

Confessions of a converted lecturer



Learning Forum
Case Western Reserve University
Cleveland, OH, 28 September 2012



Confessions of a converted lecturer



@eric_mazur

Learning Forum
Case Western Reserve University
Cleveland, OH, 28 September 2012





- no ON/OFF button
- only last "click" counts
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unique ID on back of clicker

Think of something you are good at

EDUCACION

Think of something you are good at

How did you become good at this?

EDUCACION

Became good at it by:

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

EDUCACION





What are the following...
1. Personal...
2. The...
3. The...
4. The...
5. The...

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1 education

2 PI



1 education

2 PI

3 test



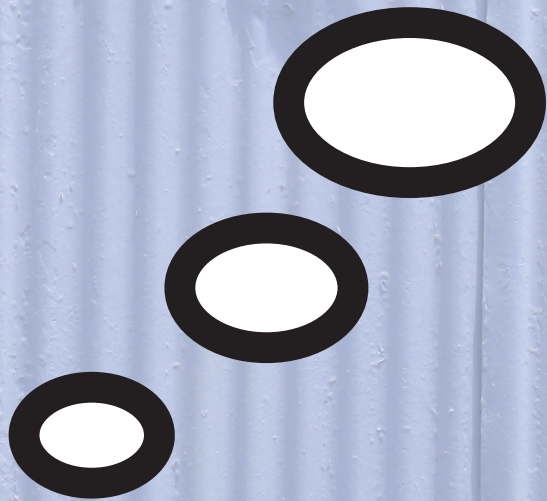
**better pay
attention!**

1 education

2 PI

3 test

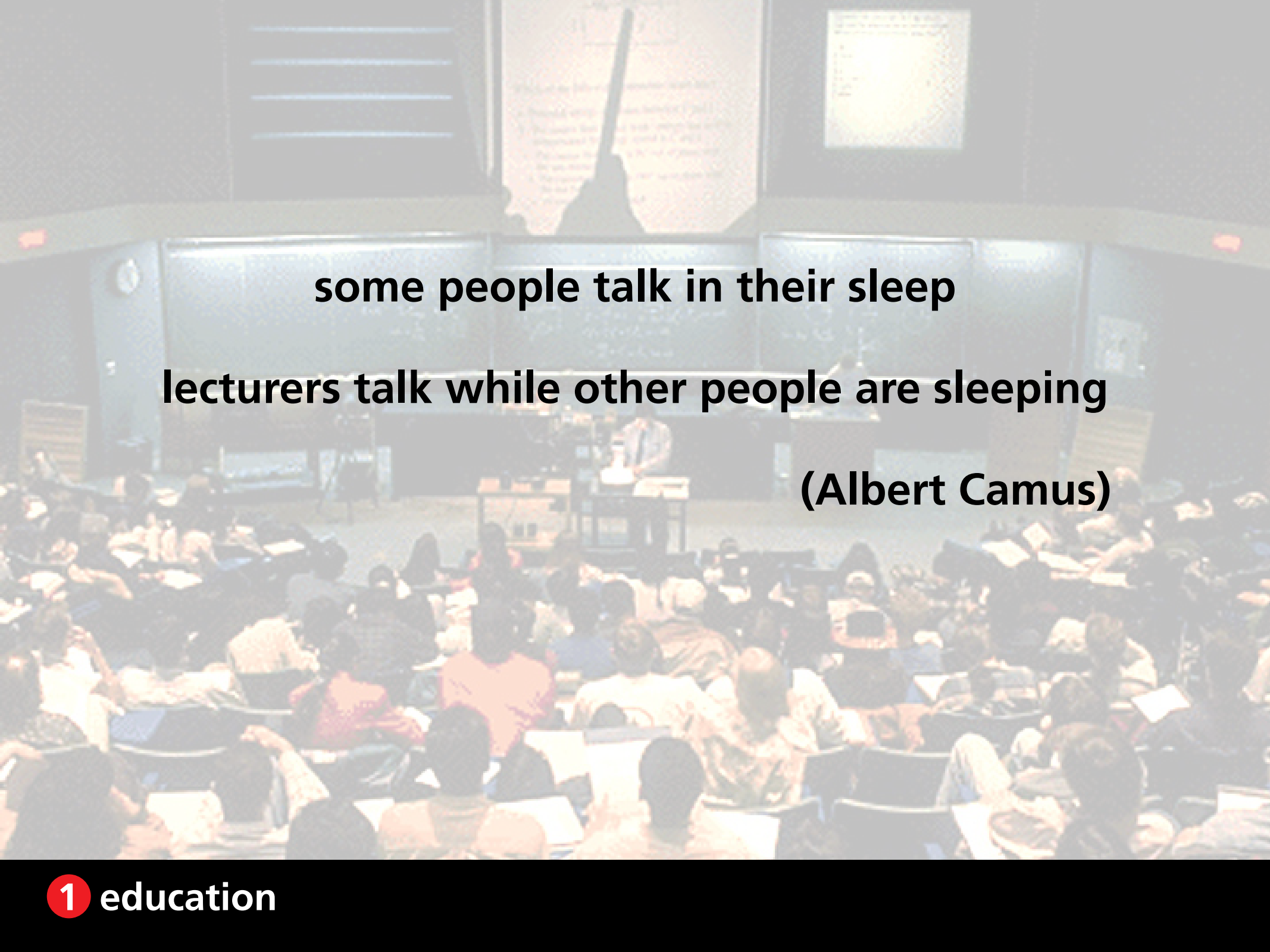
**What happens
in a lecture?**





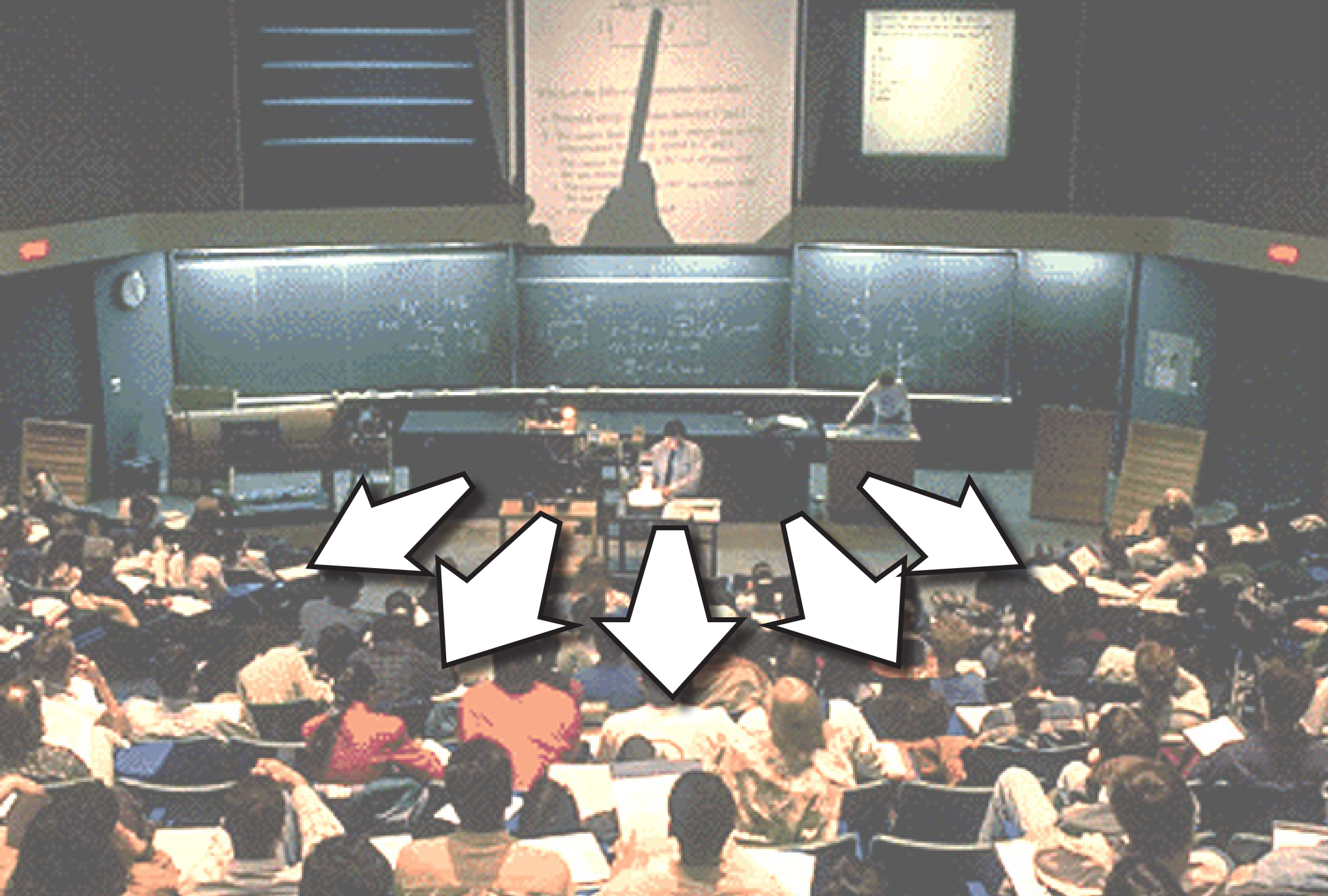
A large lecture hall with a professor at a podium and students in the audience. The professor is standing at a podium on the stage, facing the audience. The audience is seated in rows of chairs, filling the hall. The stage has a large screen behind the professor displaying text. The text on the screen is partially legible and appears to be a list of items or a document. The overall scene is a typical classroom or lecture hall setting.

some people talk in their sleep

A large lecture hall with a lecturer at a podium and a large audience of students sitting at desks. The room is dimly lit, and the audience is mostly seen from behind, looking towards the front. There are several large screens or whiteboards at the front of the room.

some people talk in their sleep
lecturers talk while other people are sleeping
(Albert Camus)

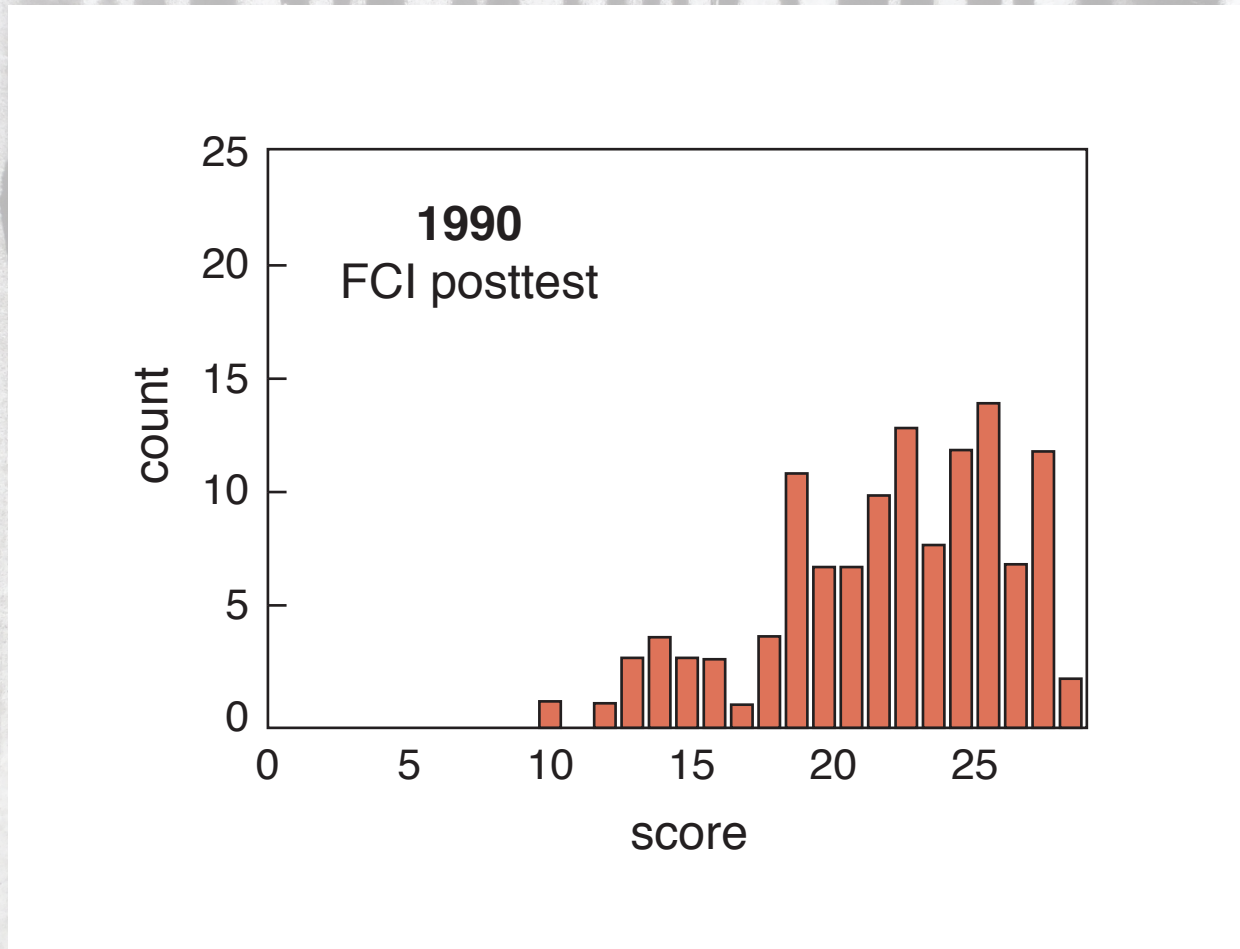




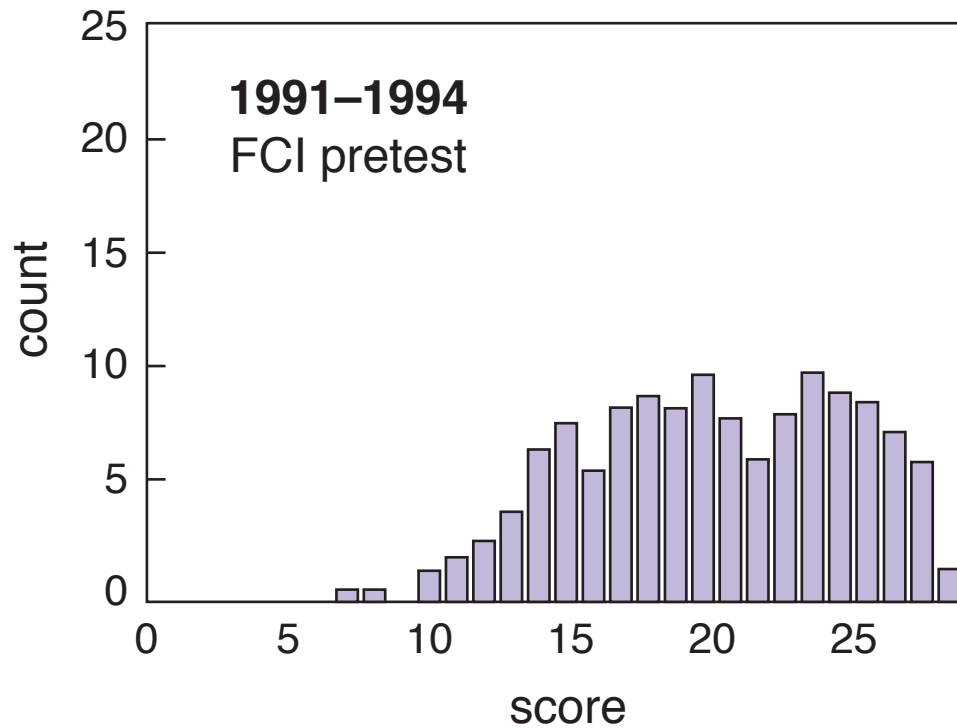
The result?

EDUCACION

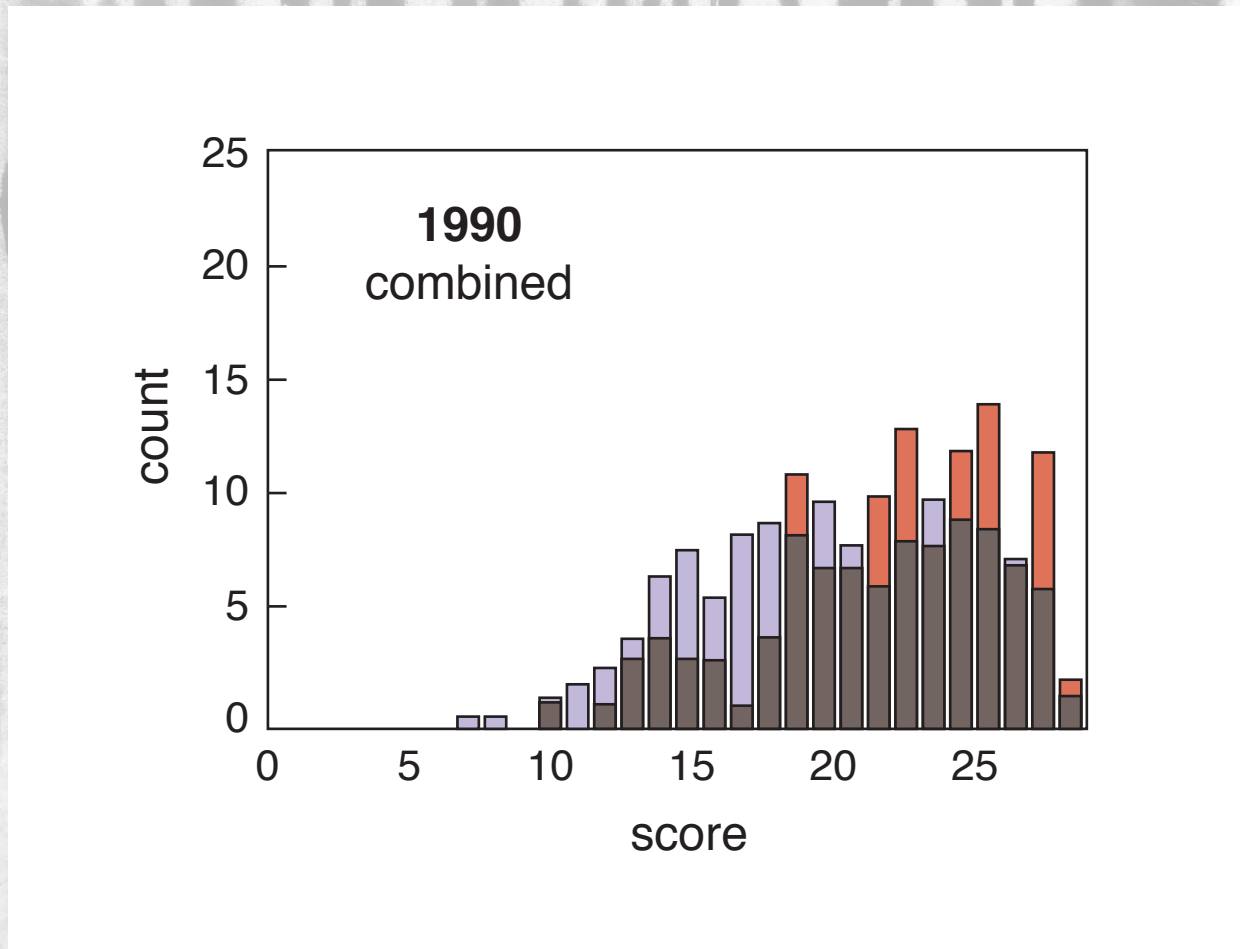
education is not just information transfer

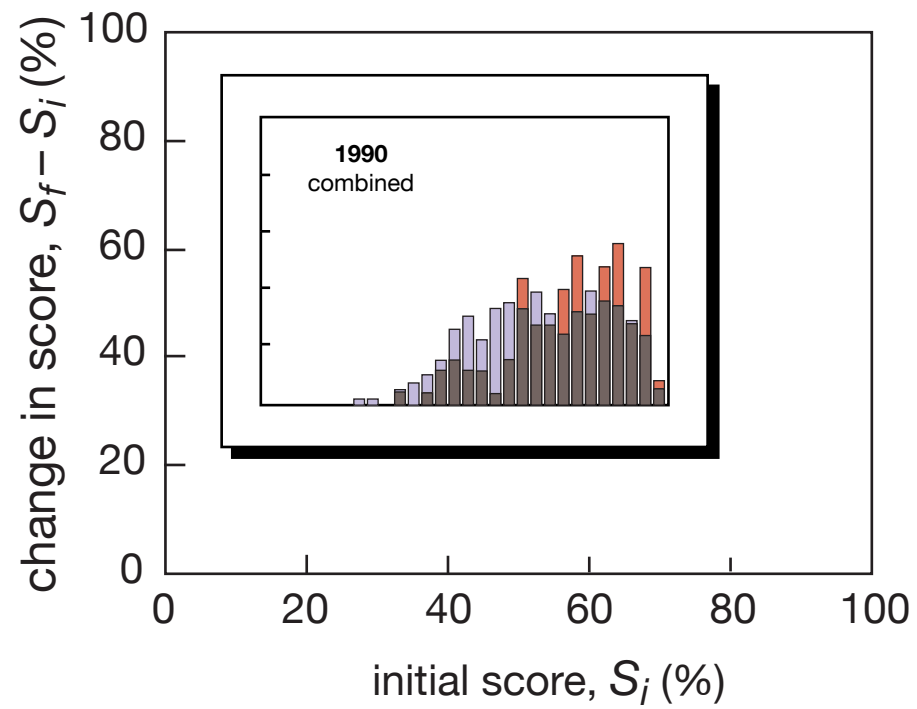


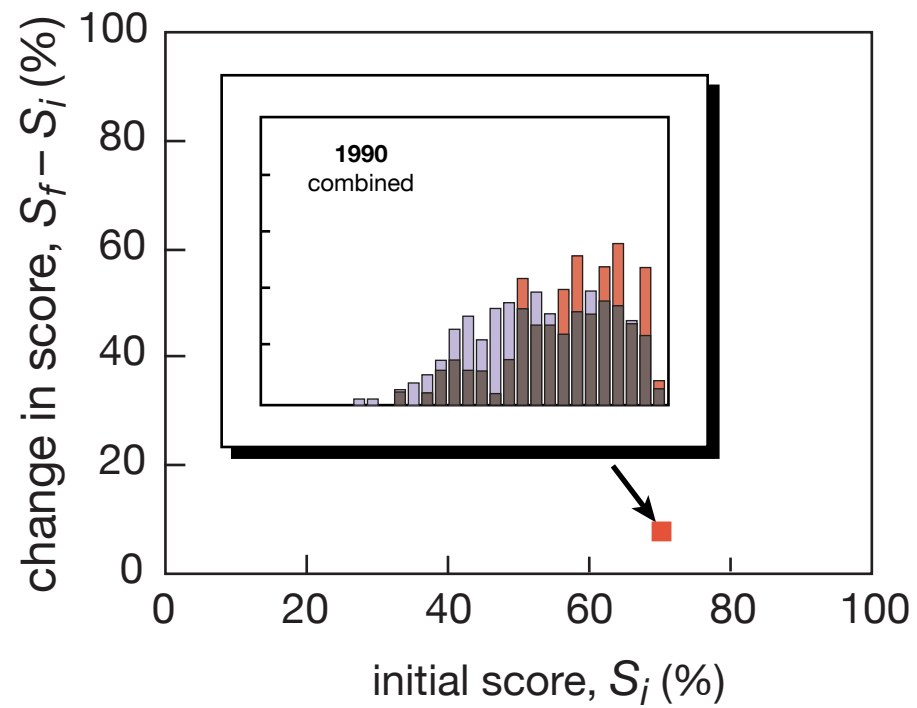
education is not just information transfer

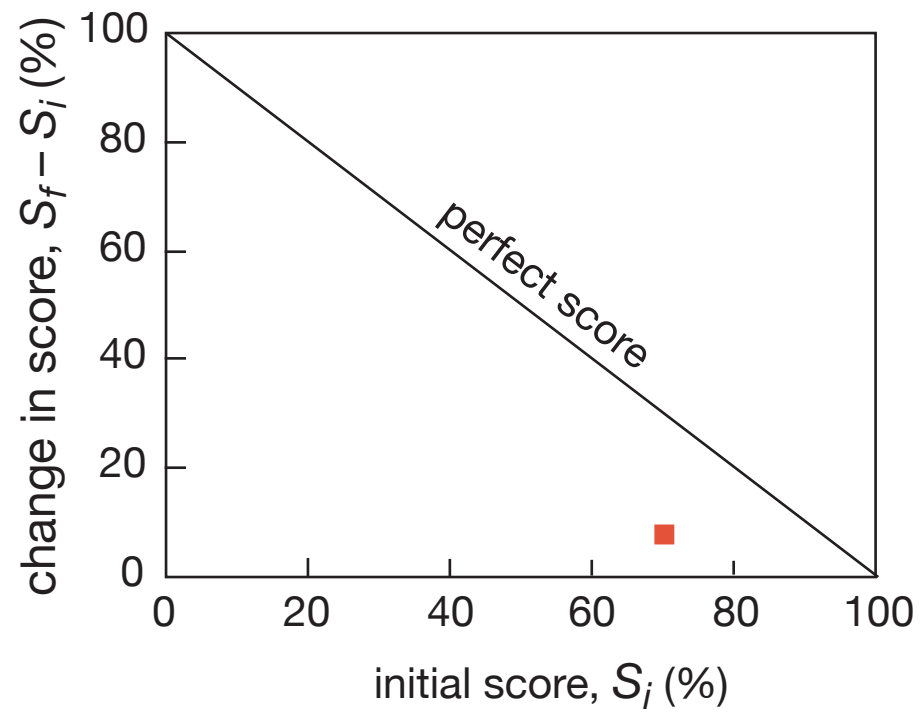


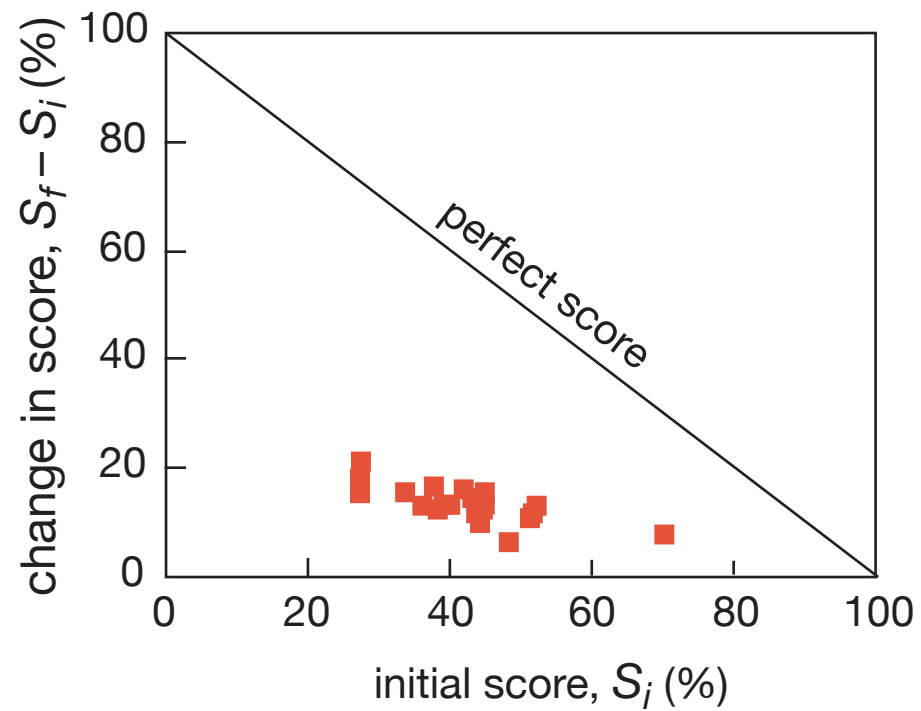
education is not just information transfer





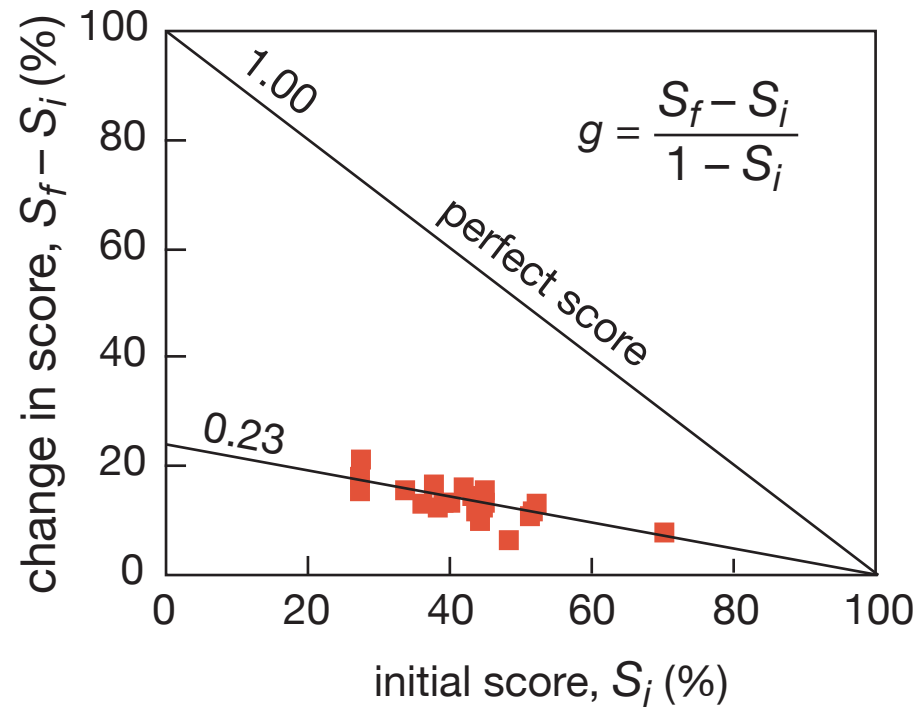






R.R. Hake, *Am. J. Phys.* 66, 64 (1998)

only one quarter of maximum gain realized



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

not transfer but assimilation of information is key

EDUCACION



1 education

2 PI



1. transfer of information



1. transfer of information

2. assimilation of that information




1. transfer of information (in class)

2. assimilation of that information



1. transfer of information (in class)

2. assimilation of that information (out of class)



**Should focus
on THIS!**

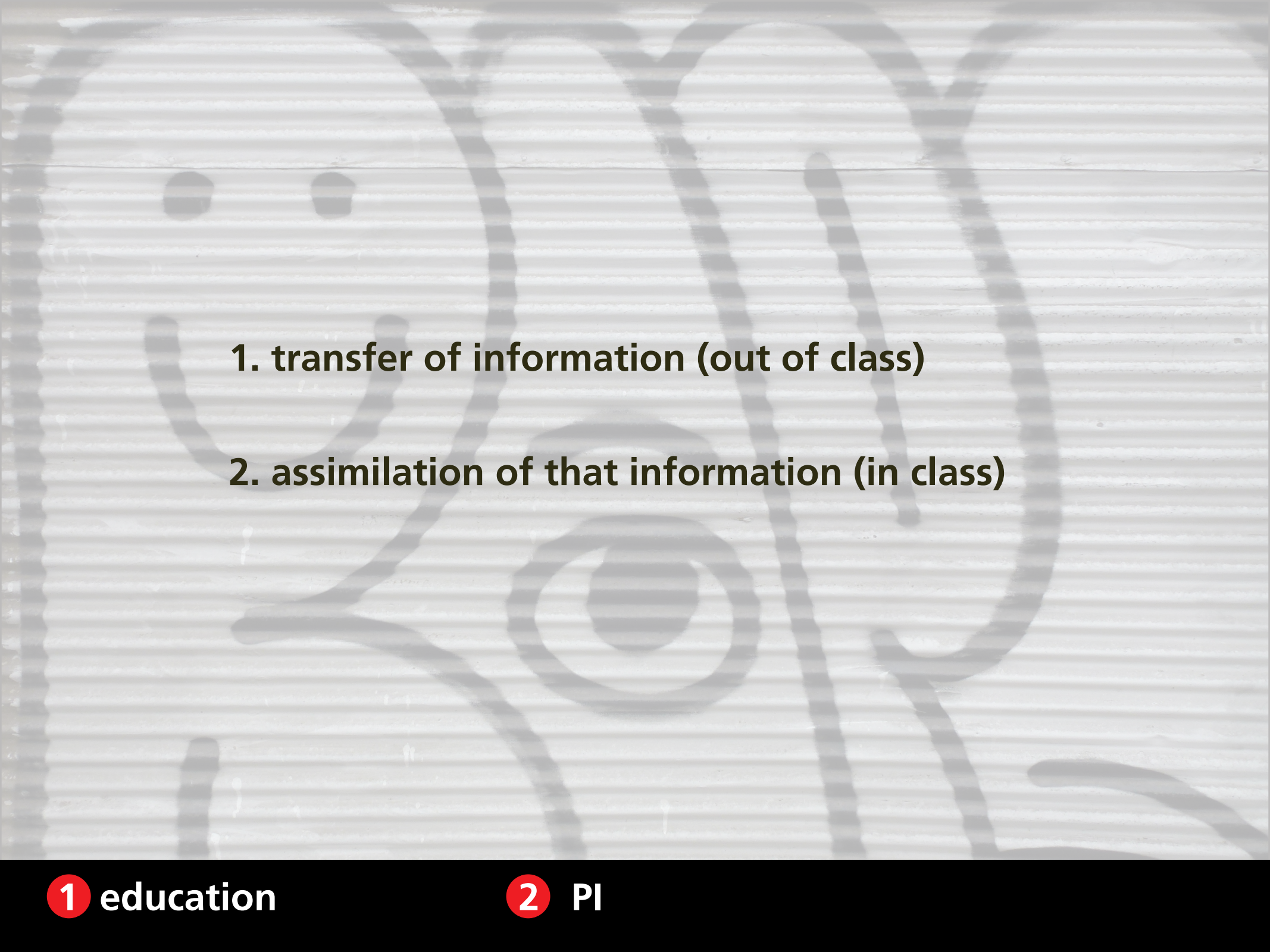
1. transfer of information (in class)

2. assimilation of that information (out of class)



1. transfer of information (in class)

2. assimilation of that information (out of class)

- 
- 1. transfer of information (out of class)**
 - 2. assimilation of that information (in class)**

Peer



1. transfer of information (out of class)

2. assimilation of that information (in class)

INSTRUCTION

question

1 education

2 PI

question



think

question



think



poll

question



think



poll



discuss

question



think



poll



discuss



repoll

question



think



poll



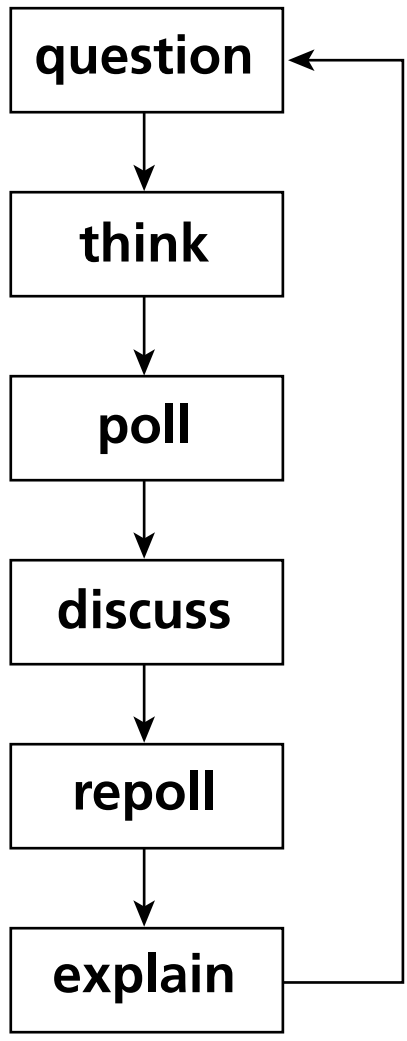
discuss

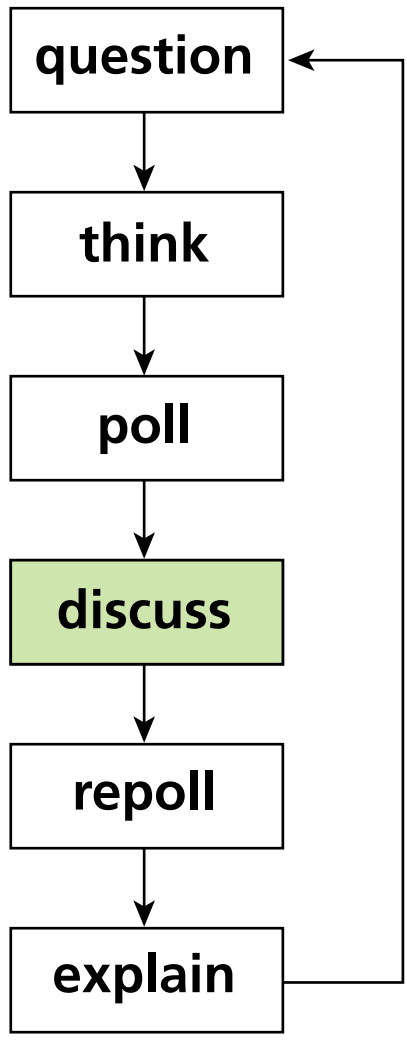


repoll



explain





1 education

2 PI

Let's try it!

QUESTION

think

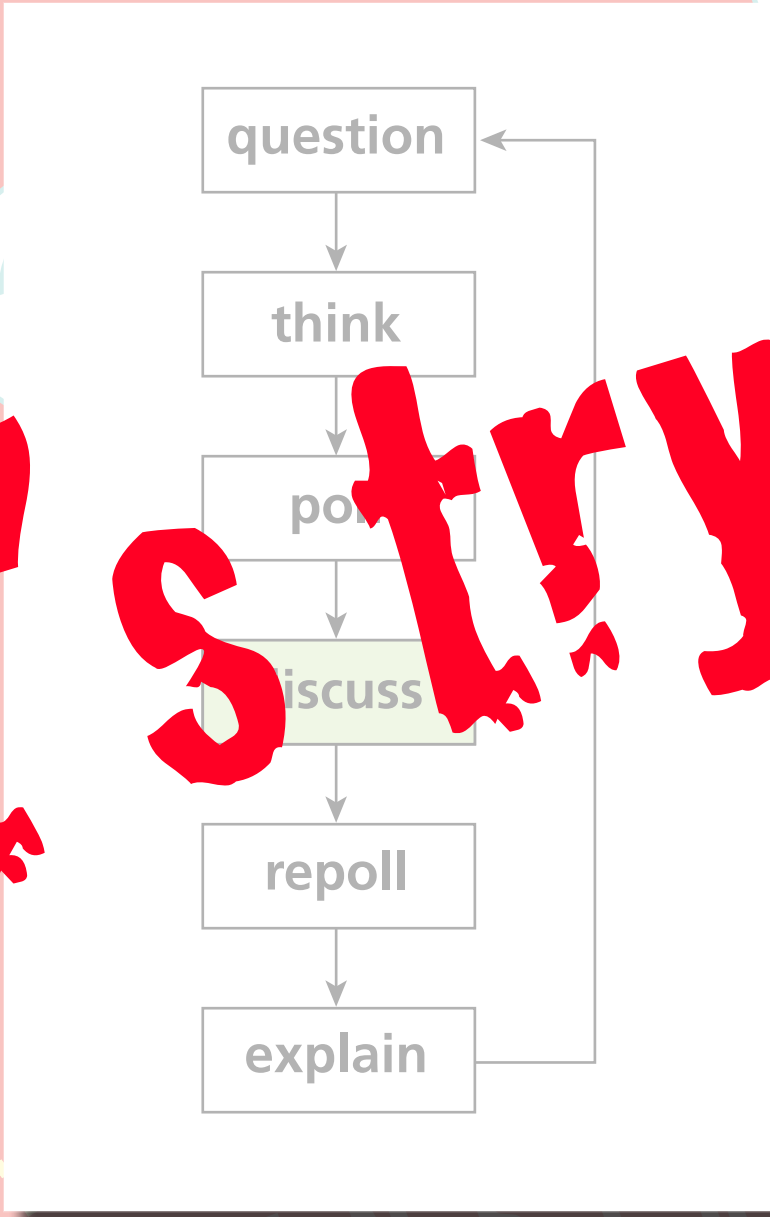
poll

discuss

repoll

explain

ACTION

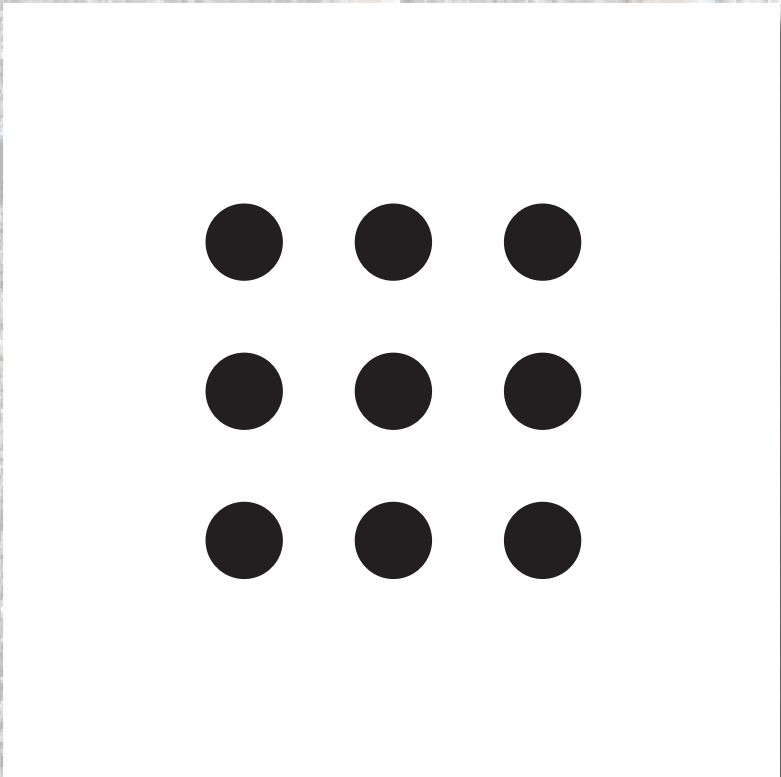


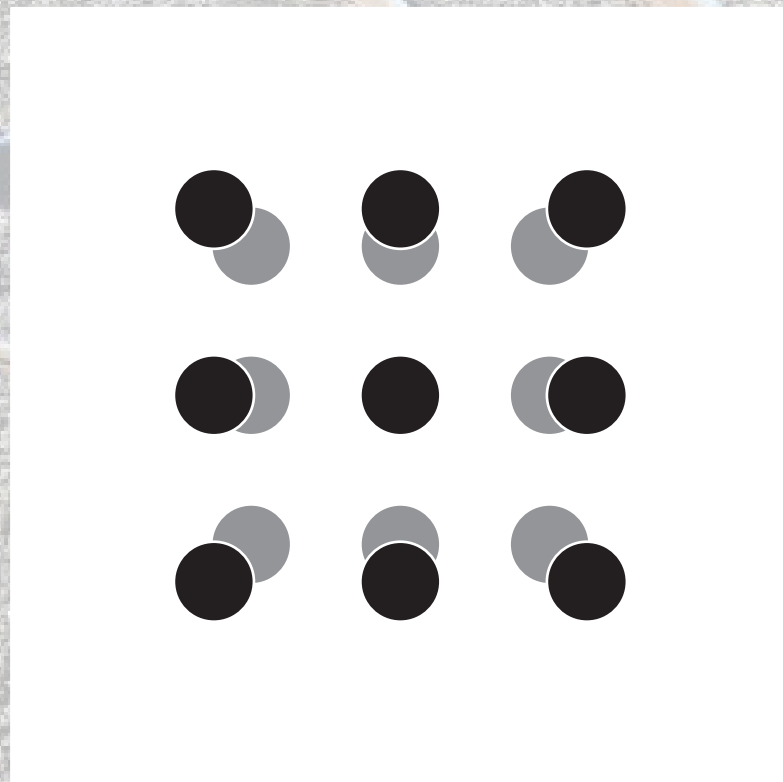
1 education

2 PI

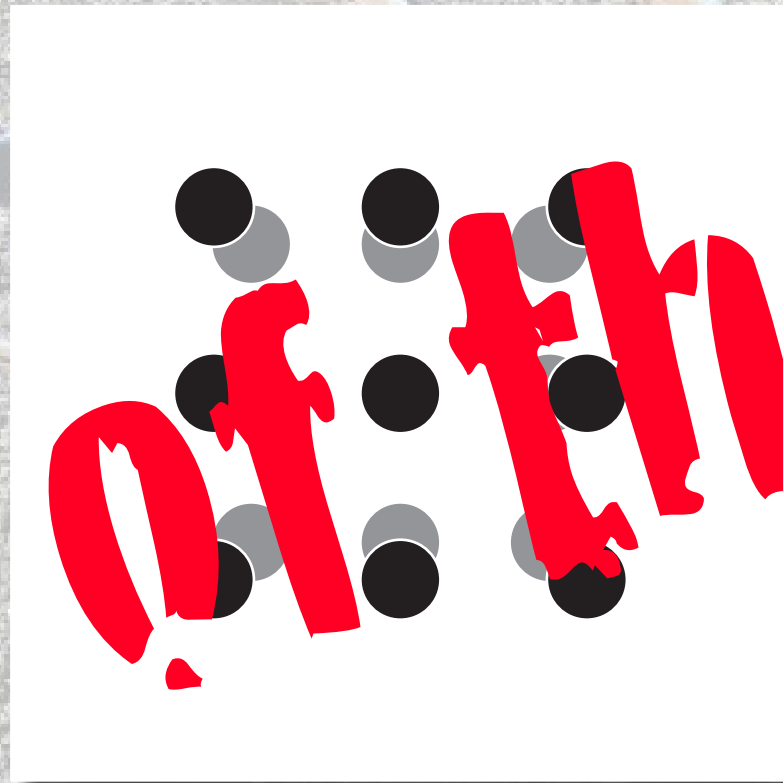
A photograph of a gravel path with a blue wavy line drawn on it, illustrating thermal expansion. The path is made of grey gravel and is bordered by green grass on both sides. The blue line is drawn in a series of connected, rounded curves, resembling a sine wave. The text "thermal expansion" is overlaid in the center of the path.

thermal expansion





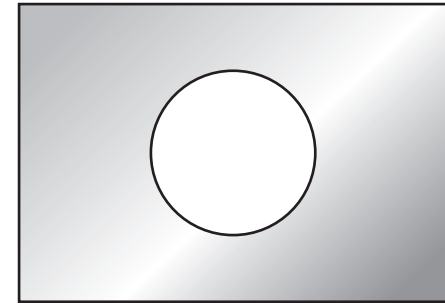
all of them!



1 education

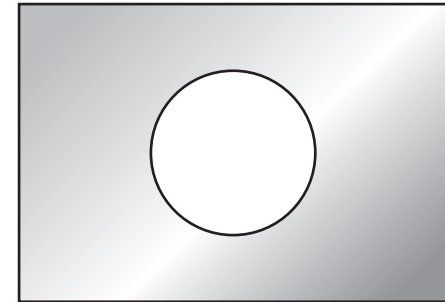
2 PI

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



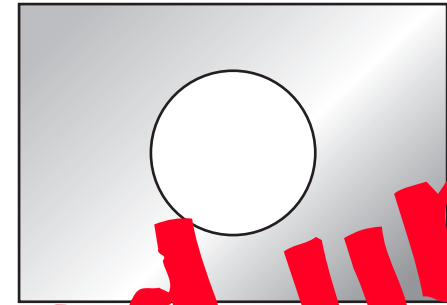
Consider a rectangular metal plate with a circular hole in it.

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



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

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



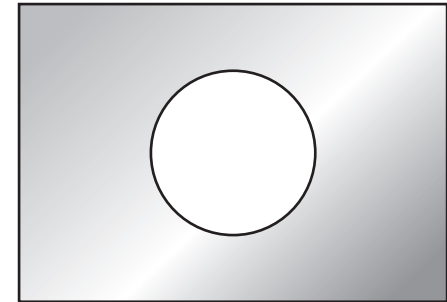
When the plate is uniformly heated, the diameter of the hole

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

you got all fired up!

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.**

Before I tell you the answer...

1 education

2 PI

3 test

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

1 education

2 PI

3 test

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

You...

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

You...

1. made a commitment

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

You...

- 1. made a commitment**
- 2. externalized your answer**

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**

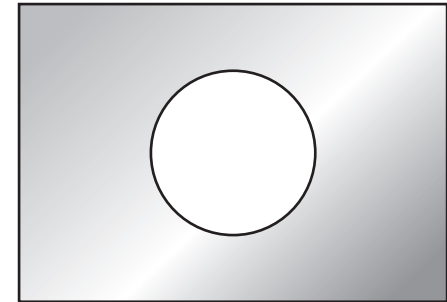
Before I tell you the answer, let's analyze what happened.

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**

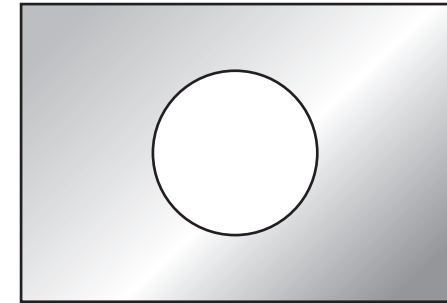
Consider a rectangular metal plate with a circular hole in it.

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



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

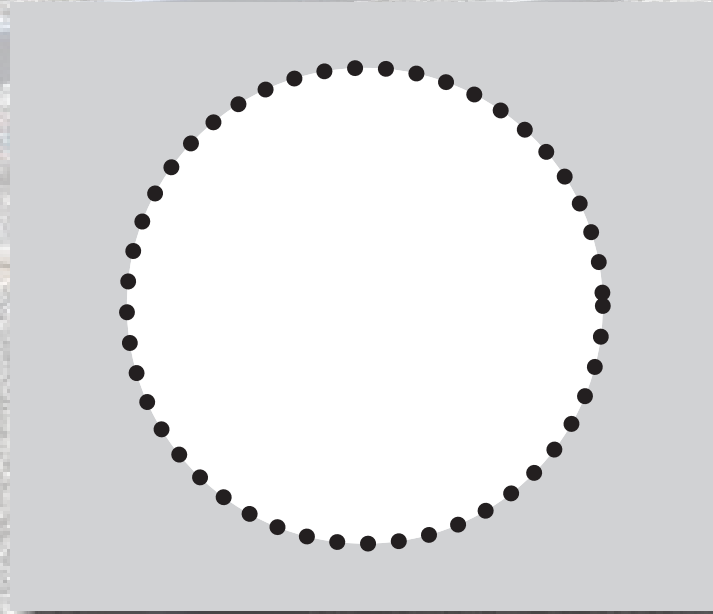
Consider a rectangular metal plate with a circular hole in it.



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

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

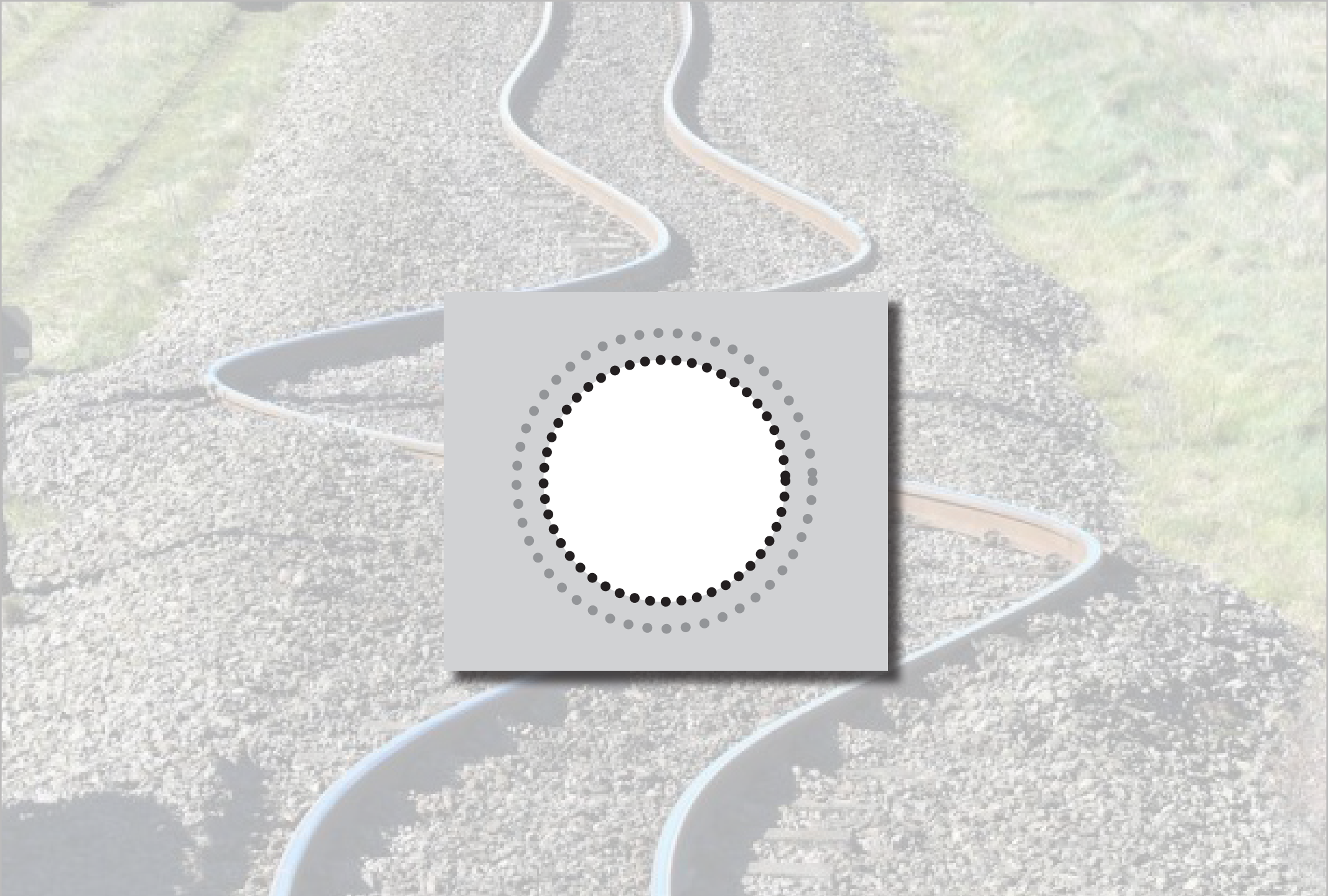
consider atoms at rim of hole



1 education

2 PI

3 test

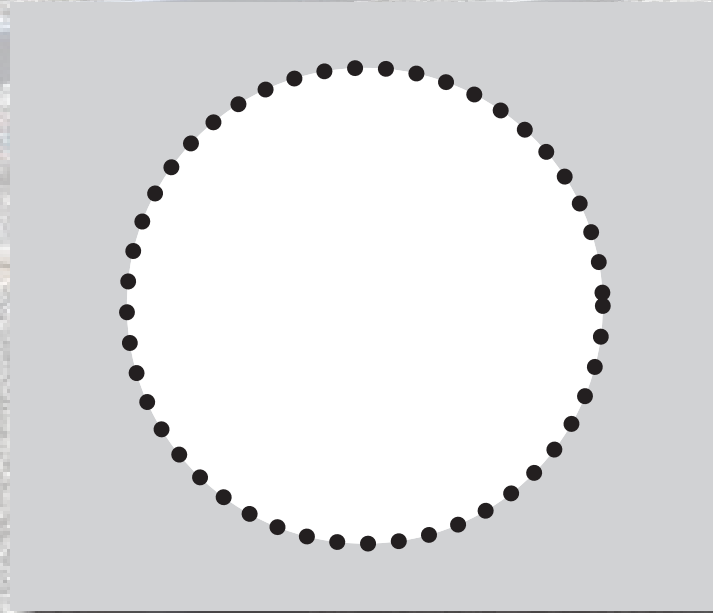


1 education

2 PI

3 test

consider atoms at rim of hole

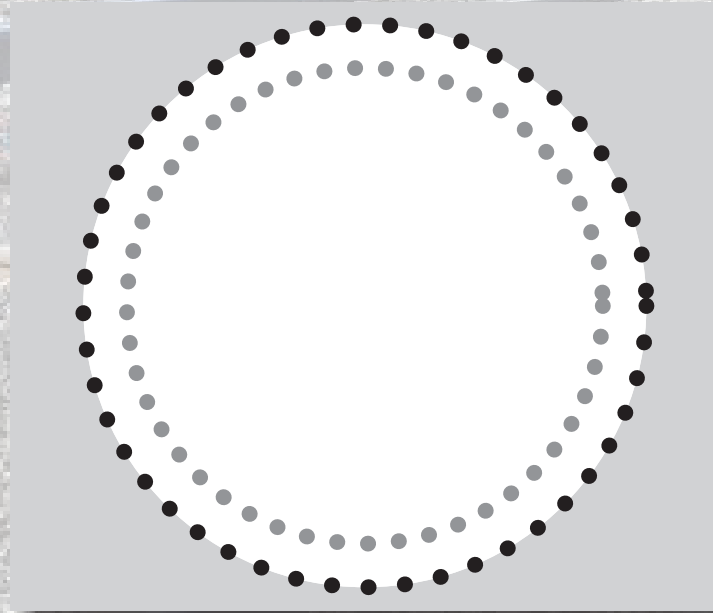


1 education

2 PI

3 test

consider atoms at rim of hole



consider atoms at rim of hole

you won't forget this

A diagram of a circular hole with a dotted border, representing atoms at the rim. The hole is shown in a perspective view, with the dotted line forming the inner edge of the hole. The text "you won't forget this" is written in a large, red, stylized font across the diagram.

1 education

2 PI

3 test

Peer

back to PI

INSTRUCTION

1 education

2 PI

3 test

Peer

is it any good?

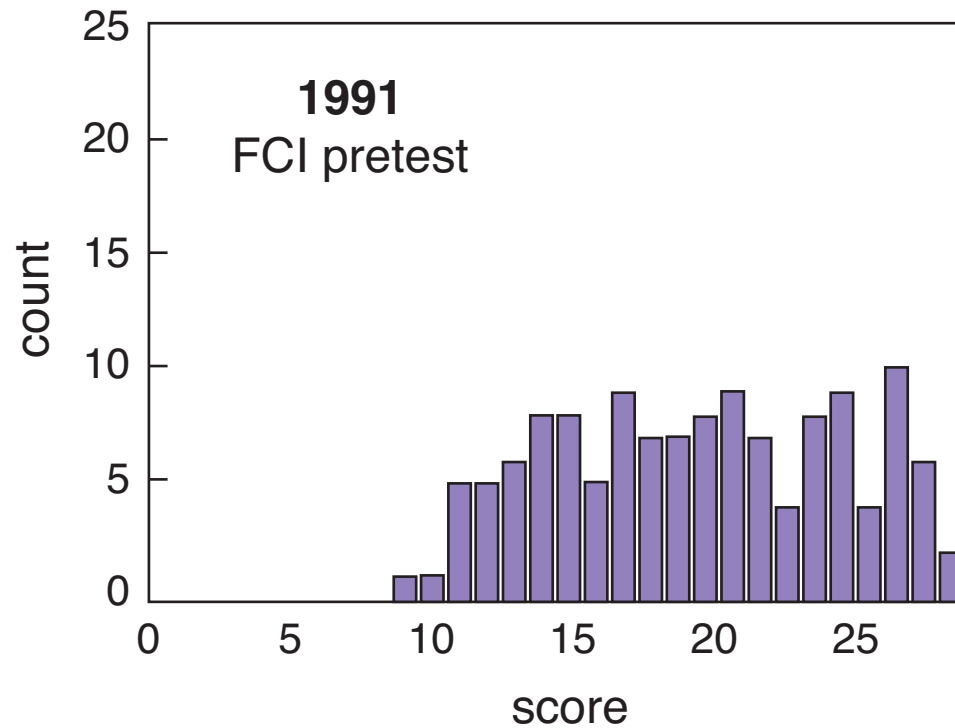
INSTRUCTION

1 education

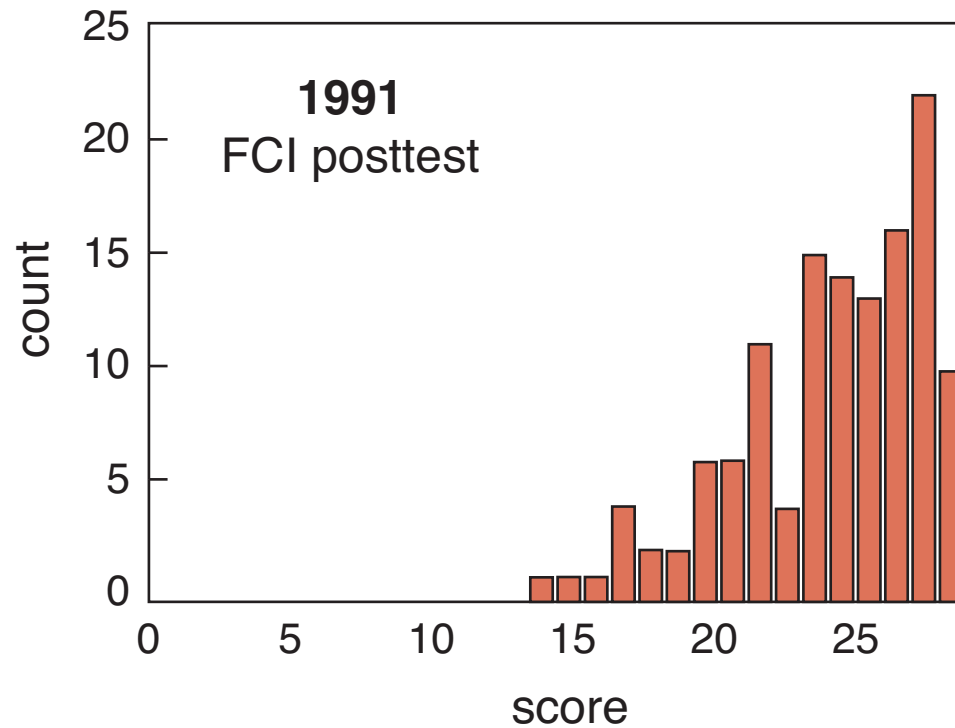
2 PI

3 test

first year of implementing PI



first year of implementing PI

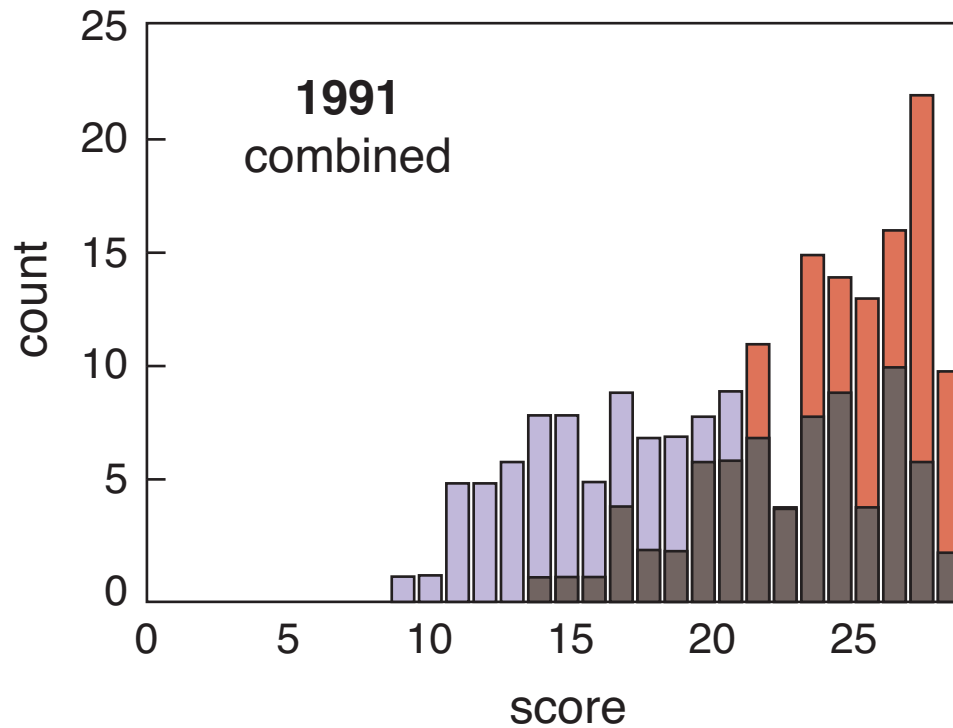


1 education

2 PI

3 test

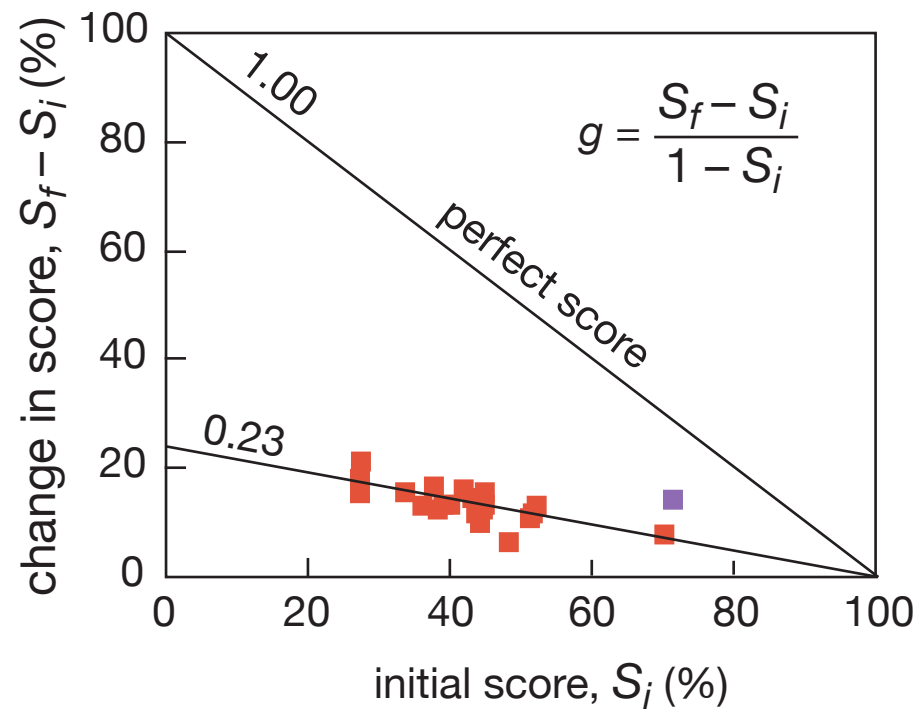
first year of implementing PI



1 education

2 PI

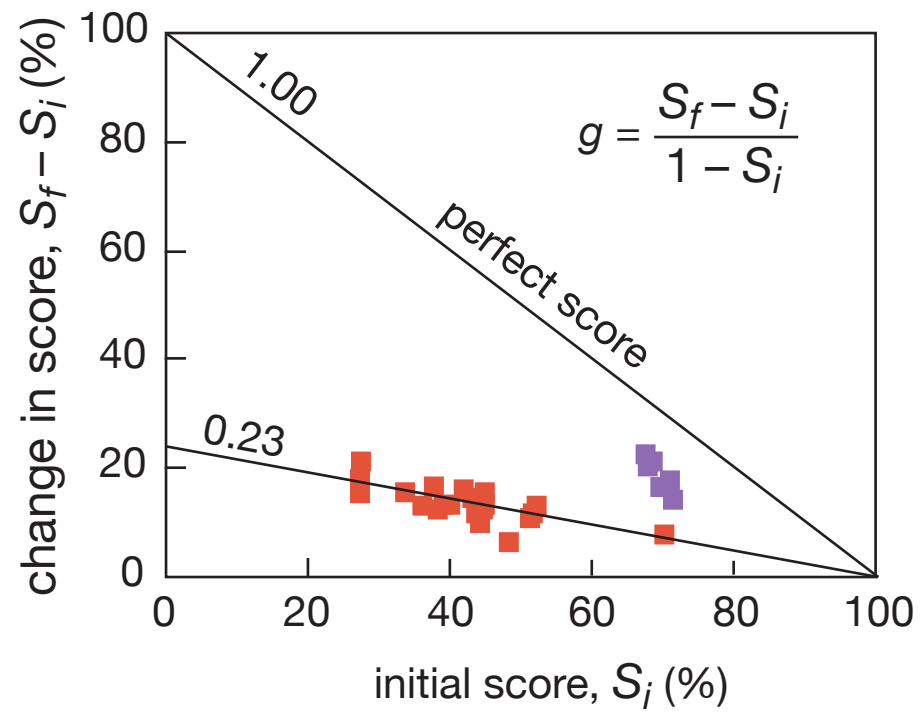
3 test



1 education

2 PI

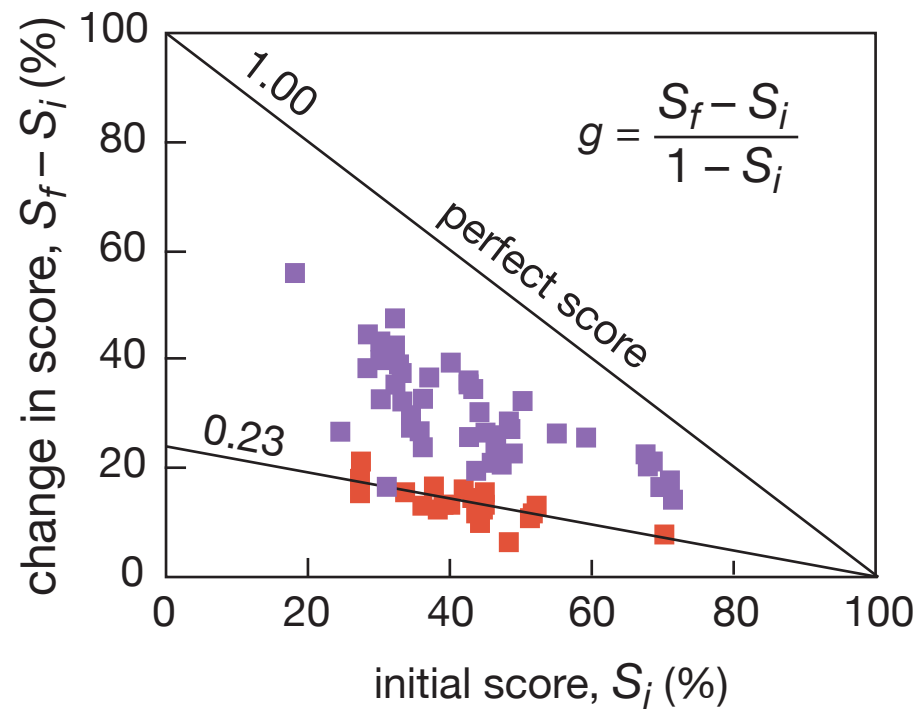
3 test



1 education

2 PI

3 test

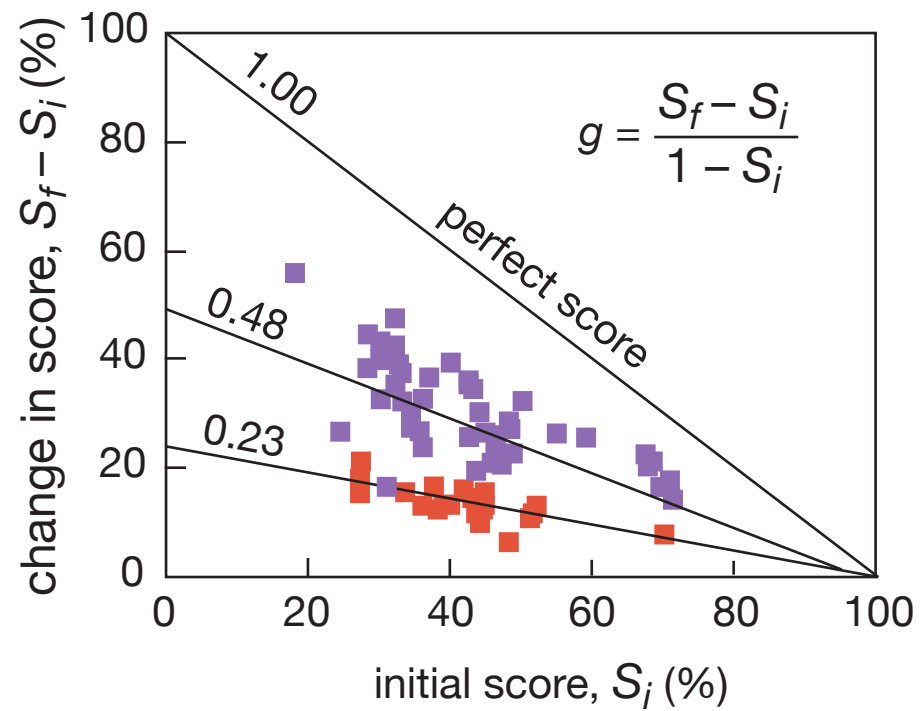


R.R. Hake, *Am. J. Phys.* 66, 64 (1998)

1 education

2 PI

3 test



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

1 education

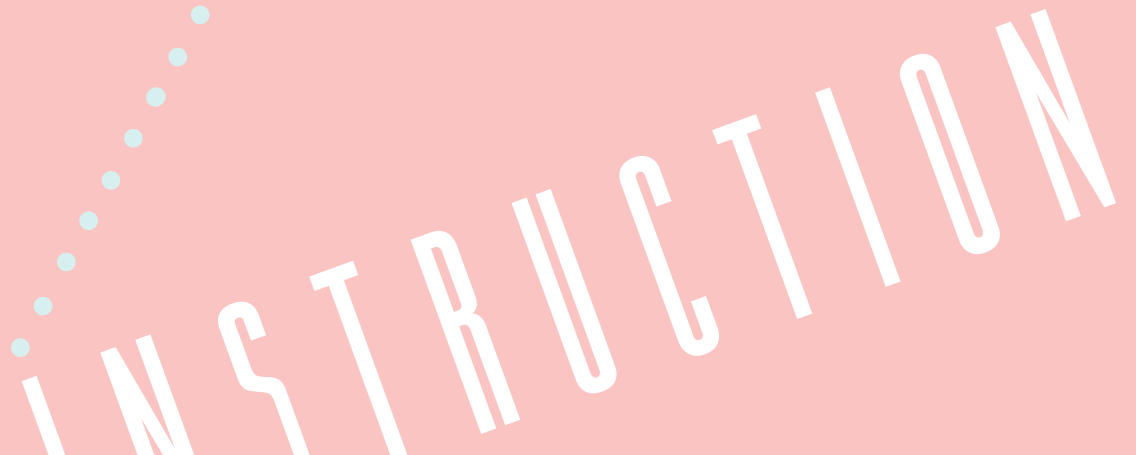
2 PI

3 test



Peer

what about problem solving?

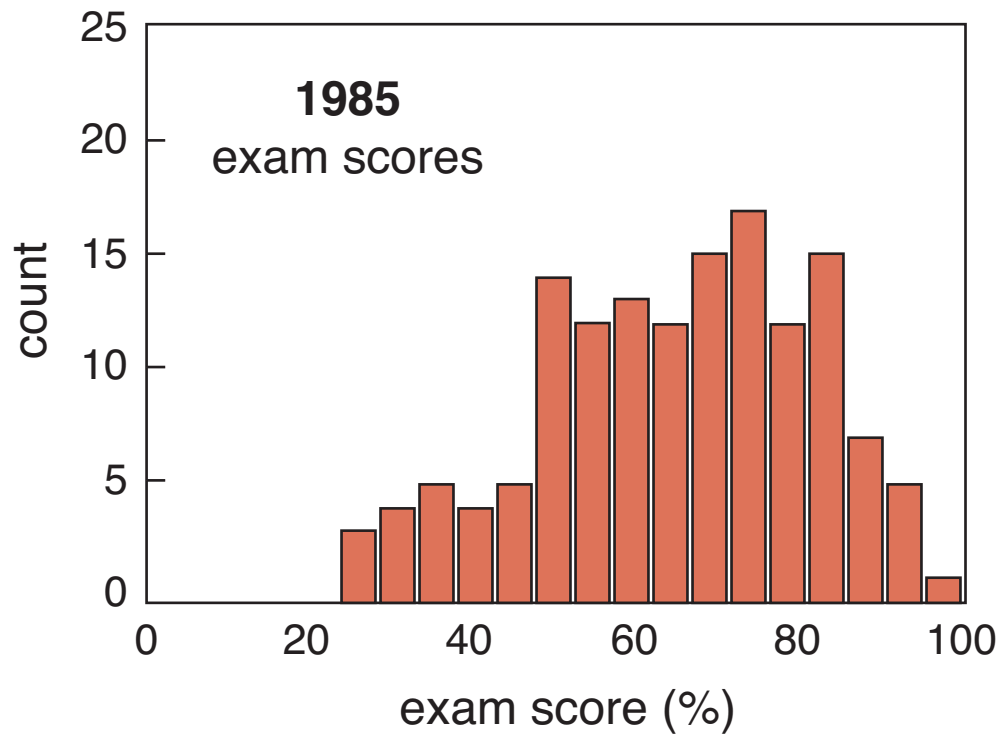


INSTRUCTION

1 education

2 PI

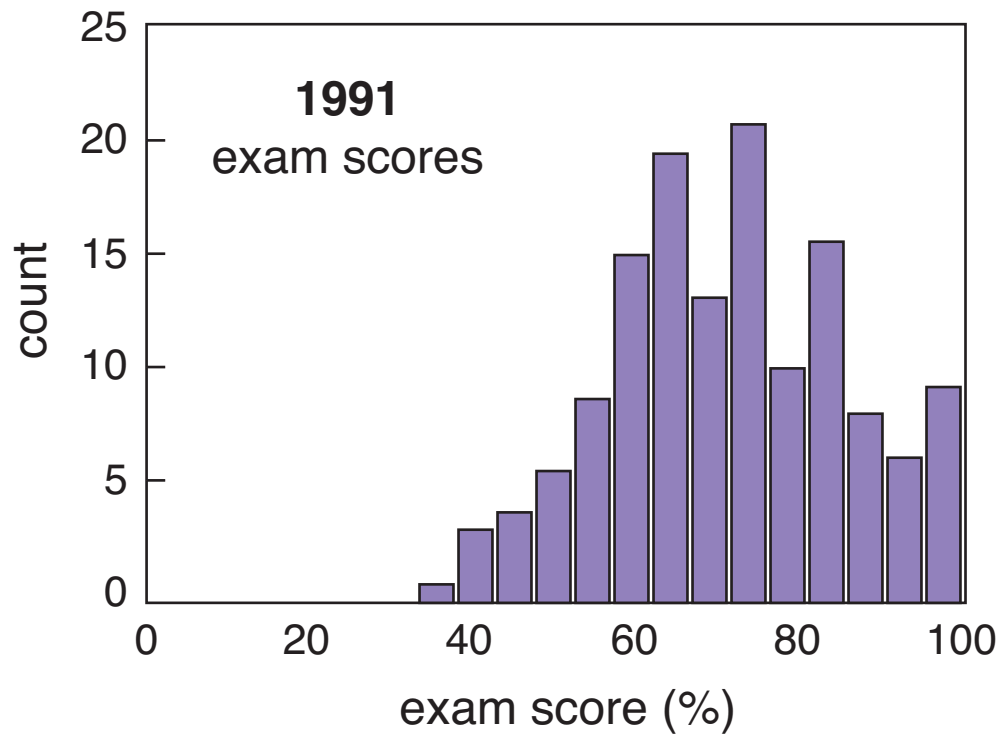
3 test



1 education

2 PI

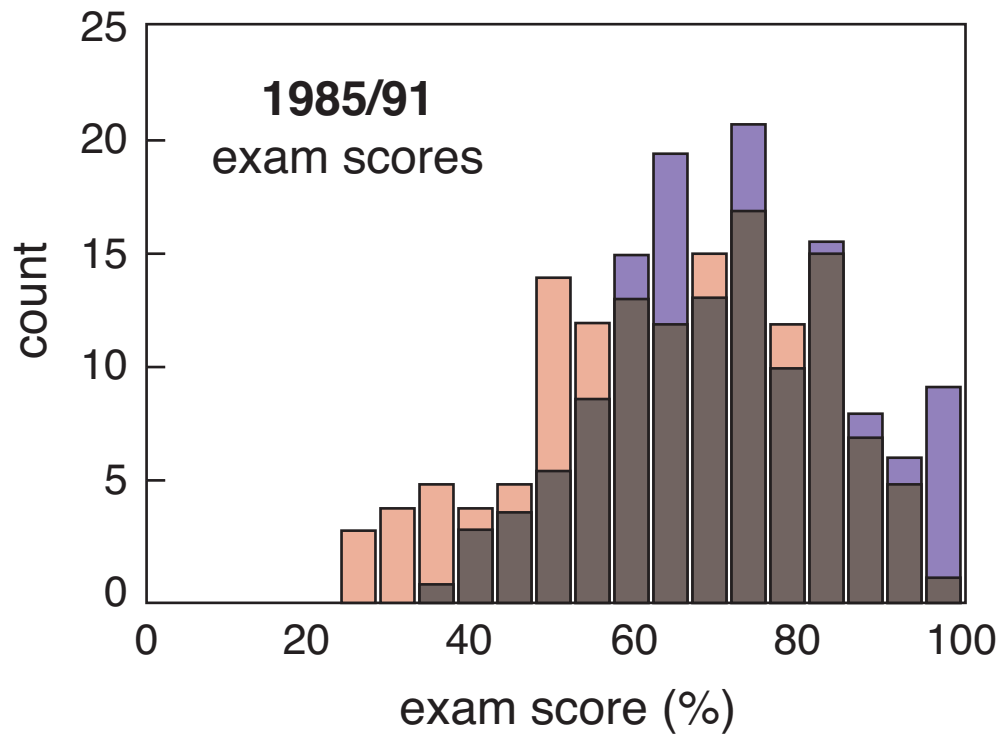
3 test



1 education

2 PI

3 test



1 education

2 PI

3 test



**So better understanding leads to better
problem solving!**

1 education

2 PI

3 test



So better understanding leads to better problem solving!

(but “good” problem solving doesn’t always indicate understanding!)

INSTRUCTION

1 education

2 PI

3 test



1 education

2 PI

3 test

in a lecture, students...

1 education

2 PI

3 test

in a lecture, students...

1. don't pay utmost attention

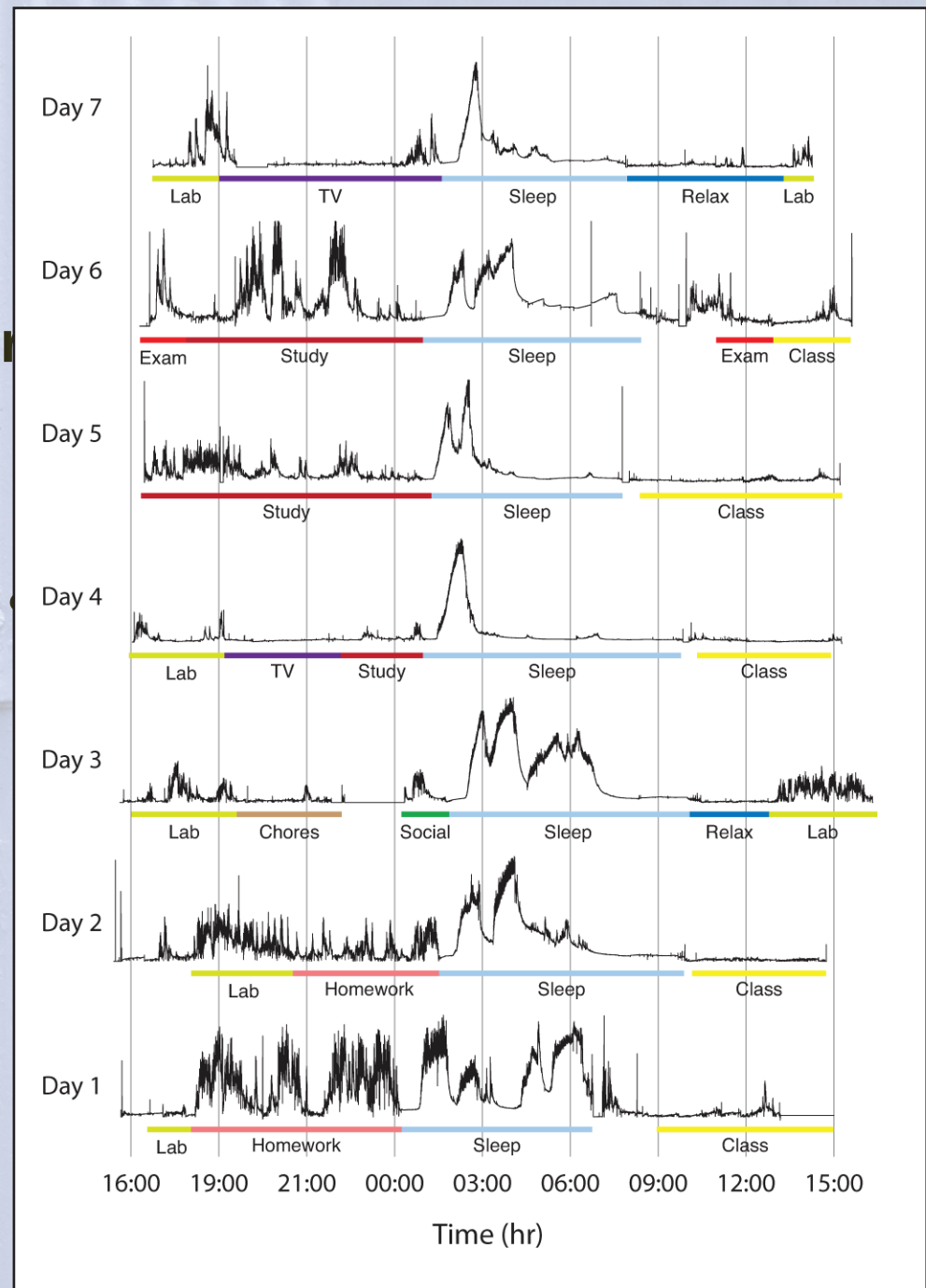
1 education

2 PI

3 test

in a lecture

1. don't pay utmost



doi: 10.1109/TBME.2009.2038487

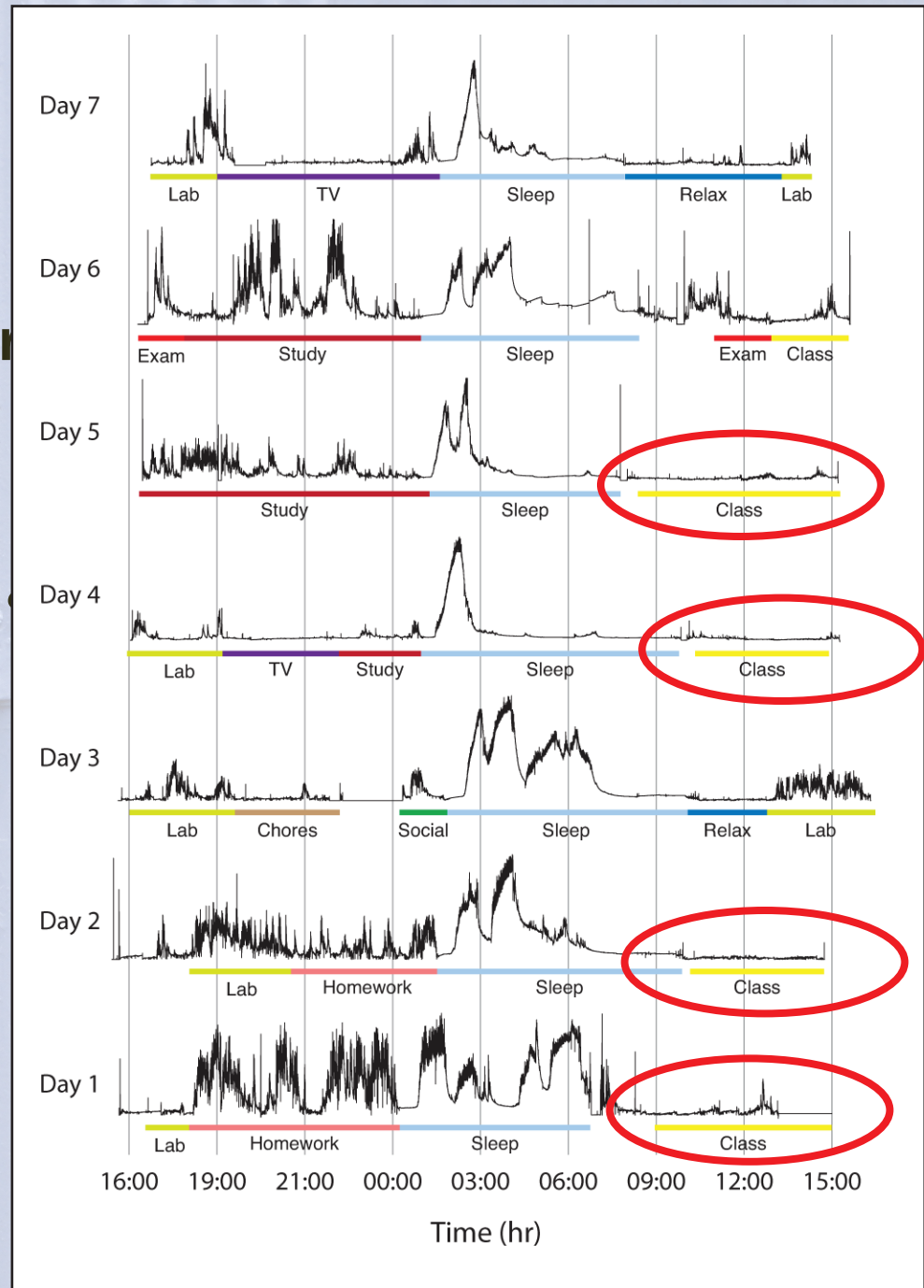
1 education

2 PI

3 test

in a lecture

1. don't pay utmost



doi: 10.1109/TBME.2009.2038487

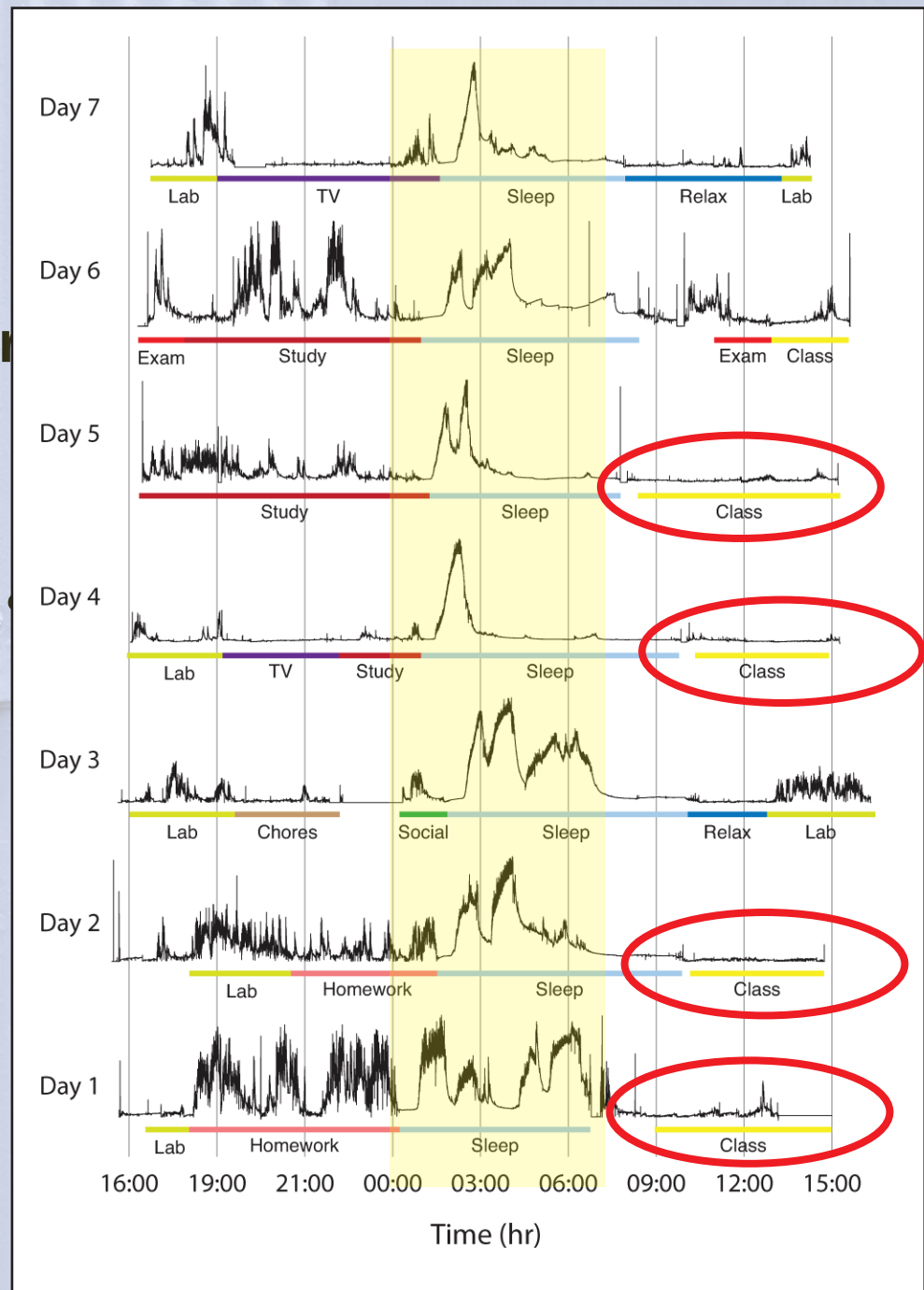
1 education

2 PI

3 test

in a lecture

1. don't pay utmost



doi: 10.1109/TBME.2009.2038487

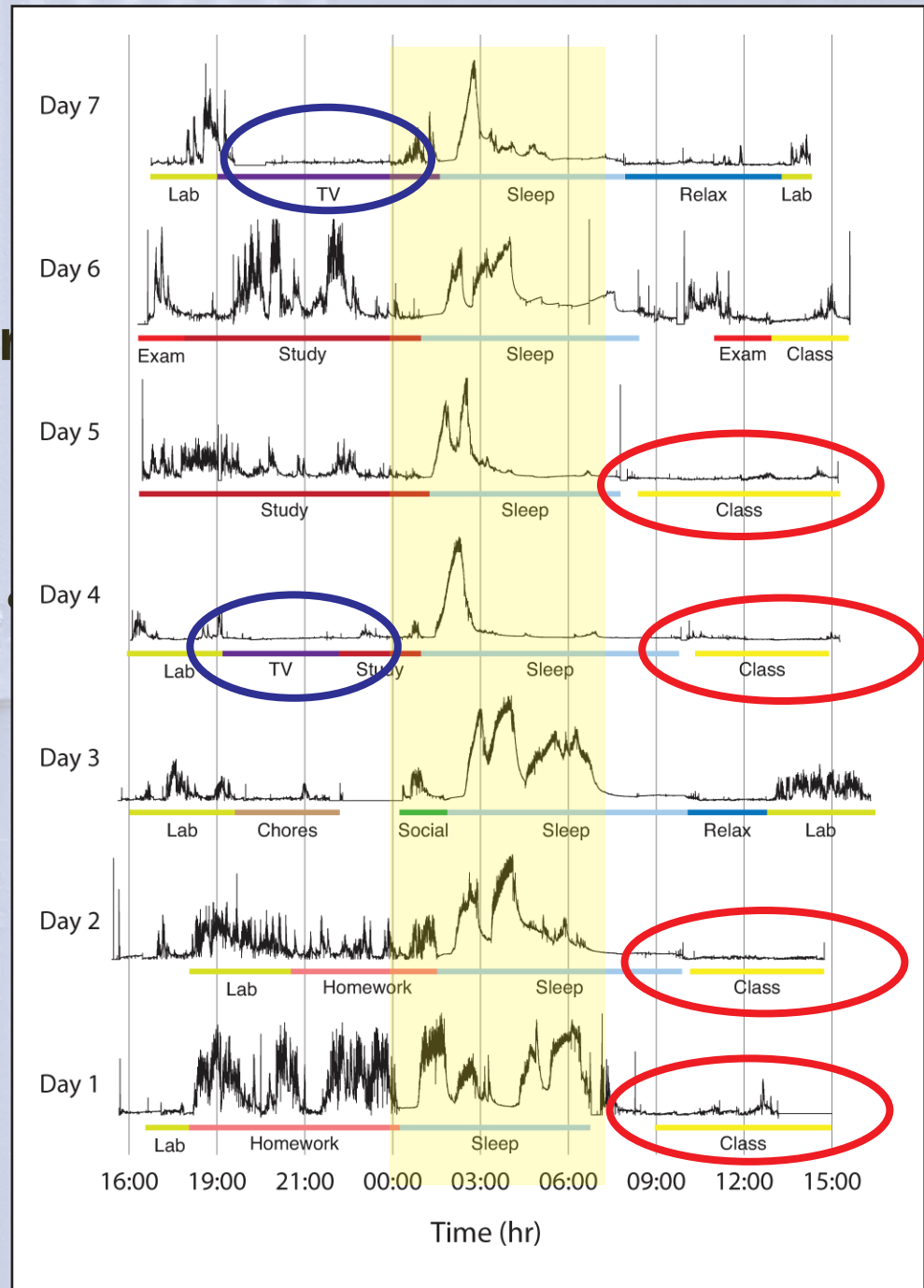
1 education

2 PI

3 test

in a lecture

1. don't pay utmost



doi: 10.1109/TBME.2009.2038487

1 education

2 PI

3 test

in a lecture, students...

1. don't pay utmost attention

2. think they know it

in a lecture, students...

- 1. don't pay utmost attention**
- 2. think they know it**
- 3. are not confronted with misconceptions**

in a lecture, students...

1. don't pay utmost attention

2. think they know it

3. are not confronted with misconceptions

false
sense of security



1 education

2 PI

3 test



an illusion. . .

1 education

2 PI

3 test



Education is not just about:

- **transferring information**
- **getting students to do what we do**

1 education

2 PI

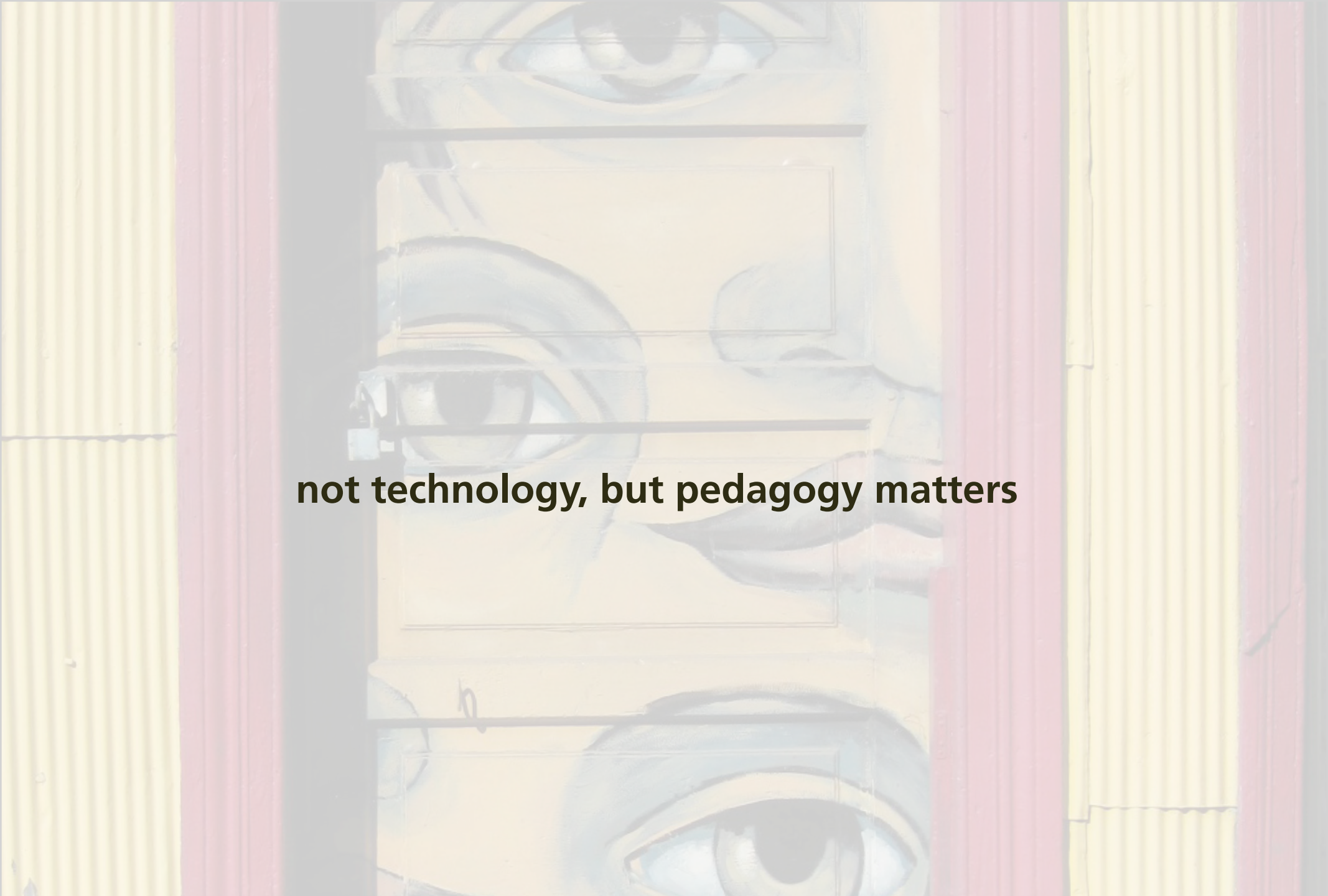
3 test



Education is not just about:

- **transferring information**
- **getting students to do what we do**

active participation a must!



not technology, but pedagogy matters

1 education

2 PI

3 test

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Beijing, China

mazur@harvard.edu

14-16 December 2012



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