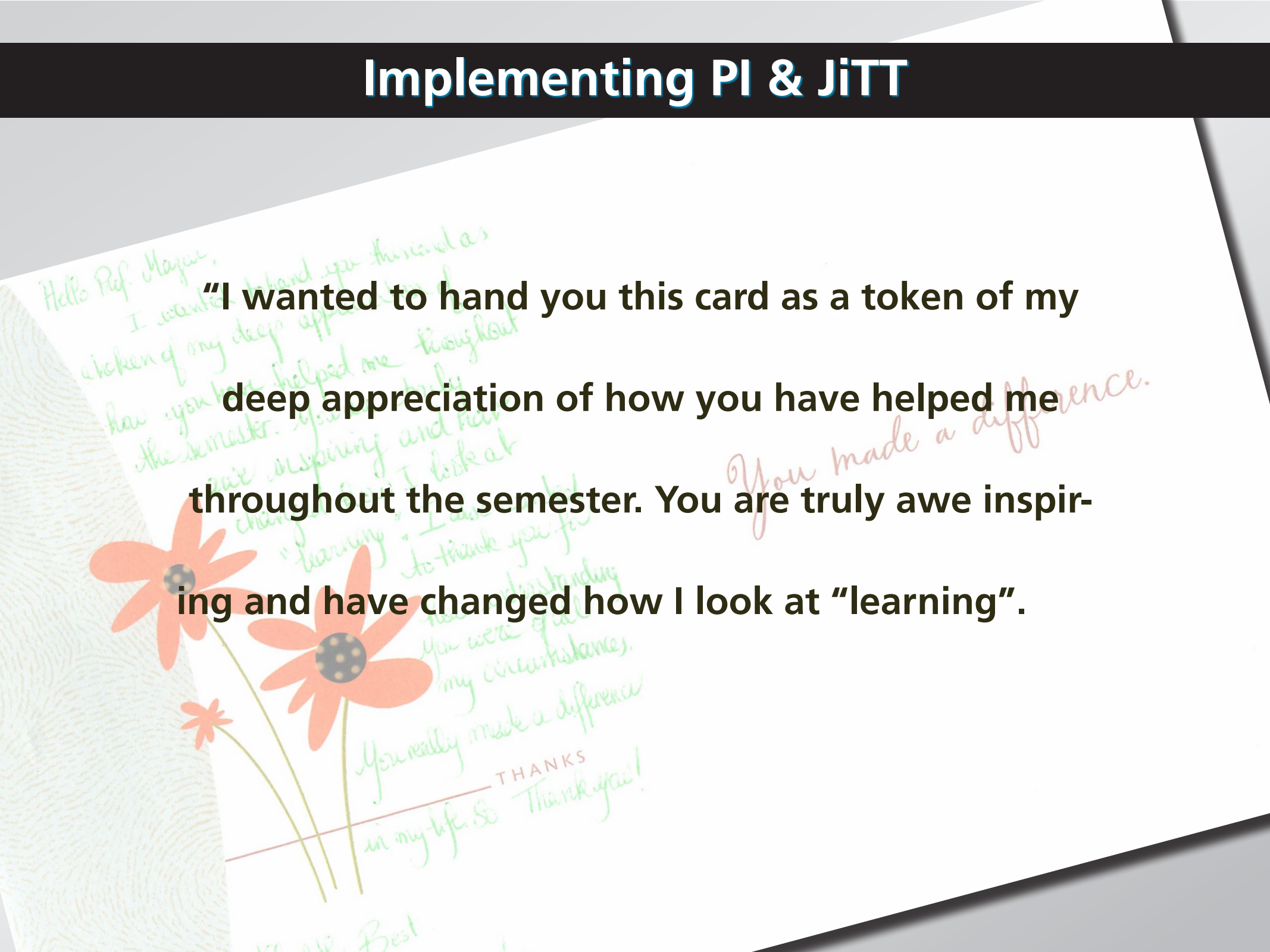
Implementing PI & JiTT

Implementing PI & JiTT

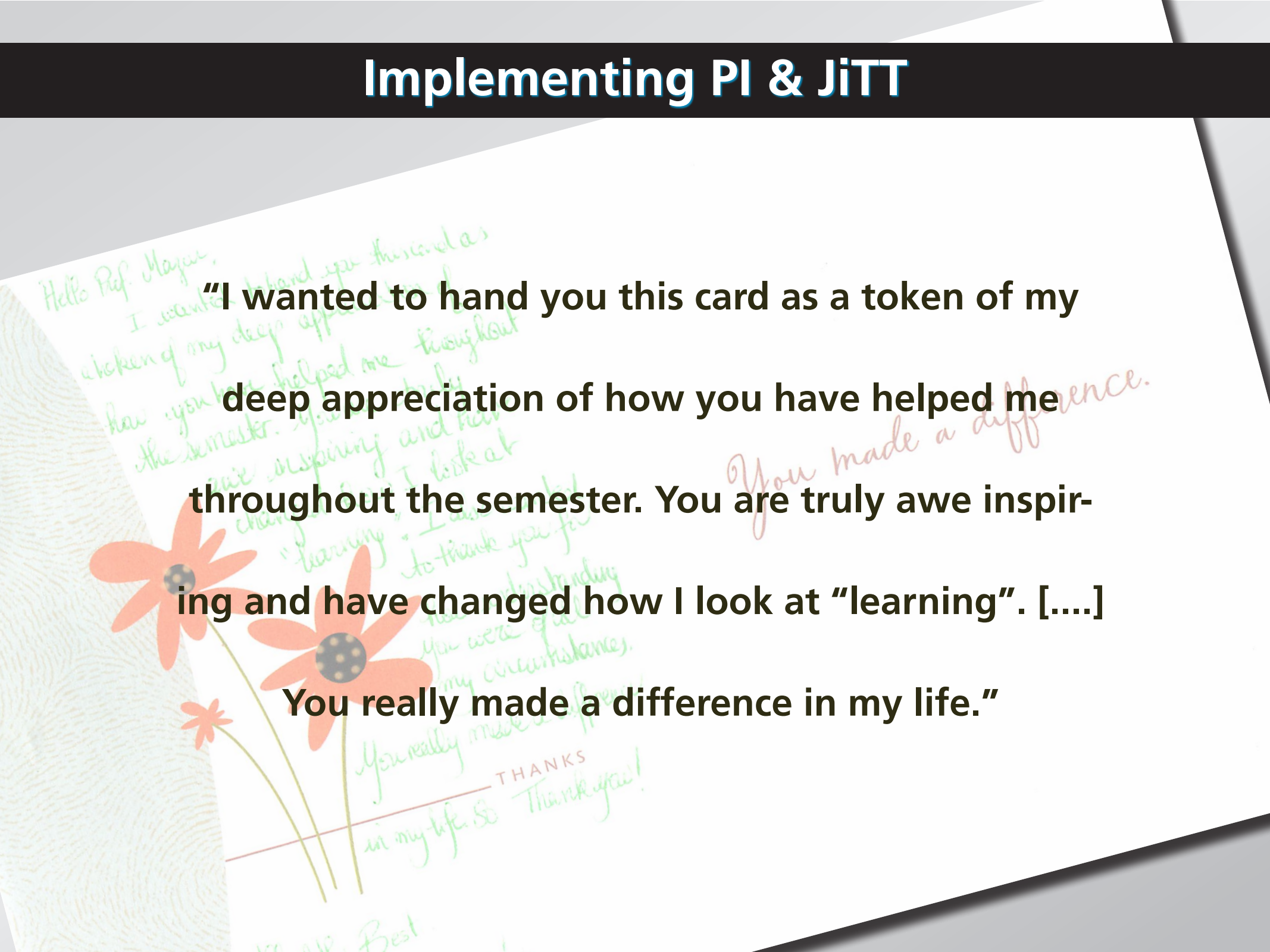


"I wanted to hand you this card as a token of my deep appreciation of how you have helped me throughout the semester.

Implementing PI & JiTT



Implementing PI & JiTT



"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."

Implementing PI & JiTT

and don’t forget…

Implementing PI & JiTT

and don’t forget…

PI leads to better learning and retention!

Outline

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

ConcepTests

"How do I get examples of good questions?"

ConcepTests

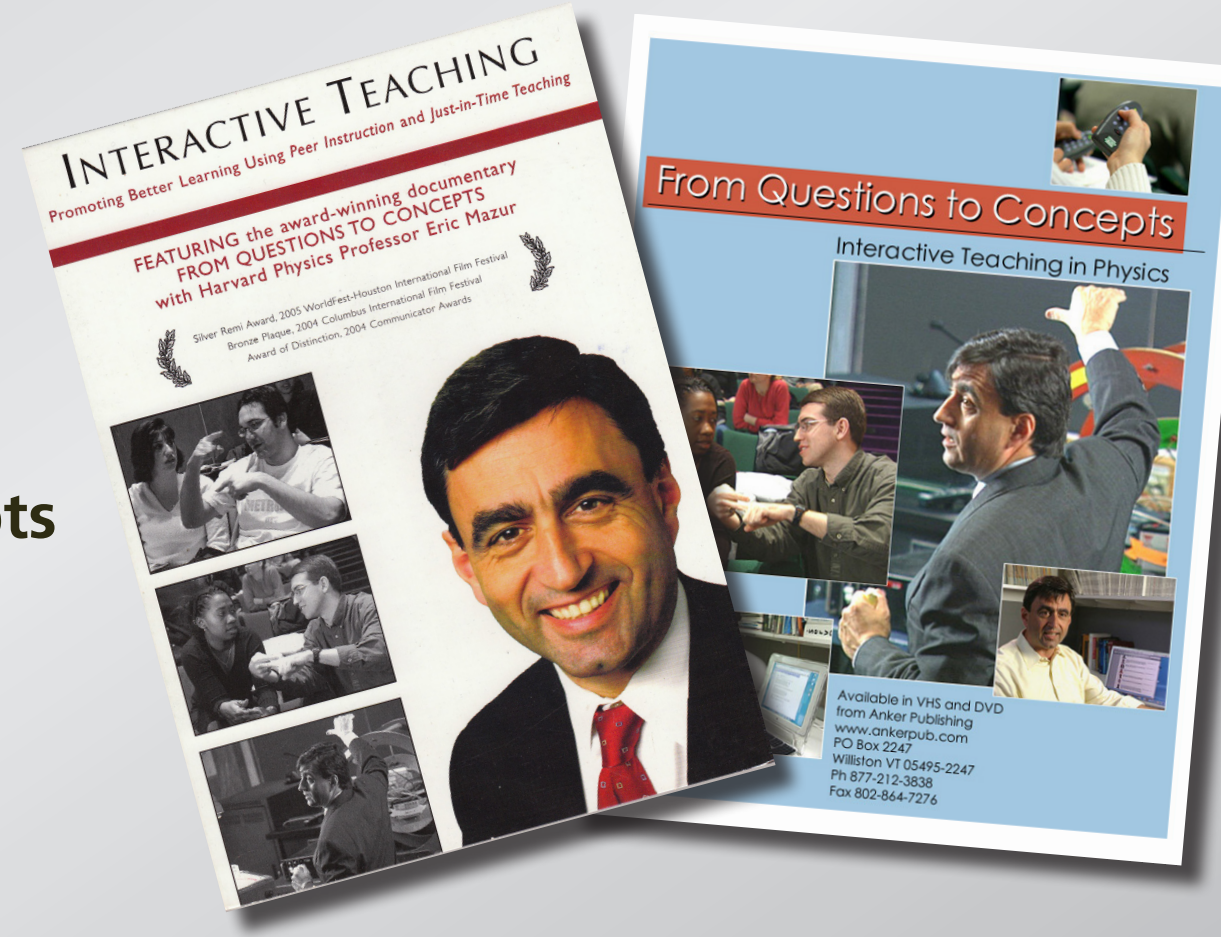
Books with ConcepTests:

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

ConcepTests

Videos:

- Interactive Teaching DVD
- From questions to concepts



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

ConcepTests

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.

ConcepTests

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.

ConcepTests

hole in plate

triage/asthma

airline

model

discussion

fact

ConcepTests

hole in plate

triage/asthma

airline

model

discussion

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


Join now!
PeerInstruction.net

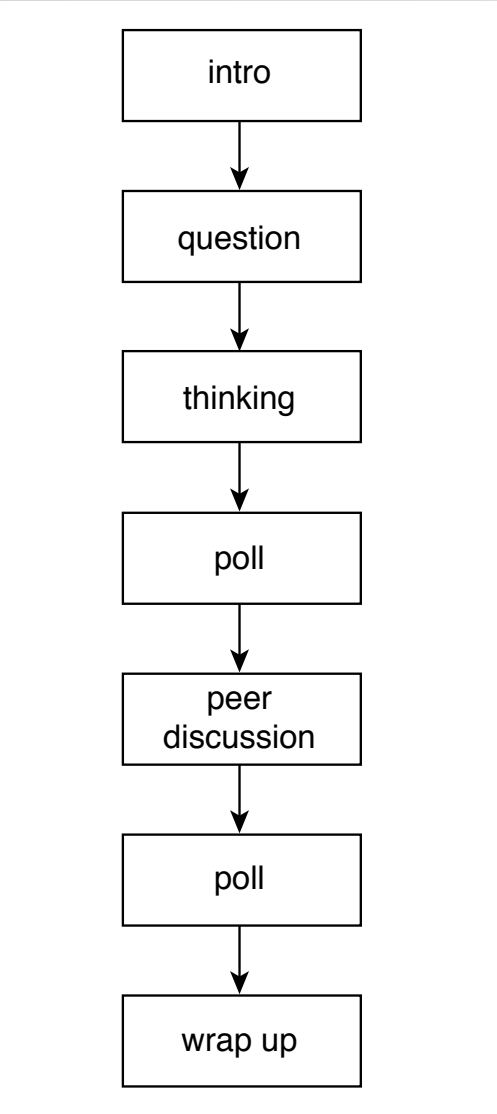
Peer Instruction: ConcepTest design

16th Annual Health Occupations Educator Institute
Ontario, CA, 3 April 2012

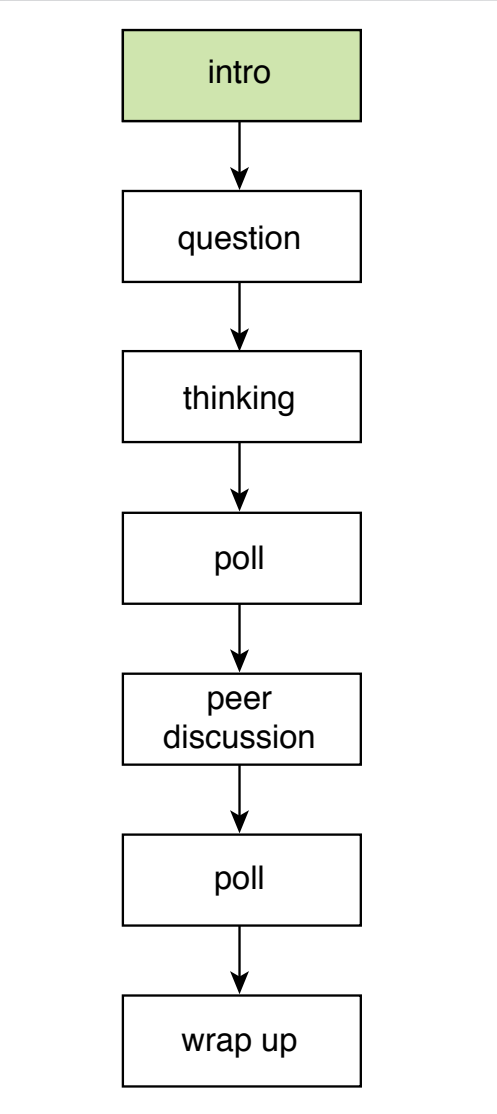
ConcepTests

"What are the important parts of a ConcepTest?"

ConcepTests

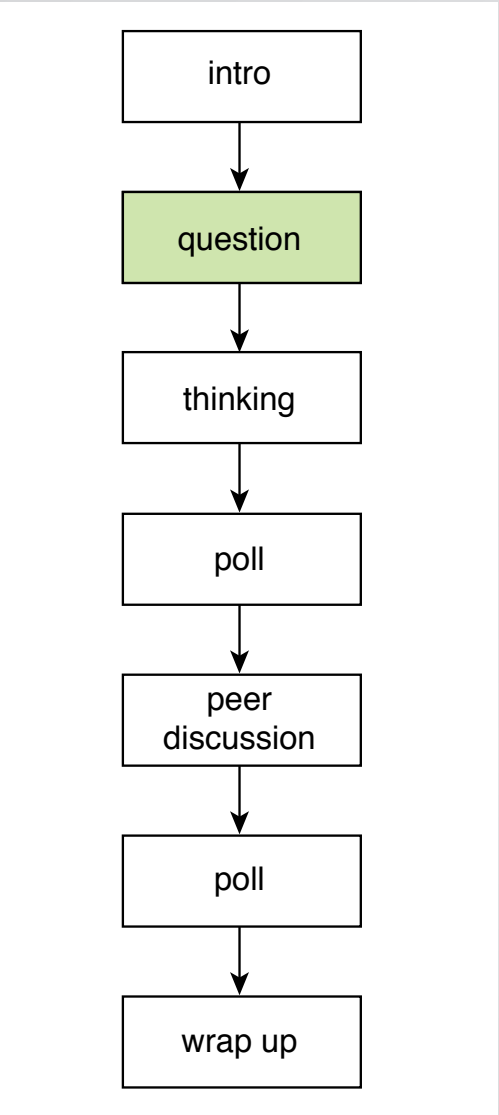


ConcepTests



setting context

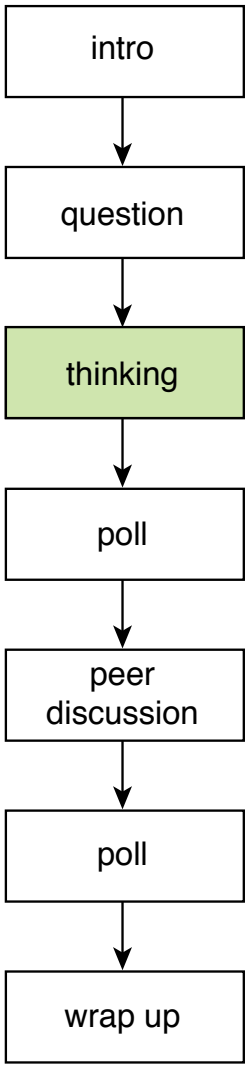
ConcepTests



setting context

posing question

ConcepTests

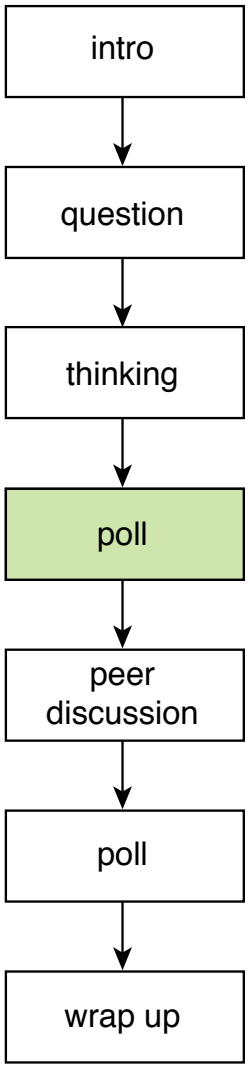


setting context

posing question

reflection

ConcepTests



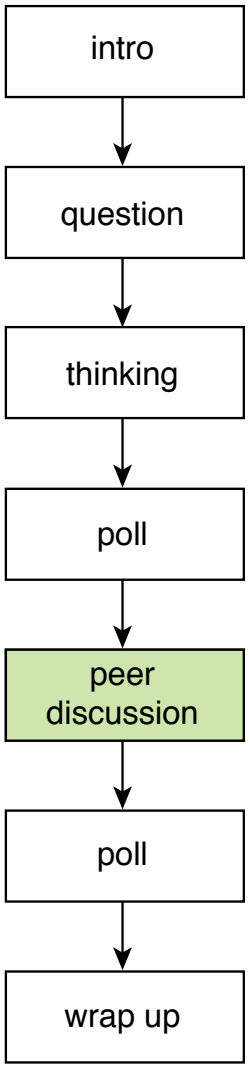
setting context

posing question

reflection

baseline data

ConcepTests



setting context

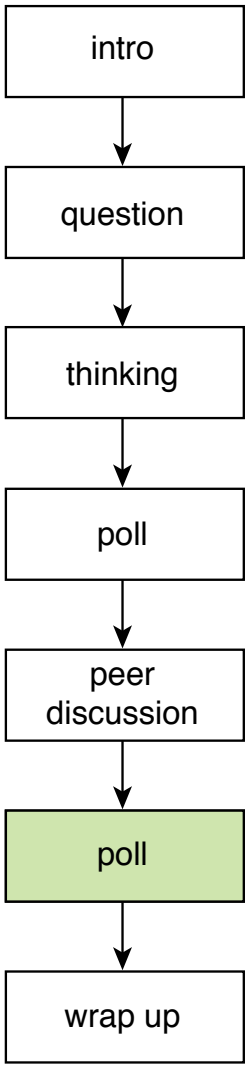
posing question

reflection

baseline data

peer instruction

ConcepTests



setting context

posing question

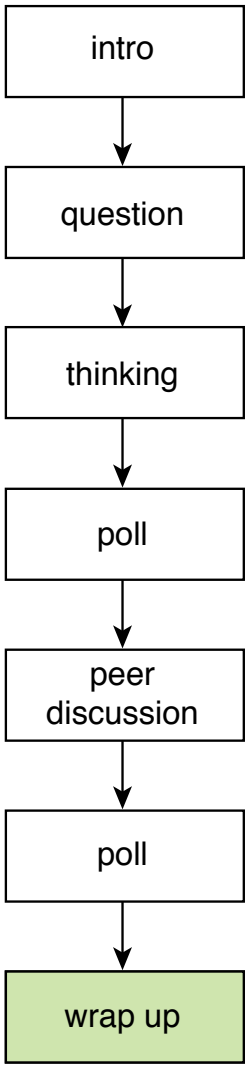
reflection

baseline data

peer instruction

gain data

ConcepTests



setting context

posing question

reflection

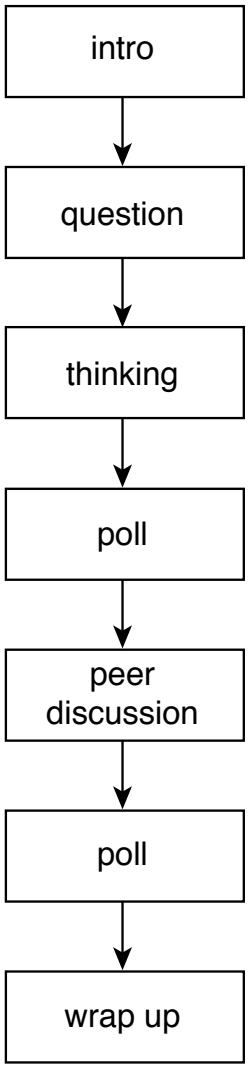
baseline data

peer instruction

gain data

closure

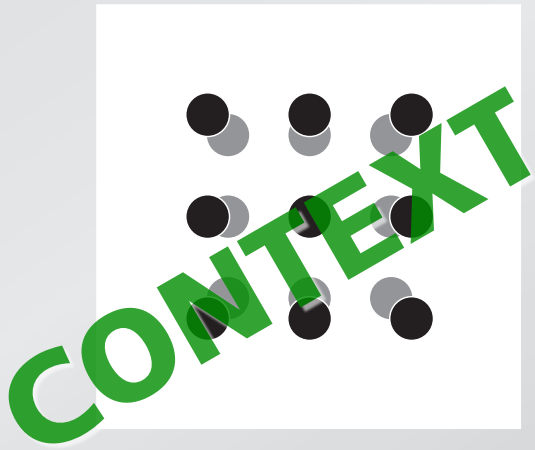
ConcepTests



setting context	5 min (max)
posing question	1 min
reflection	1–2 min
baseline data	
peer instruction	2–3 min
gain data	
closure	5 min (max)

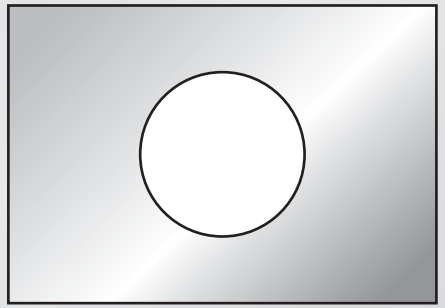
ConcepTests

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



ConcepTests

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



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

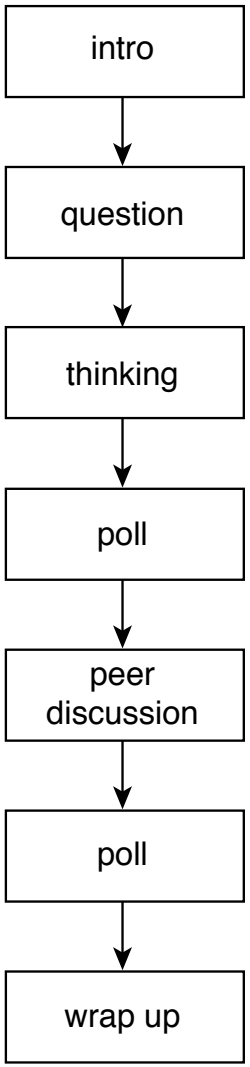
1. increases.
2. stays the same.
3. decreases.

QUESTION

ConcepTests

consider the atoms at the rim of the hole

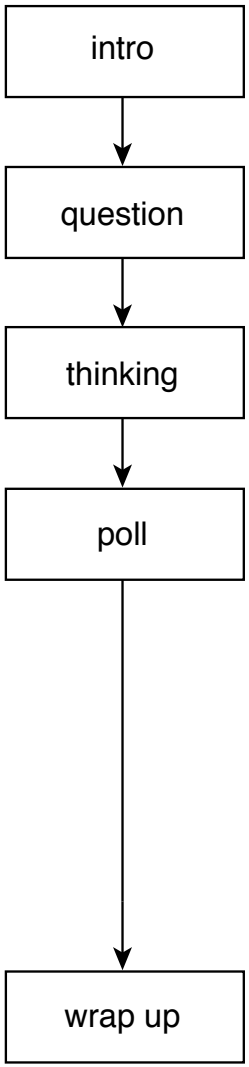
ConcepTests



setting context	5 min (max)
posing question	1 min
reflection	1–2 min
baseline data	
peer instruction	2–3 min
gain data	
closure	5 min (max)

ConcepTests

potential shortcuts

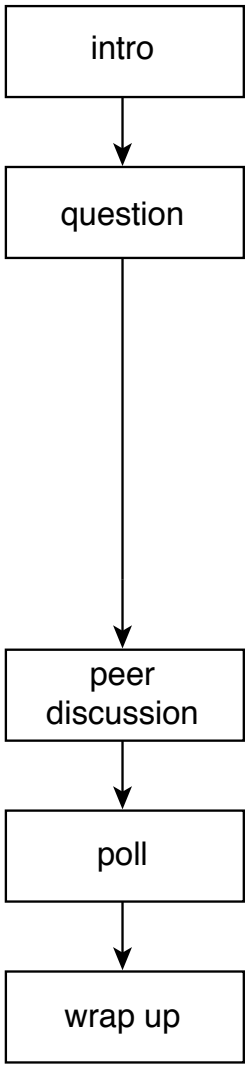


2–3 min saved, but…

takes the “Peer” out of “Peer Instruction”

ConcepTests

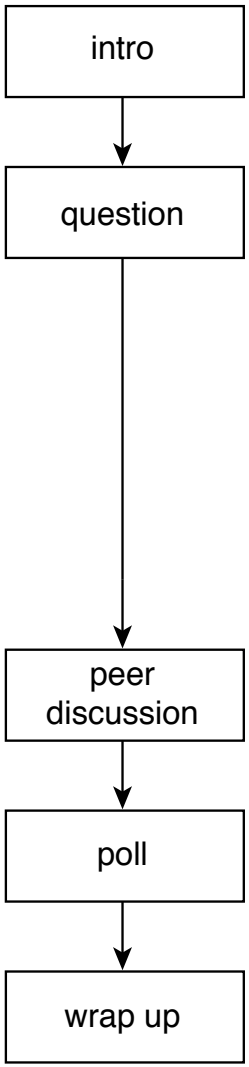
potential shortcuts



launch straight into discussion?

ConcepTests

potential shortcuts

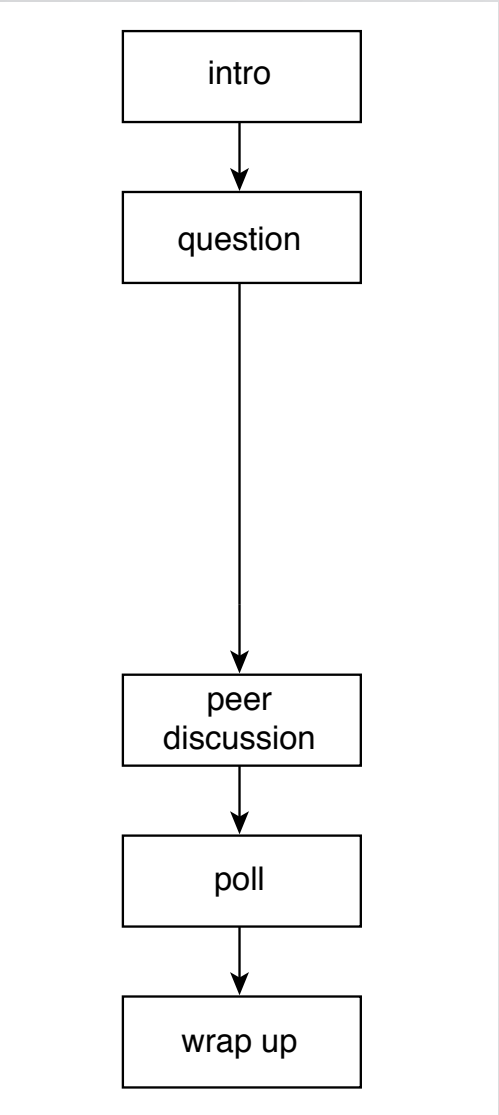


1–2 min saved, but…

no opportunity to commit before discussion

ConcepTests

potential shortcuts



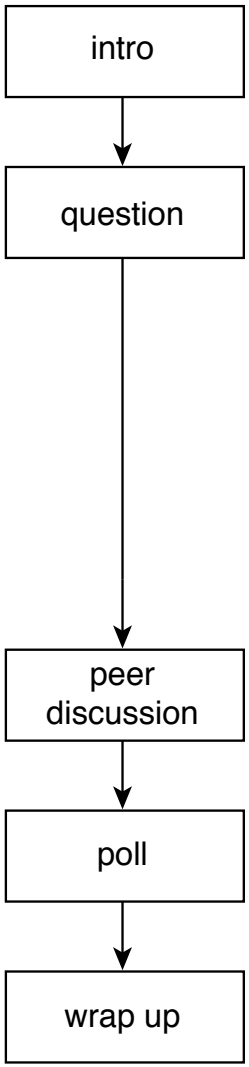
1–2 min saved, but…

no opportunity to commit before discussion

Boyle, *et. al*, Studies in Higher Education, 28, 4 (2003) 457

ConcepTests

potential shortcuts



1–2 min saved, but…

no opportunity to commit before discussion

(and no information on effectiveness of CT!)

ConcepTests

should count on about 15 min per ConcepTest

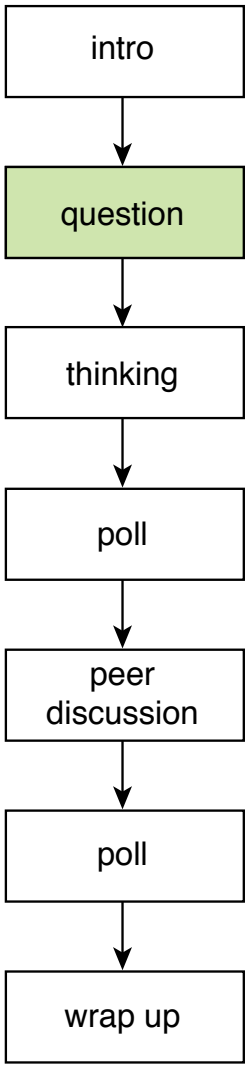
ConcepTests

should count on about 15 min per ConcepTest

(including two pollings)

ConcepTests

To create **YOUR** ConcepTests, you need…



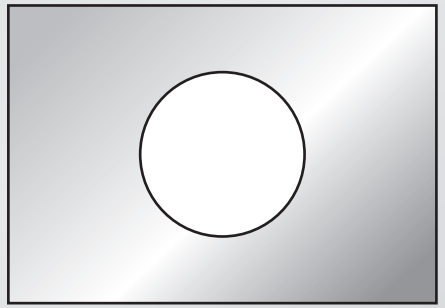
1. context

2. question

3. closure

ConcepTests

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



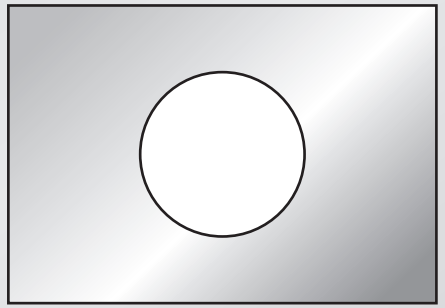
When the plate is uniformly heated, the diameter of the hole

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

QUESTION

ConcepTests

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



stem

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

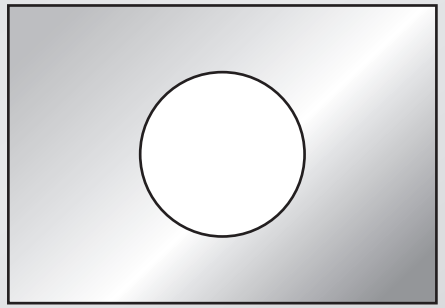
QUESTION

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

ConcepTests

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

stem



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

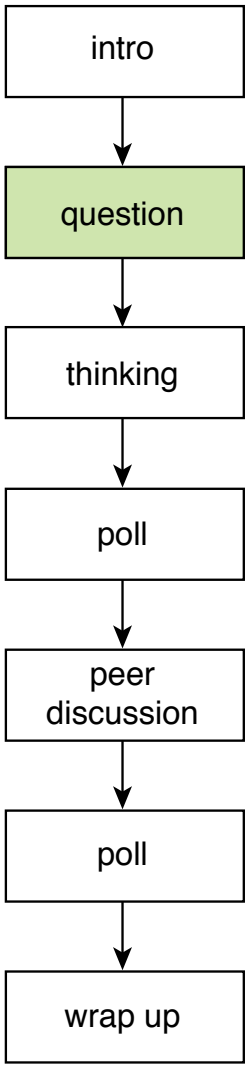
choices

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

QUESTION

ConcepTests

some basic design rules

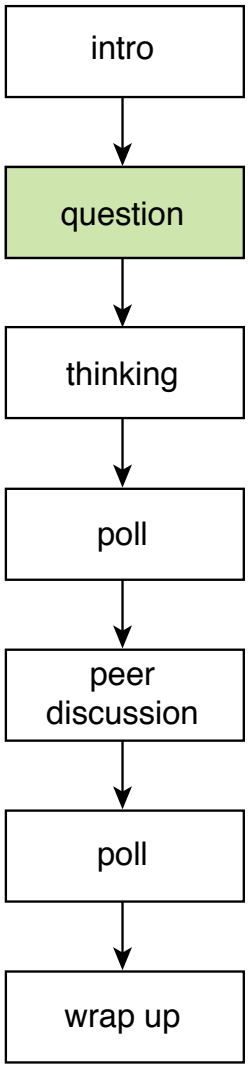


General tips:

- focus on one idea/concept/model
- keep questions concise
- define all terms
- keep vocabulary simple

ConcepTests

some basic design rules

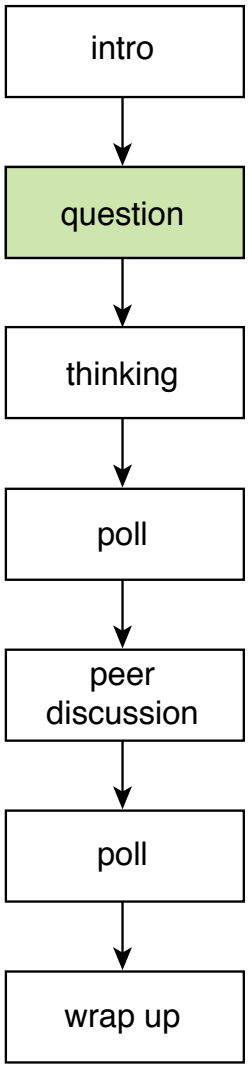


Remove:

- barriers for knowledgeable students
- clues for less-knowledgeable students

ConcepTests

some basic design rules

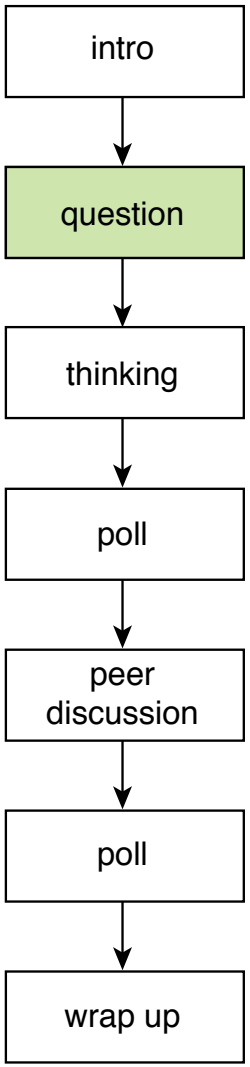


Writing good “stems”:

- ask complete question
- avoid common knowledge
- avoid negative statements (“not”, “no”,…)

ConcepTests

some basic design rules



Writing good answer choices:

- aim for 3–5 options
- order choices logically
- make all roughly same length
- avoid repeating words (move to stem)
- avoid “All/None of the above”, “Other”

ConcepTests

Example: a nonsense question

Choose most likely correct answer, based on what you know about informed guessing on tests.

Under what circumstances do *ermazoa* coagulate?

A. Only when *jushespora* increase.

B. Only when *jushespora* change color.

C. When *jushespora* draw into a circle.

D. Usually when *jushespora* increase, but occasionally when *jushespora* decrease.

ConcepTests

Example: another nonsense question

What is the color of *ermazoa*?

A. Blue.

B. Red.

C. Green.

D. Yellow.

ConcepTests

Example: a well-crafted question

Which statement constitutes a measurement as opposed to evaluation?

A. Paul's score of 20 on this test indicates that his study habits are ineffective.

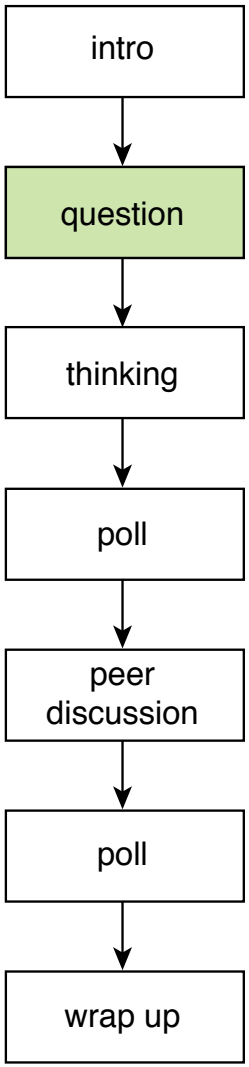
B. Mary's test scores have increased satisfactorily this year.

C. Emily got 90% correct on her math quiz.

D. Linda received a B+ for her art project.

Assignment

in groups of 2–3…



1. formulate a ConcepTest
2. prepare 3 slides (context, question, closure)
3. try question on other groups at table
4. select best ConcepTest at table

ConcepTests

GREAT JOB!

ConcepTests

even if your CT is not perfect, it will stimulate thinking

Quick survey…

After this introduction to Peer Instruction,

please rate your agreement with the following questions

Survey

Interactive teaching requires significantly more instructor preparation time than traditional lecture.

1. Strongly Agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly Disagree

Survey

Interactive teaching requires clickers.

1. Strongly Agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly Disagree

Survey

If I give my students a pre-class (reading) assignment, most of them will complete it before coming to class.

1. Strongly Agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly Disagree

Survey

It is difficult to see how to apply interactive teaching techniques in my courses.

1. Strongly Agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly Disagree

Survey

I am worried that interactive teaching will negatively affect my end-of-course evaluations.

1. Strongly Agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly Disagree

for more information and a copy of this presentation:

http://mazur.harvard.edu

more on clickers:

http://www.turningtechnologies.com

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