

Confessions of a converted lecturer



Faculty Enrichment Day
Northwestern Oklahoma State University
Alva, OK, 25 March 2015



Confessions of a converted lecturer



@eric_mazur

Faculty Enrichment Day
Northwestern Oklahoma State University
Alva, OK, 25 March 2015



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**









1 education

2 PI



1 education

2 PI

3 test



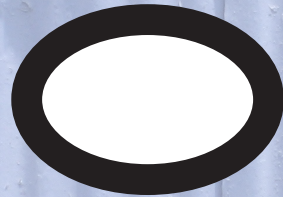
**better pay
attention!**

1 education

2 PI

3 test

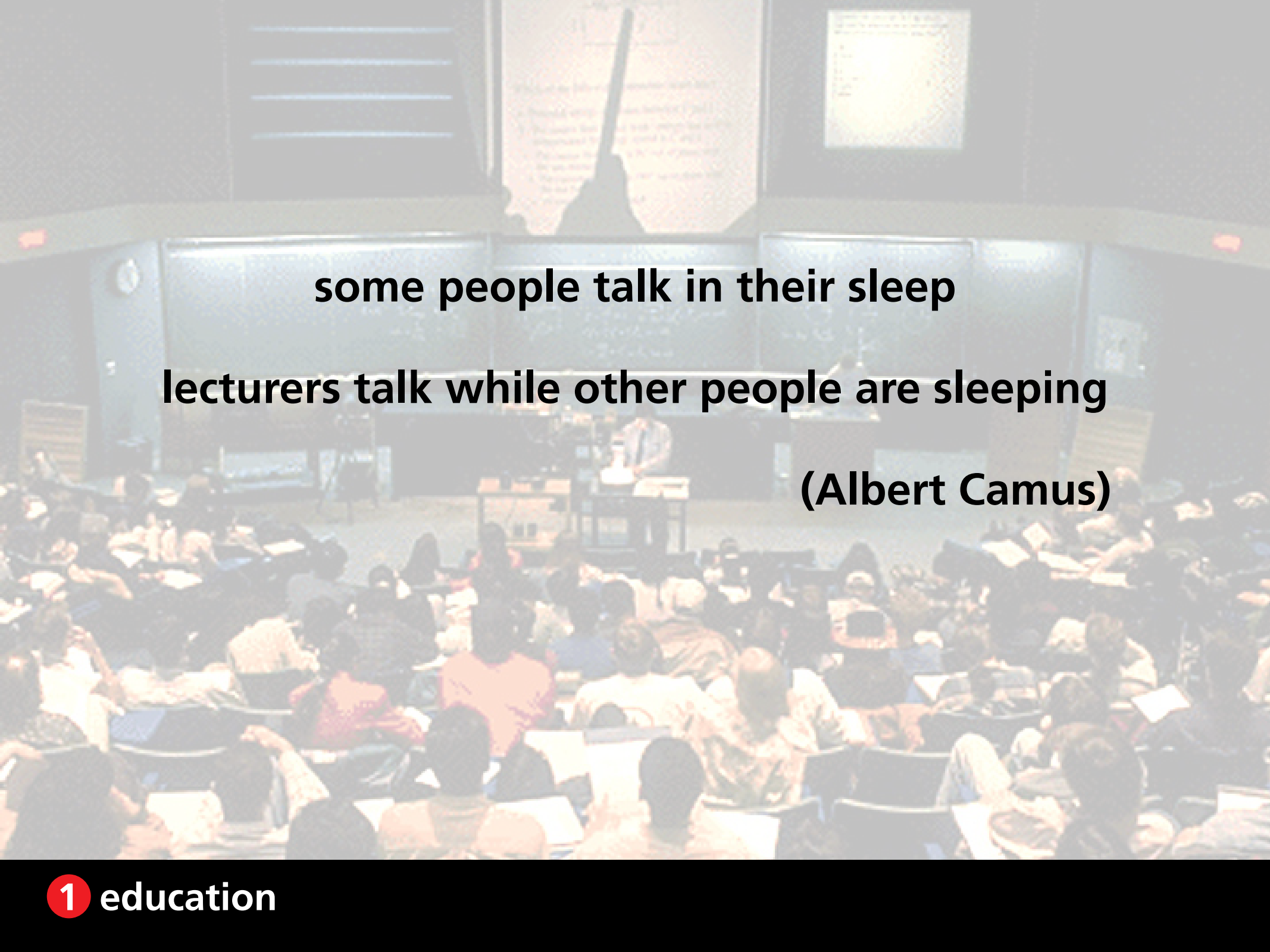
**What happens
in a lecture?**





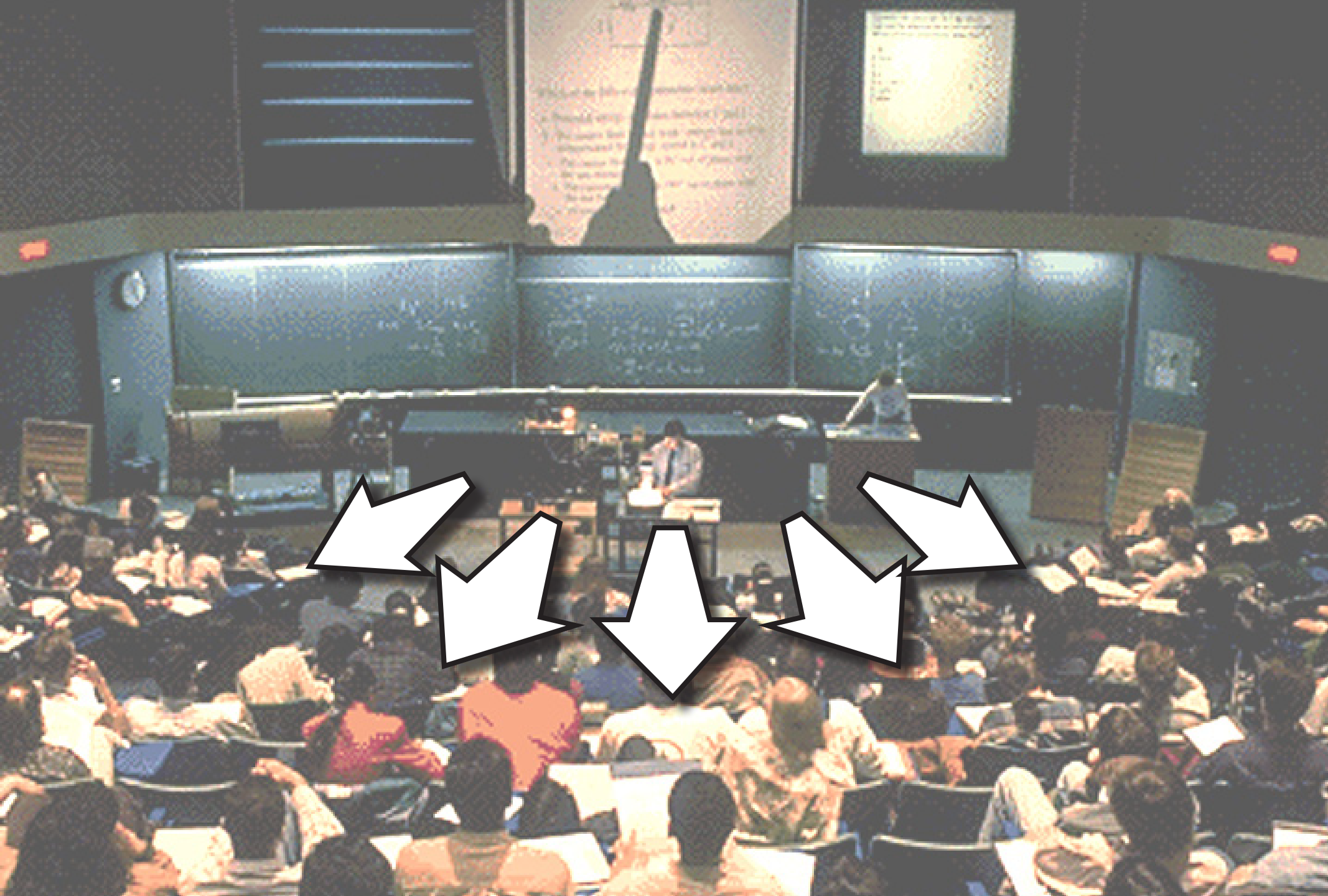
A large lecture hall with a professor at a podium and students in the audience. The professor is standing at a podium on the stage, facing the audience. The audience is seated in rows of chairs, filling the lecture hall. The stage has a large screen behind the professor, and there are several smaller screens or monitors on the walls. The lighting is dim, and the overall atmosphere is that of a formal lecture or presentation.

some people talk in their sleep

A large lecture hall with a lecturer at a podium and an audience of students. The room is filled with people sitting at desks, and a large screen is visible in the background.

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

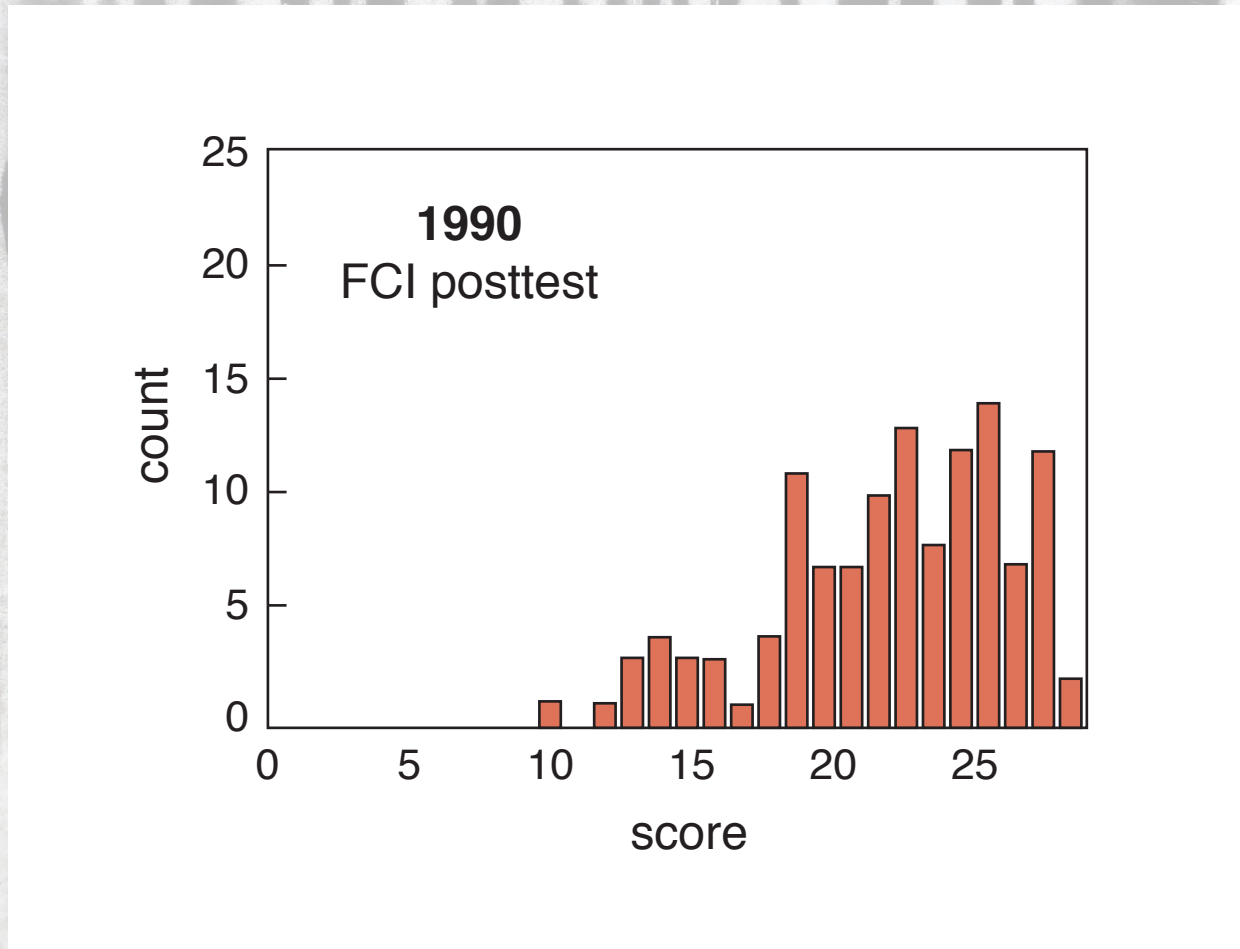




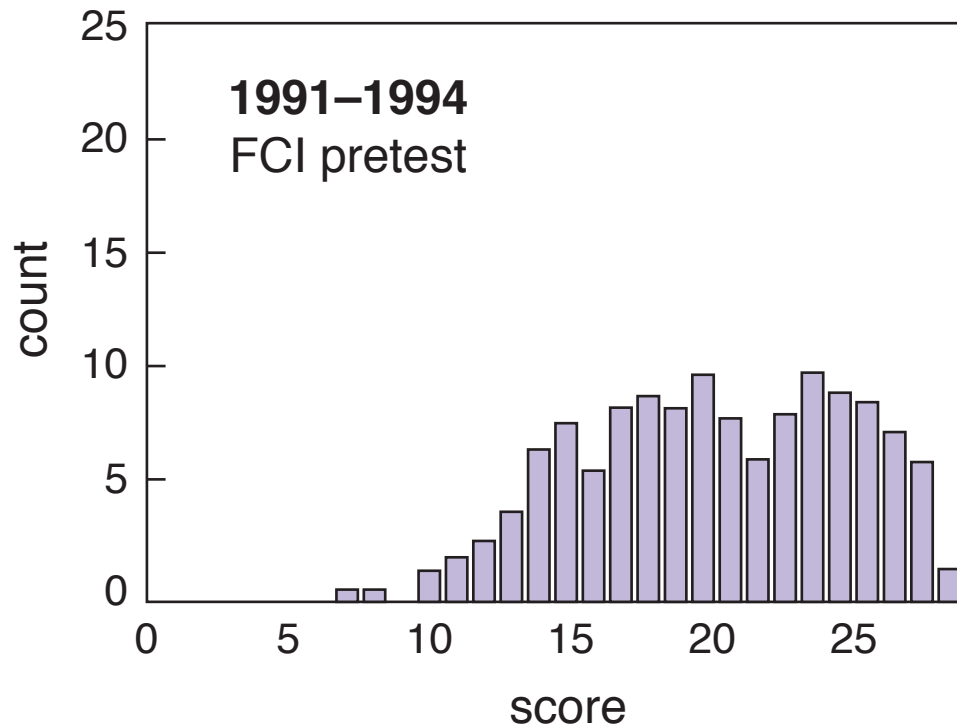
The result?

EDUCACION

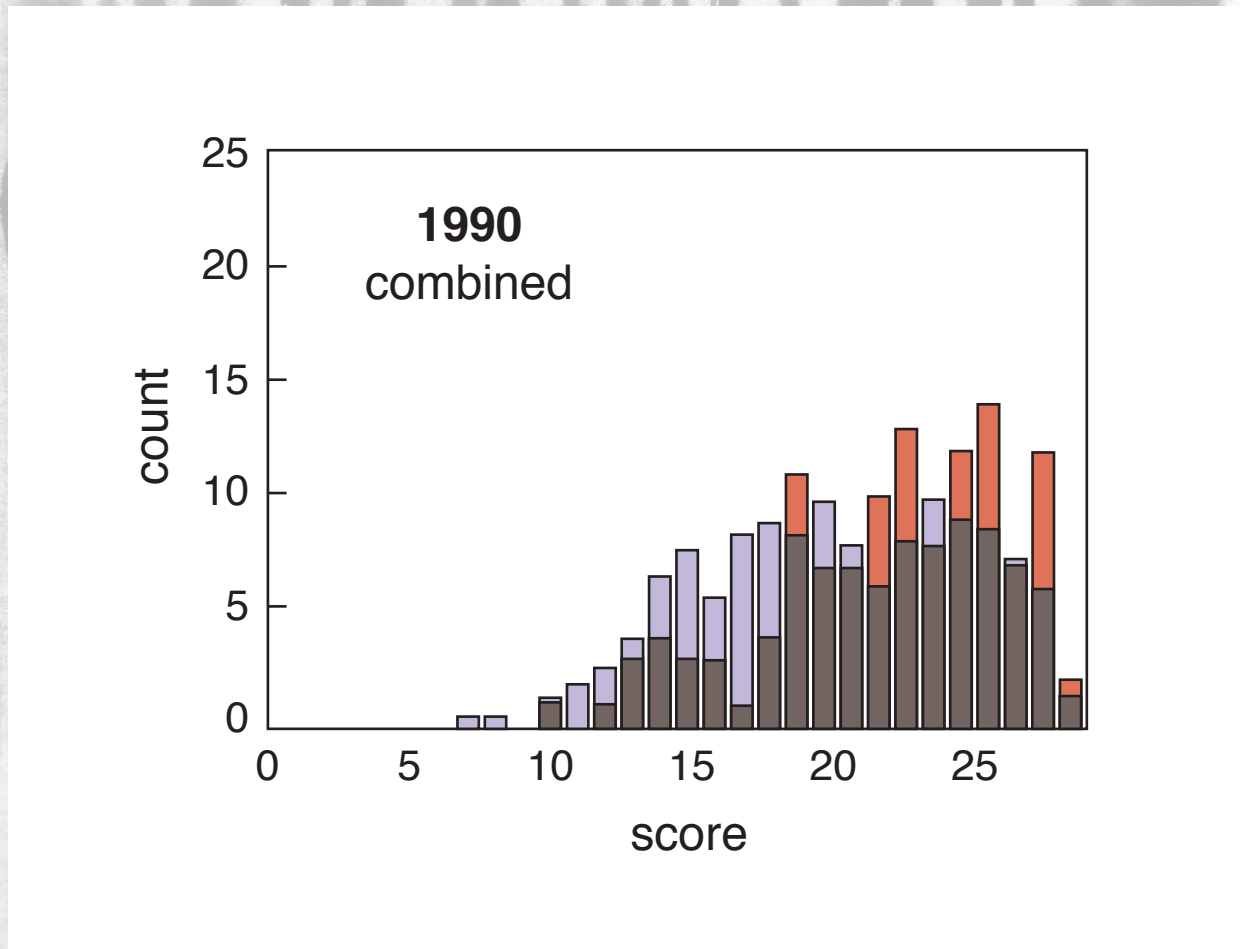
education is not just information transfer

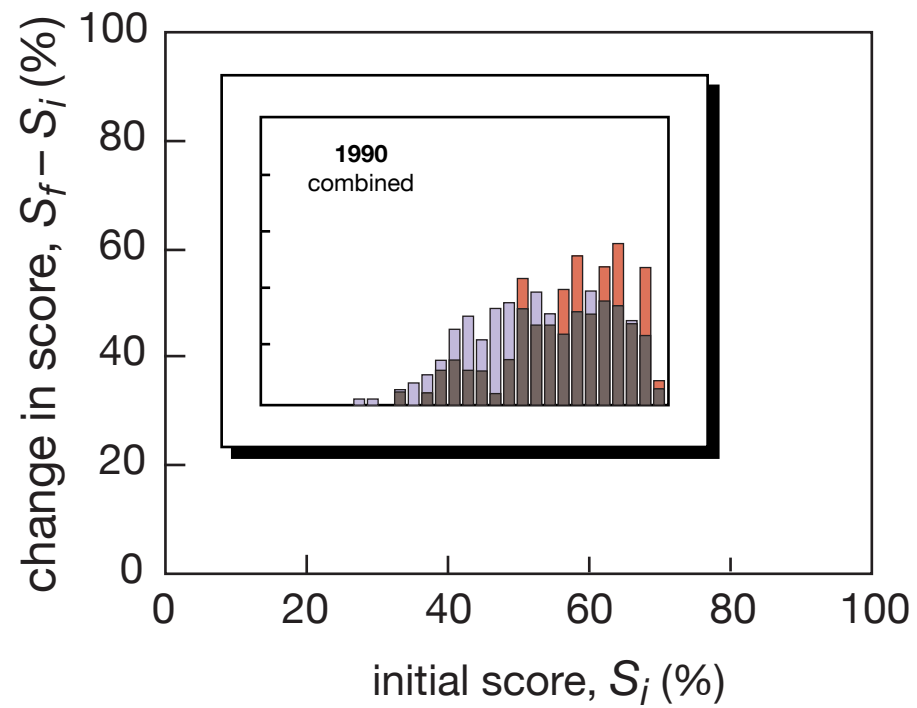


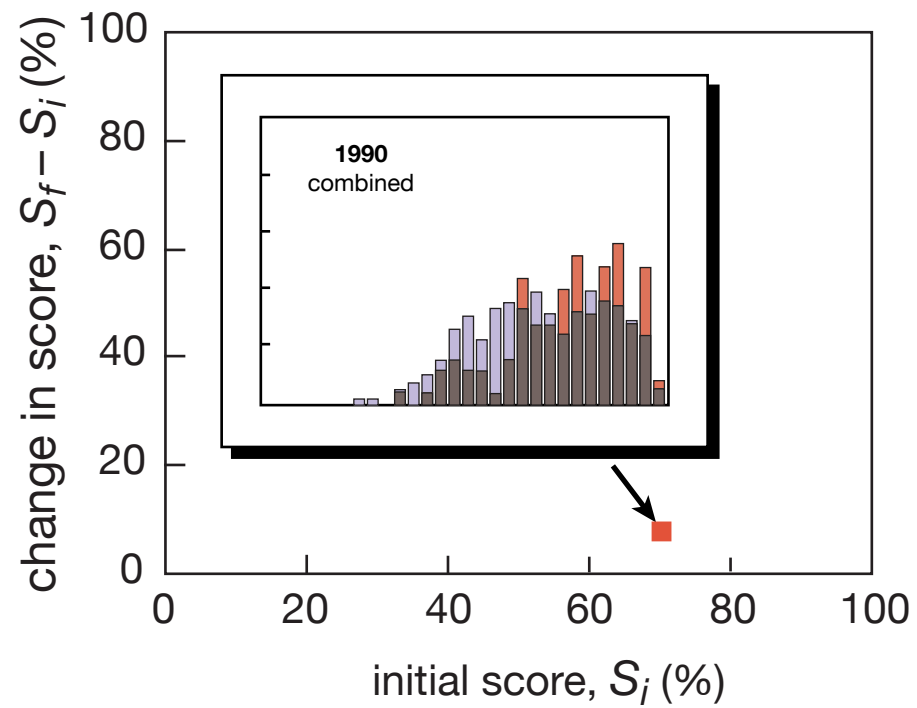
education is not just information transfer

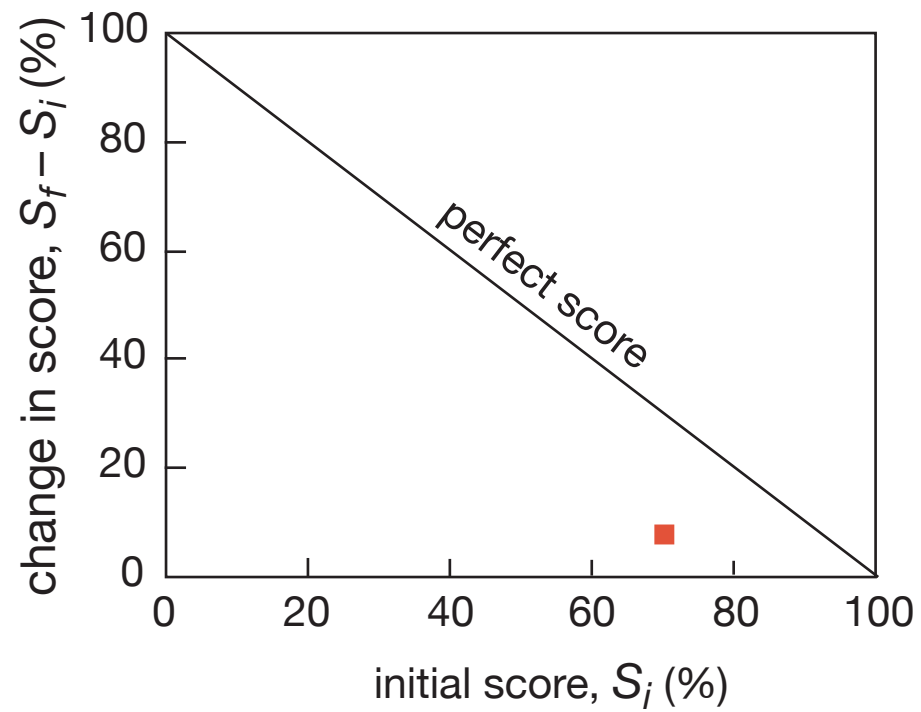


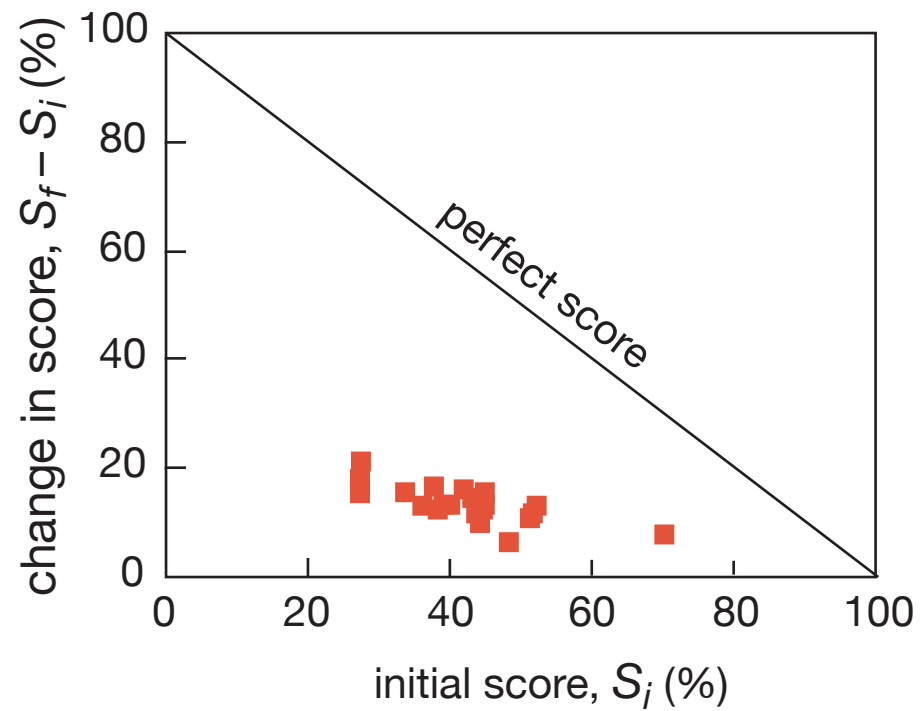
education is not just information transfer





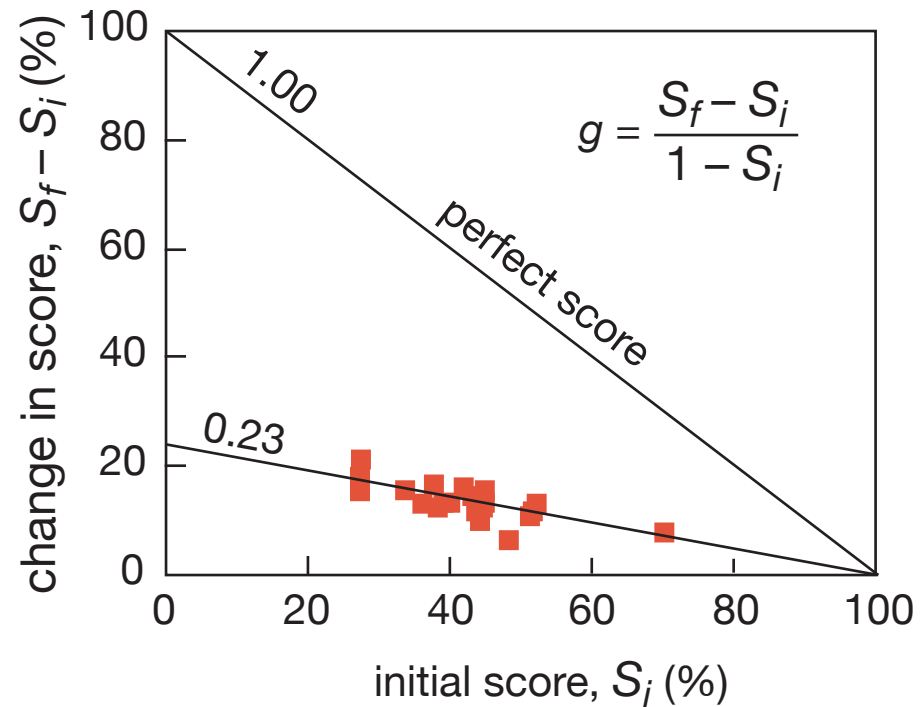






R.R. Hake, *Am. J. Phys.* 66, 64 (1998)

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!**

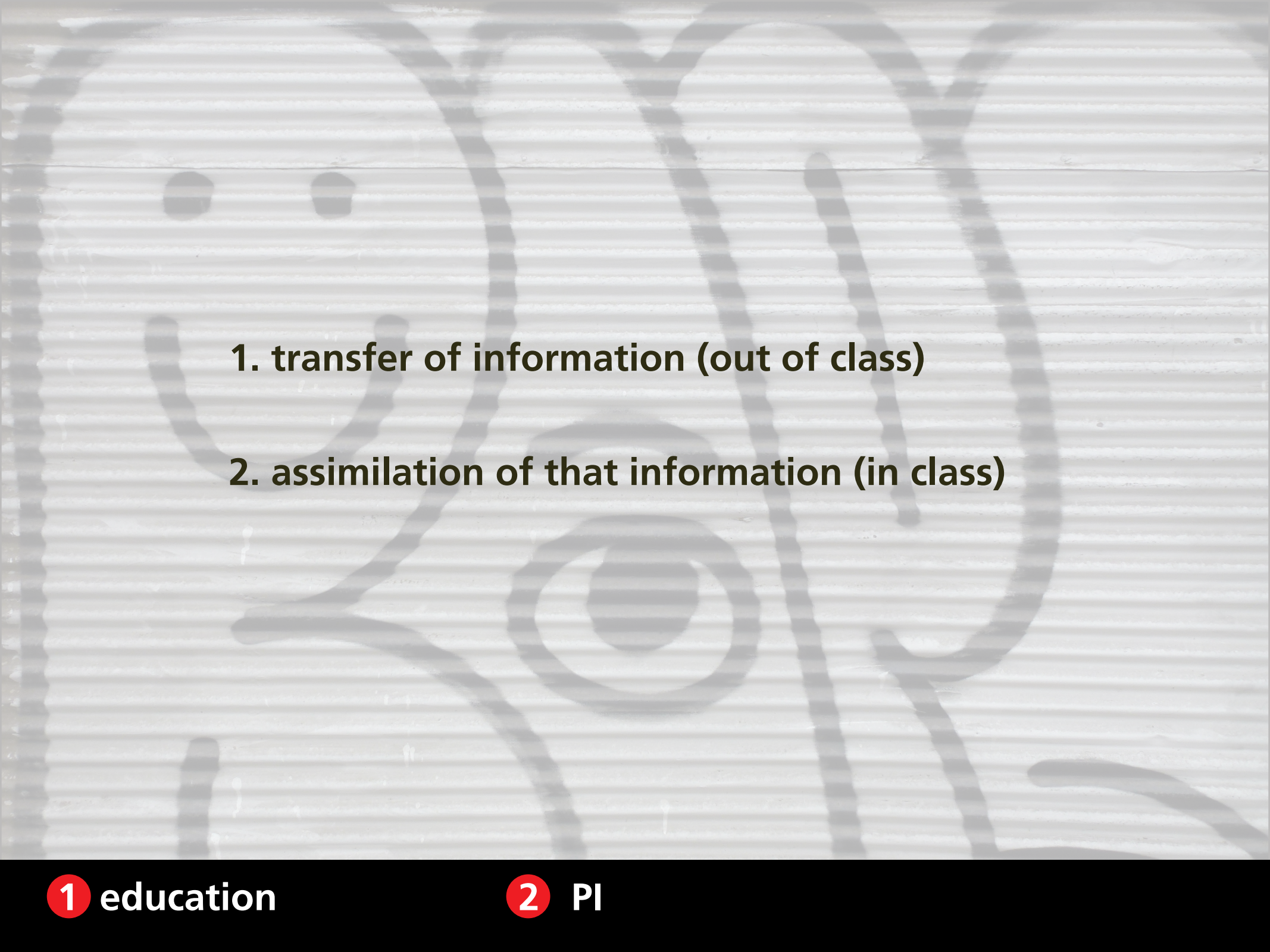
1. transfer of information (in class)

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



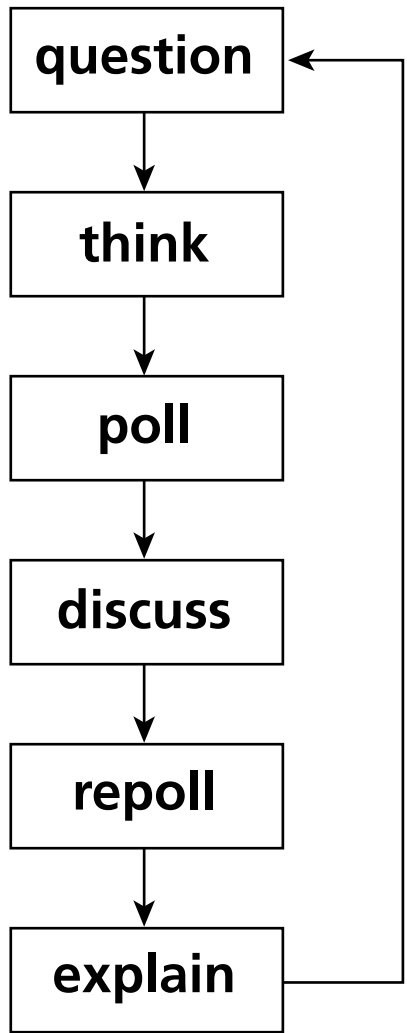
discuss

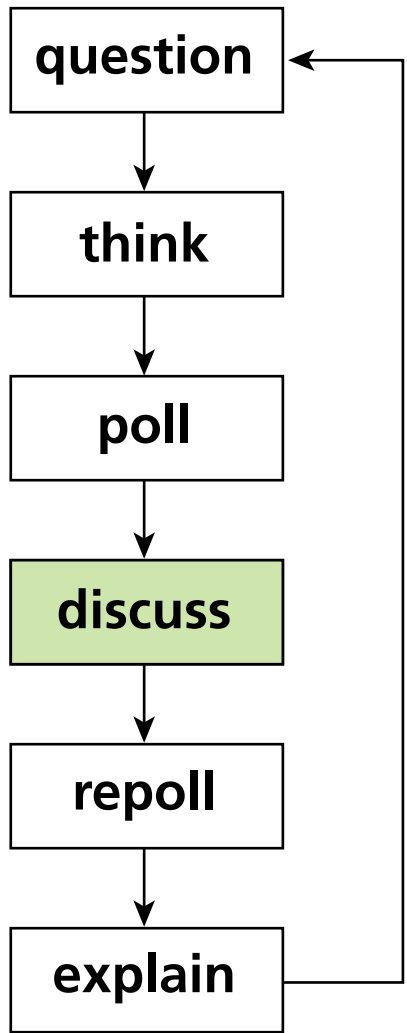


repoll



explain





1 education

2 PI

Let's try it!

QUESTION

think

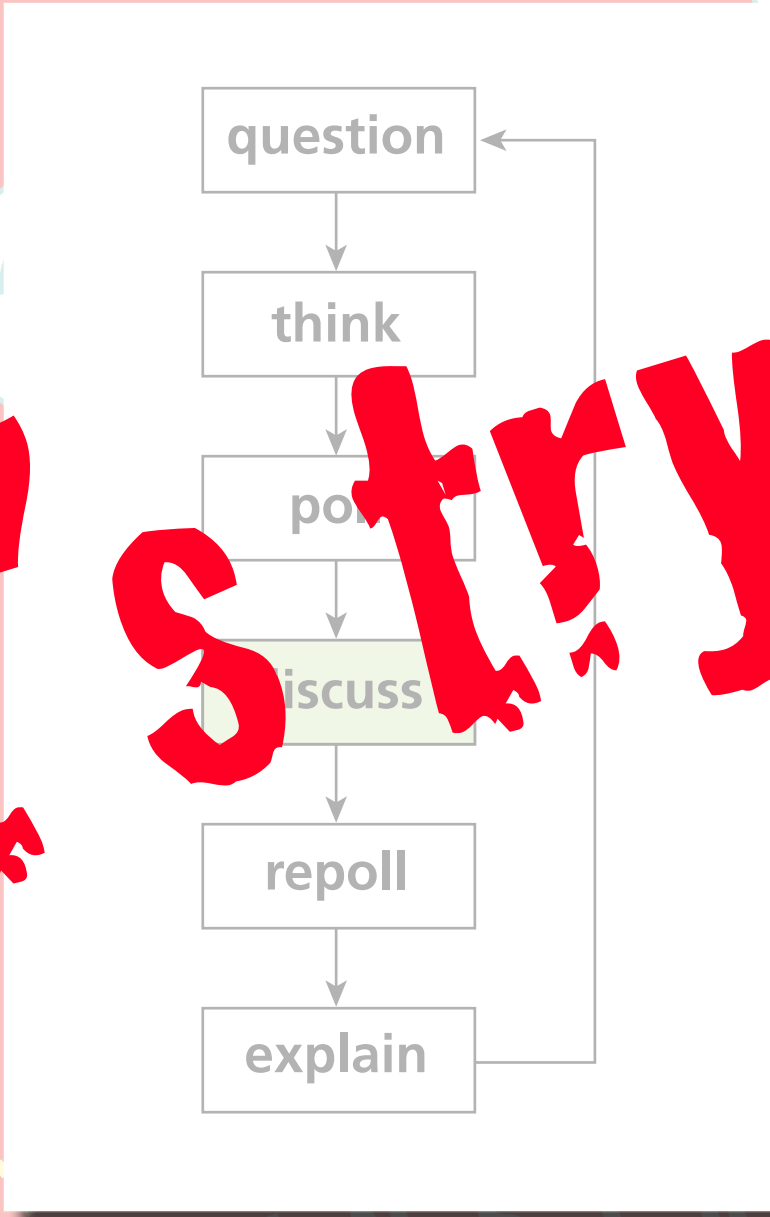
poll

discuss

repoll

explain

ACTION

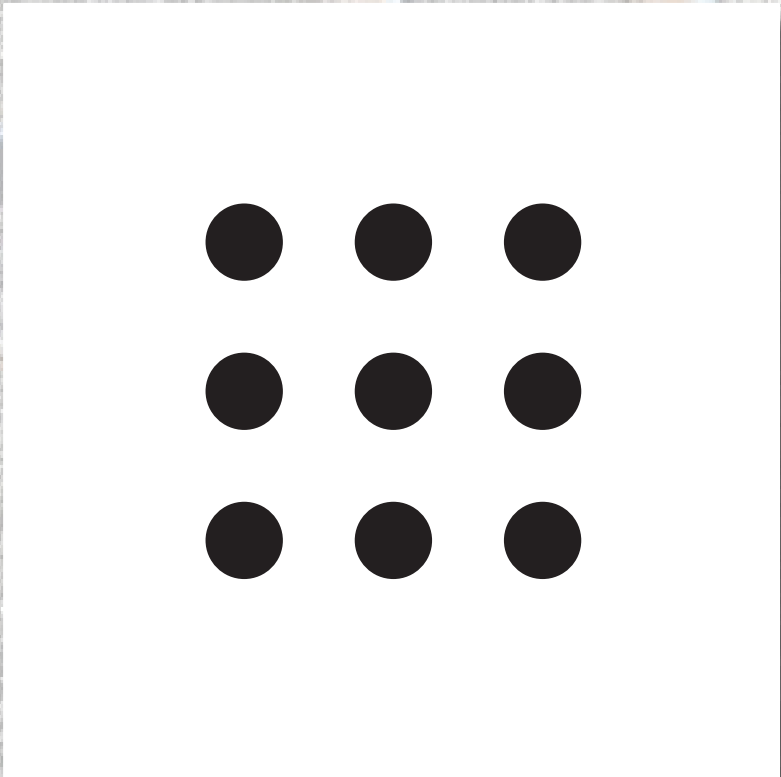


1 education

2 PI

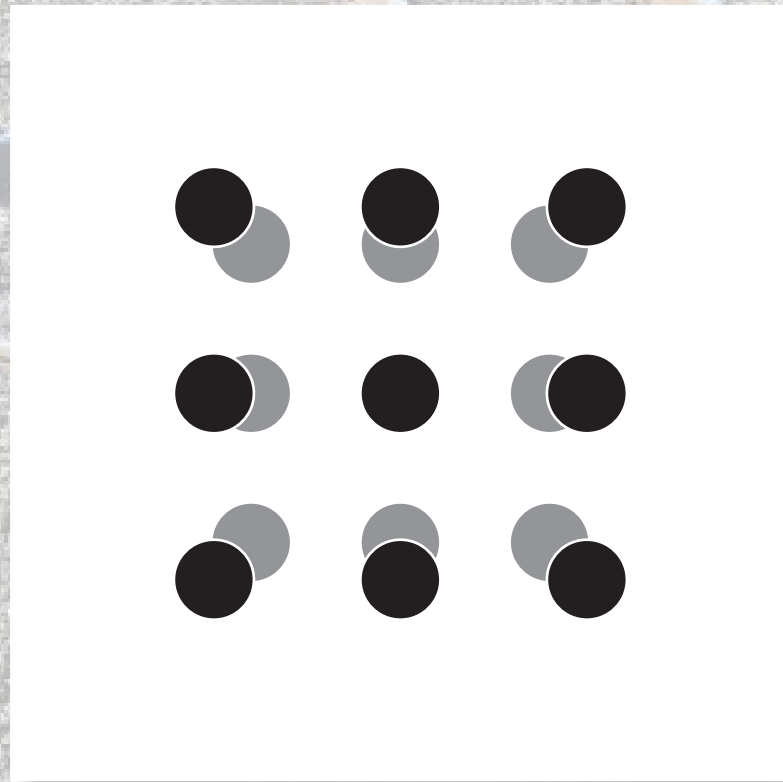
A photograph of a gravel path with a blue wavy line drawn on it, illustrating thermal expansion. The path is made of grey gravel and is bordered by green grass on both sides. The blue line is drawn in a series of connected, rounded curves, resembling a sine wave. The text "thermal expansion" is overlaid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

thermal expansion

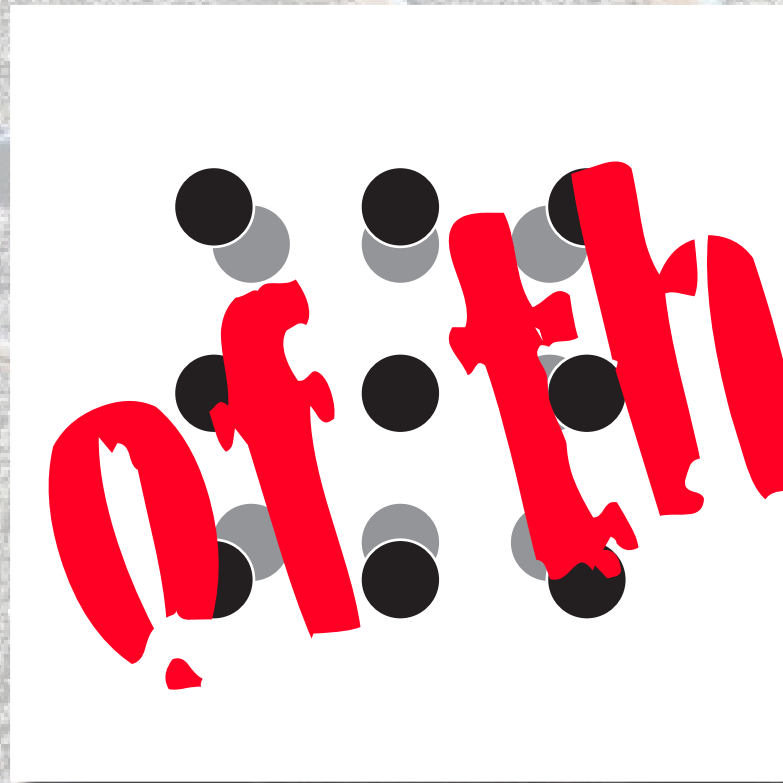


1 education

2 PI



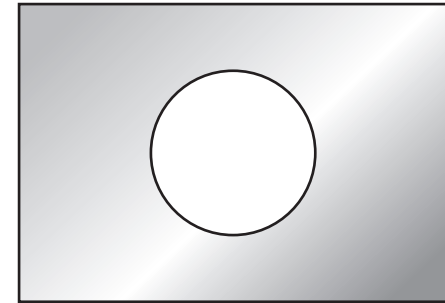
all of them!



1 education

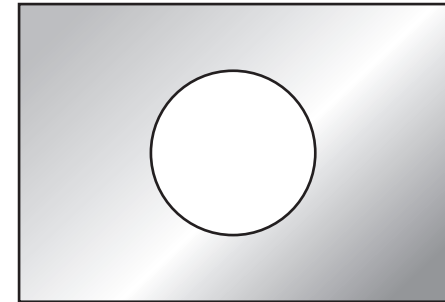
2 PI

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



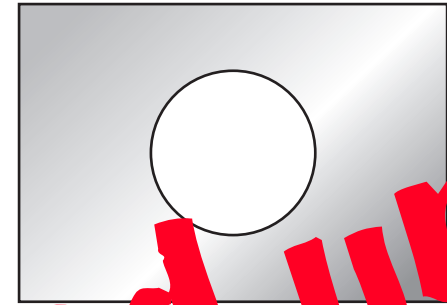
Consider a rectangular metal plate with a circular hole in it.

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.



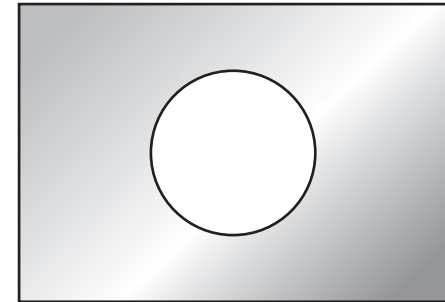
When the plate is uniformly heated, the diameter of the hole

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**

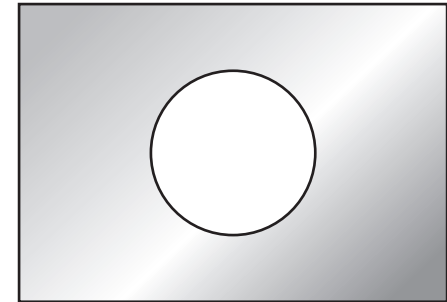
Before I tell you the answer, let's analyze what happened.

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**

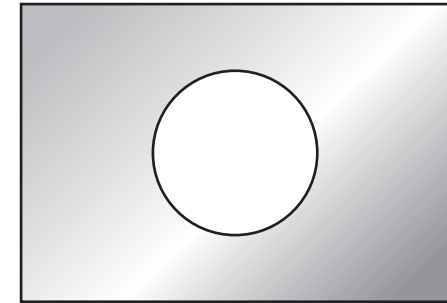
Consider a rectangular metal plate with a circular hole in it.

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



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

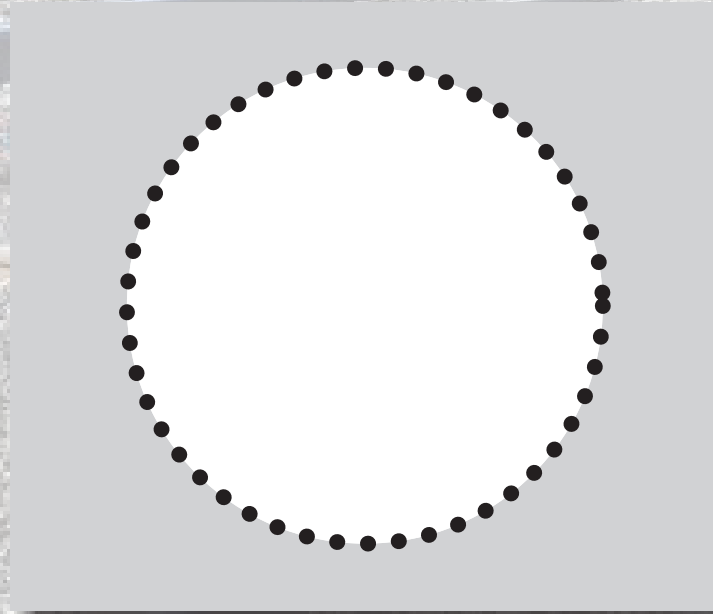
Consider a rectangular metal plate with a circular hole in it.



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

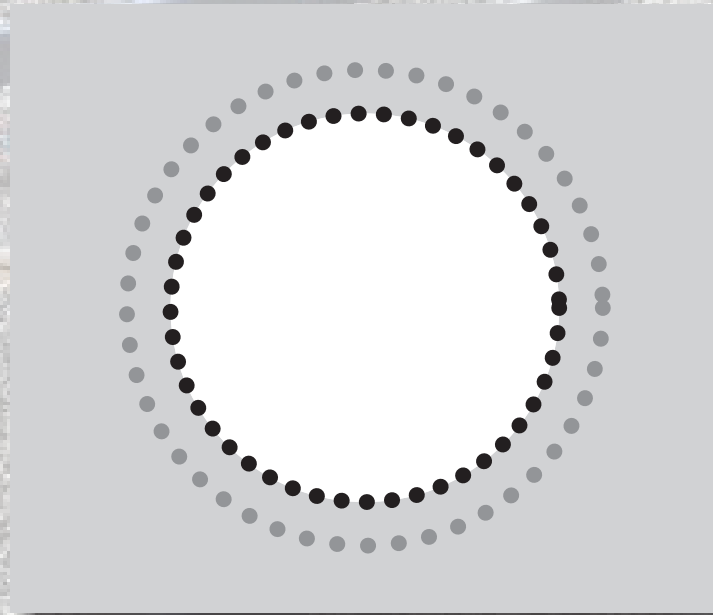


1 education

2 PI

3 test

consider atoms at rim of hole

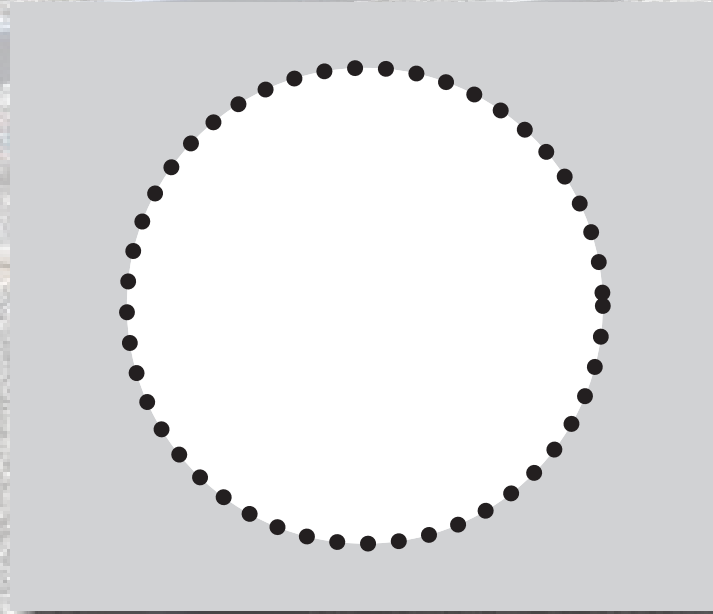


1 education

2 PI

3 test

consider atoms at rim of hole

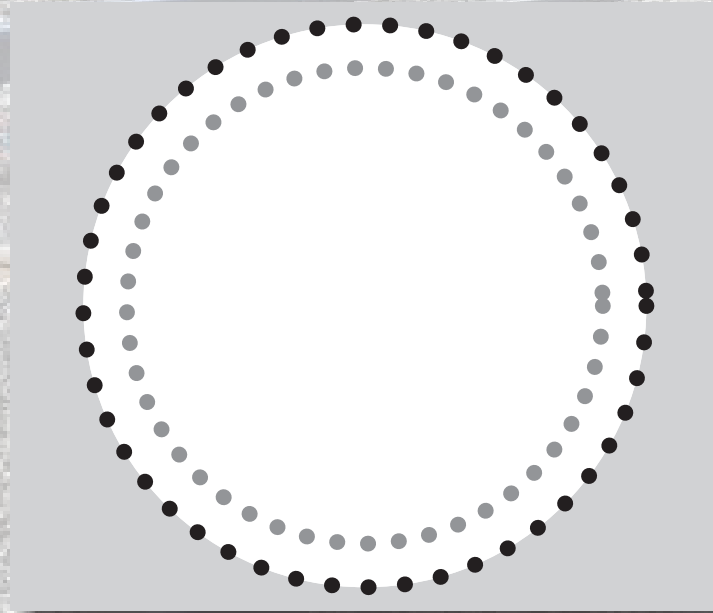


1 education

2 PI

3 test

consider atoms at rim of hole



1 education

2 PI

3 test

consider atoms at rim of hole

you won't forget this

A diagram of a circular hole with a dotted line representing the rim of atoms. The hole is shown in a perspective view, with a grey rim and a white interior. The dotted line is a circle of small black dots, representing the atoms at the edge of the hole. The diagram is set against a grey background.

1 education

2 PI

3 test

Peer

back to PI

INSTRUCTION

1 education

2 PI

3 test

Peer

is it any good?

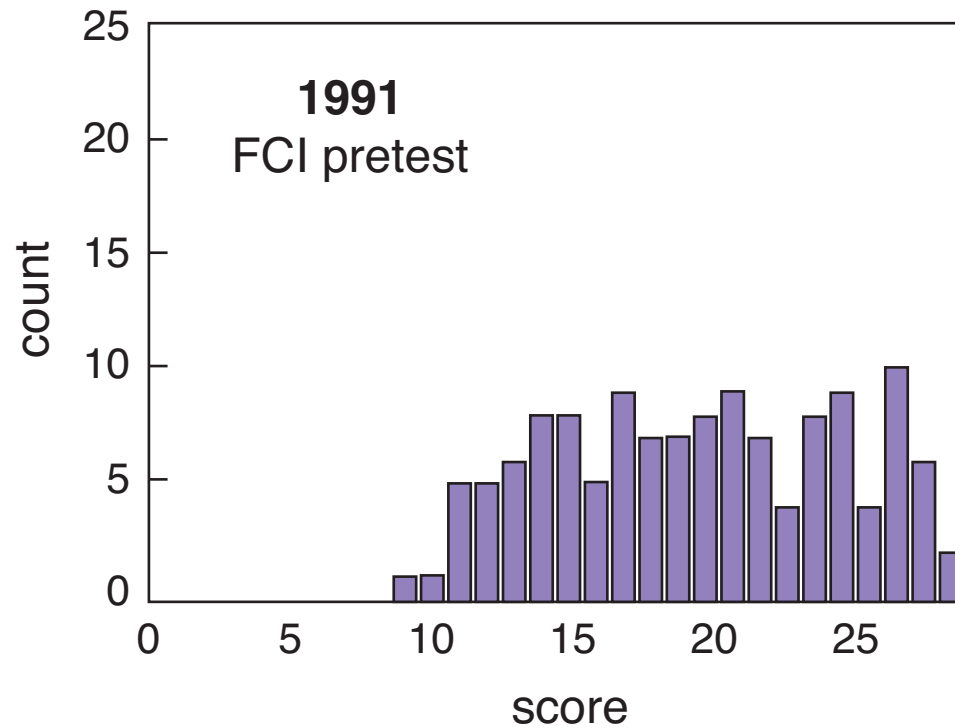
INSTRUCTION

1 education

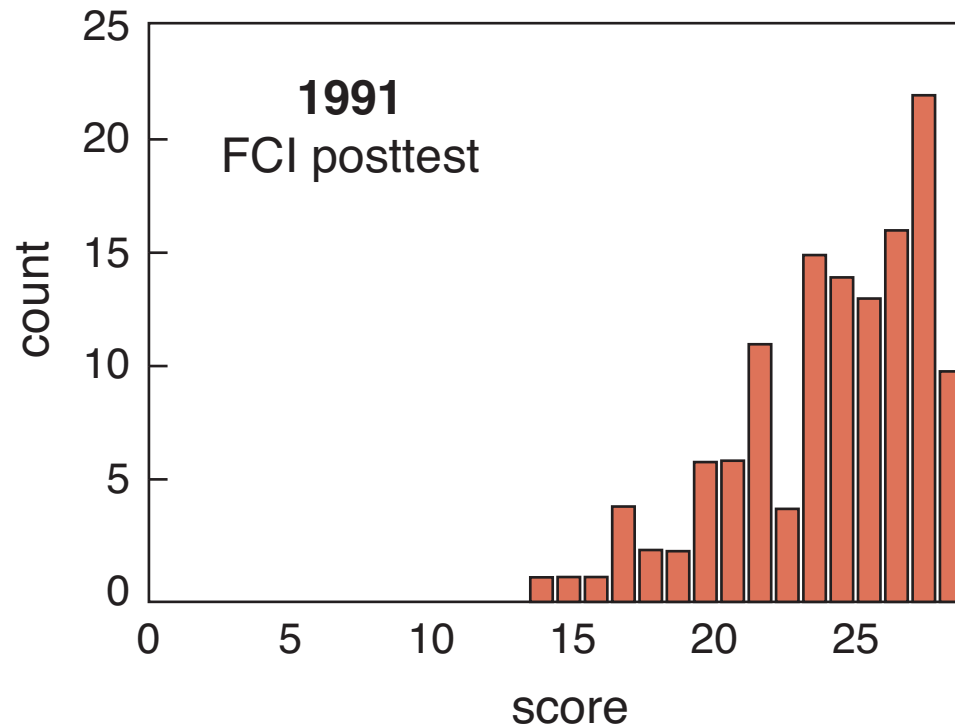
2 PI

3 test

first year of implementing PI



first year of implementing PI

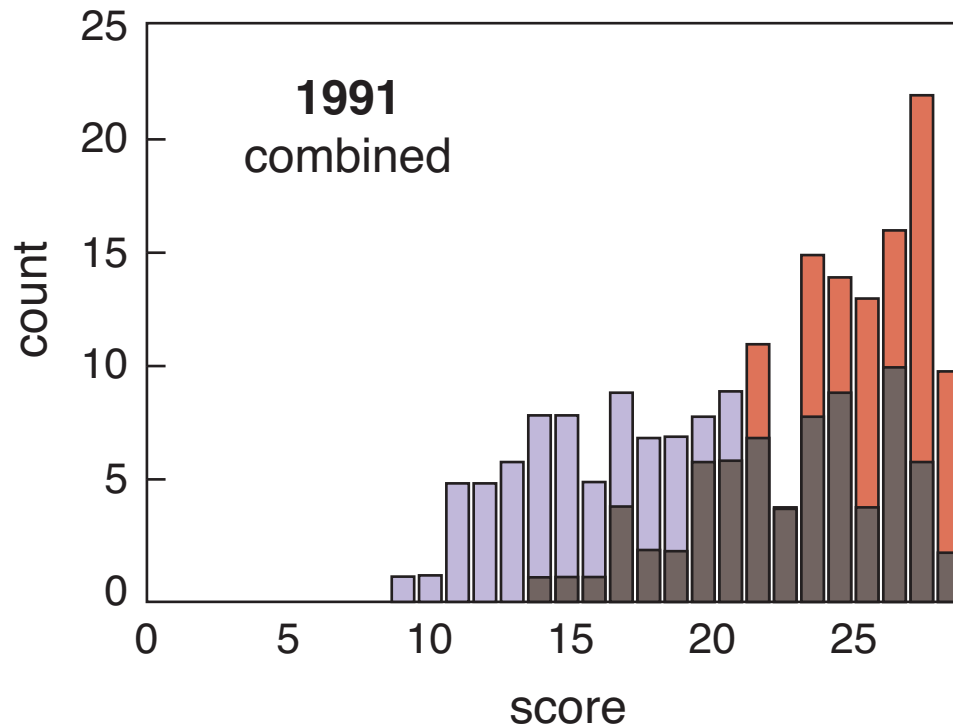


1 education

2 PI

3 test

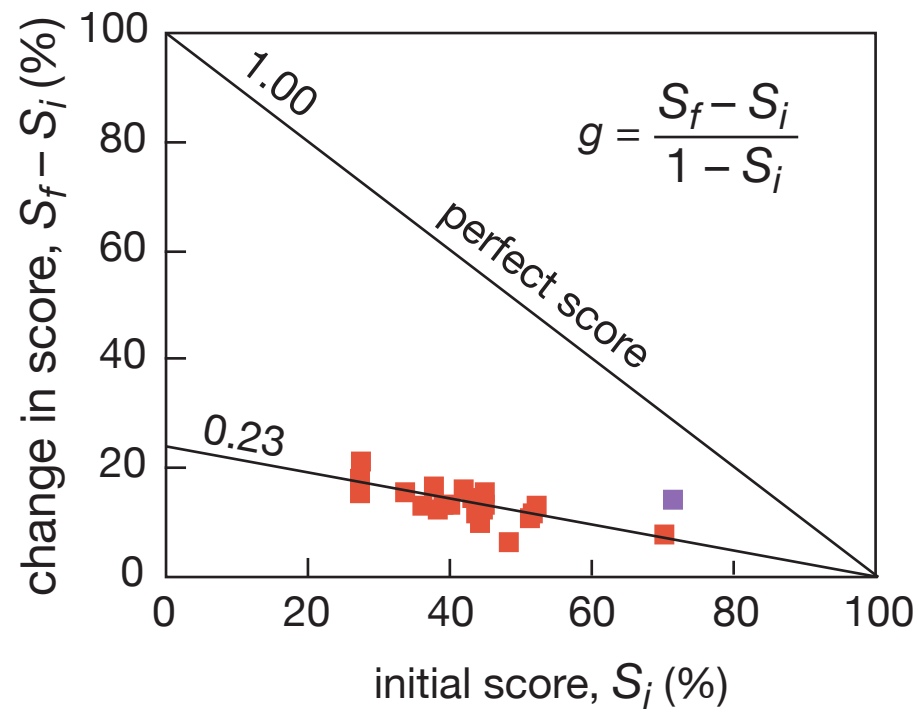
first year of implementing PI



1 education

2 PI

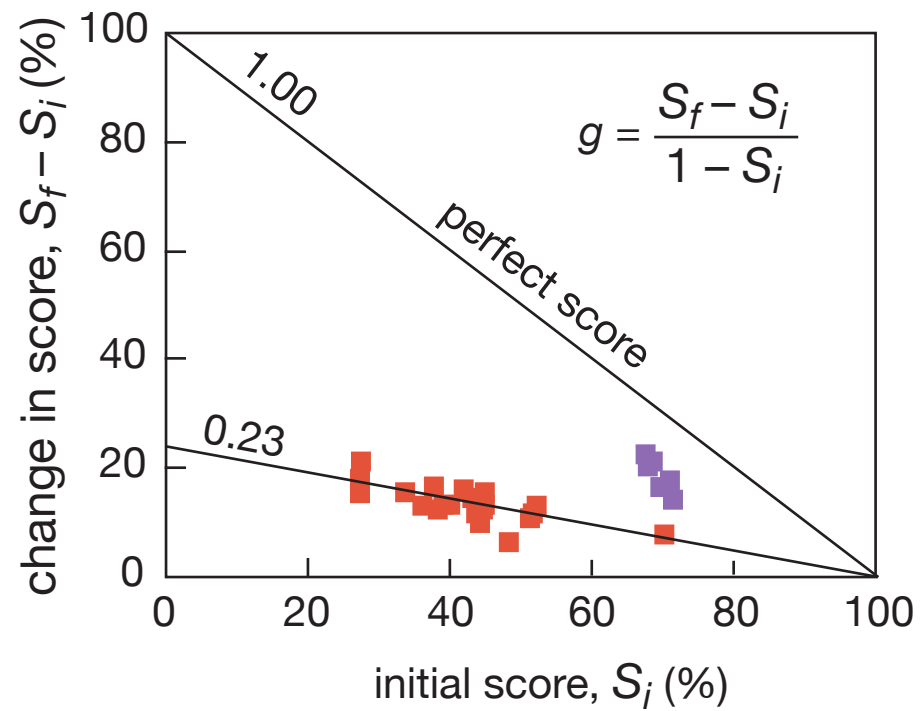
3 test



1 education

2 PI

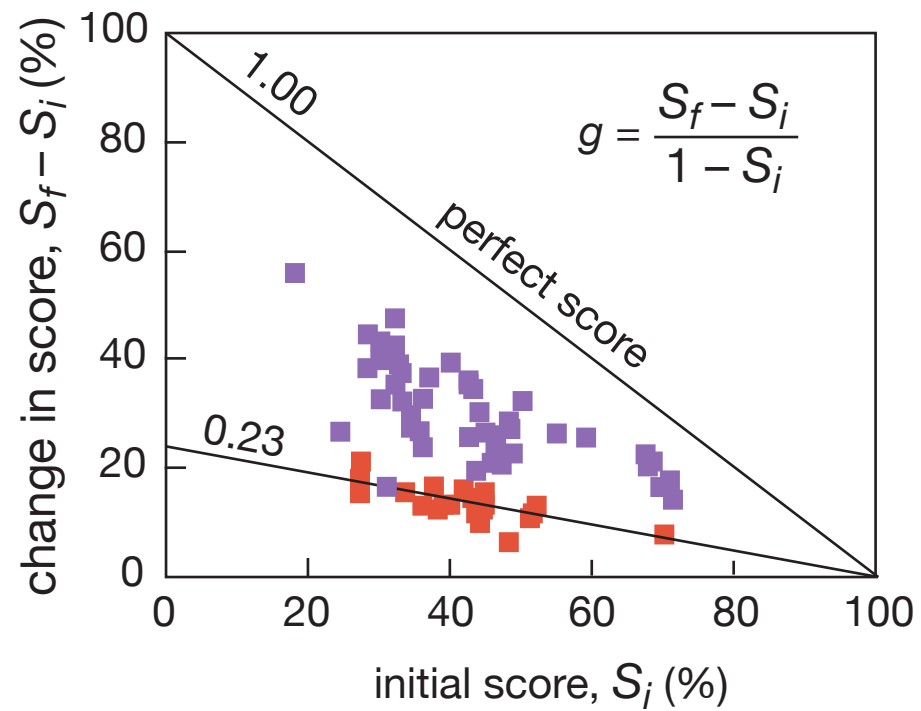
3 test



1 education

2 PI

3 test

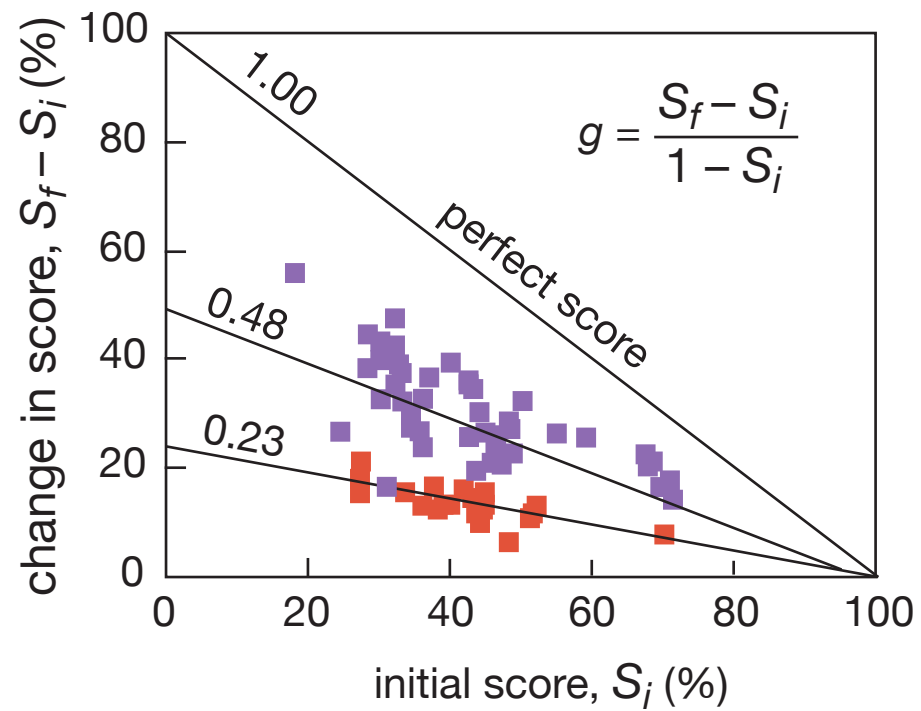


R.R. Hake, *Am. J. Phys.* 66, 64 (1998)

1 education

2 PI

3 test



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

1 education

2 PI

3 test



Peer

The word 'Peer' is rendered in a large, white, sans-serif font with a light blue outline. The first 'e' is circled by a dashed yellow line with an arrow pointing clockwise. A dotted blue line starts from the top right of the second 'e' and curves downwards and to the left, ending near the bottom left of the frame.

what about problem solving?



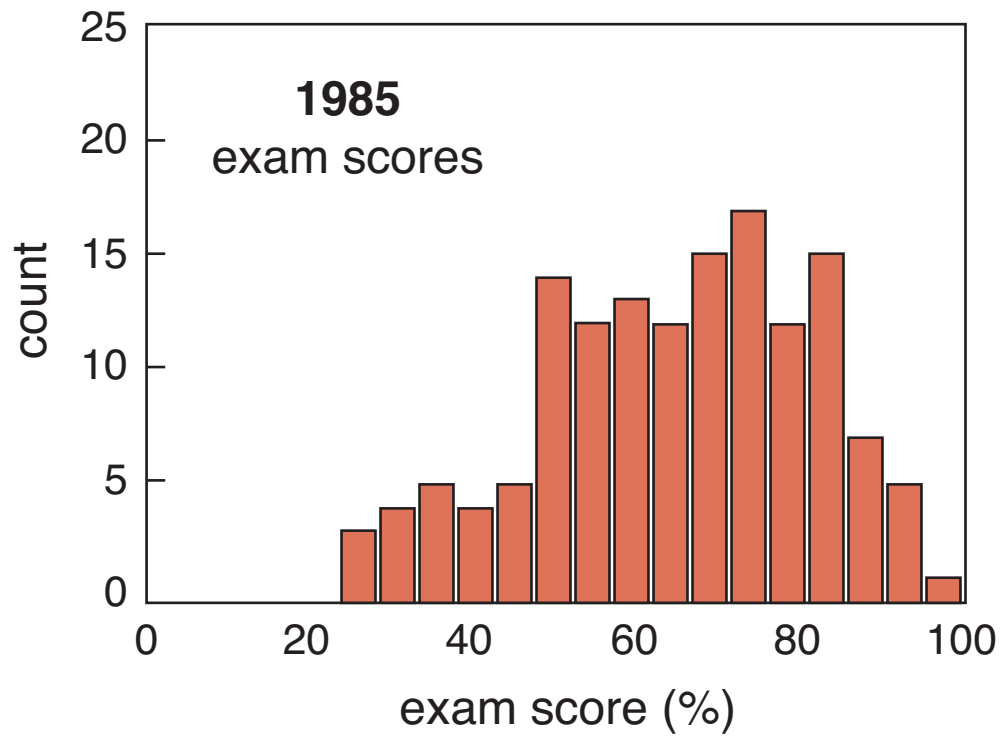
INSTRUCTION

The word 'INSTRUCTION' is written in a white, sans-serif font, slanted upwards from left to right. A dotted blue line starts from the bottom left of the word and curves upwards and to the right, ending near the top right of the frame.

1 education

2 PI

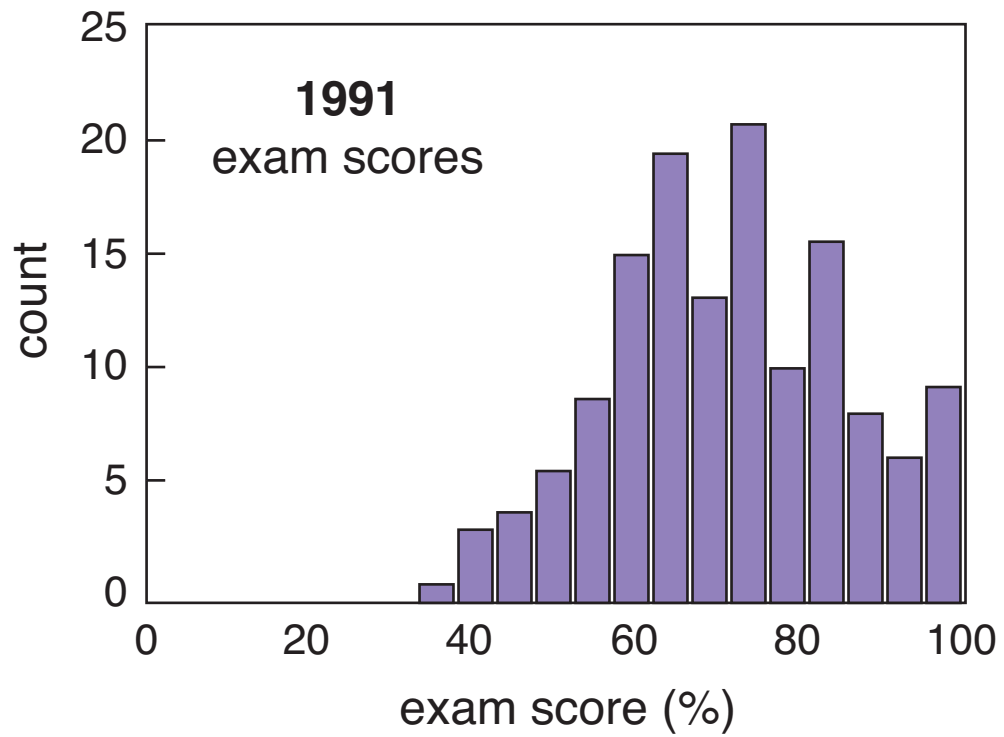
3 test



1 education

2 PI

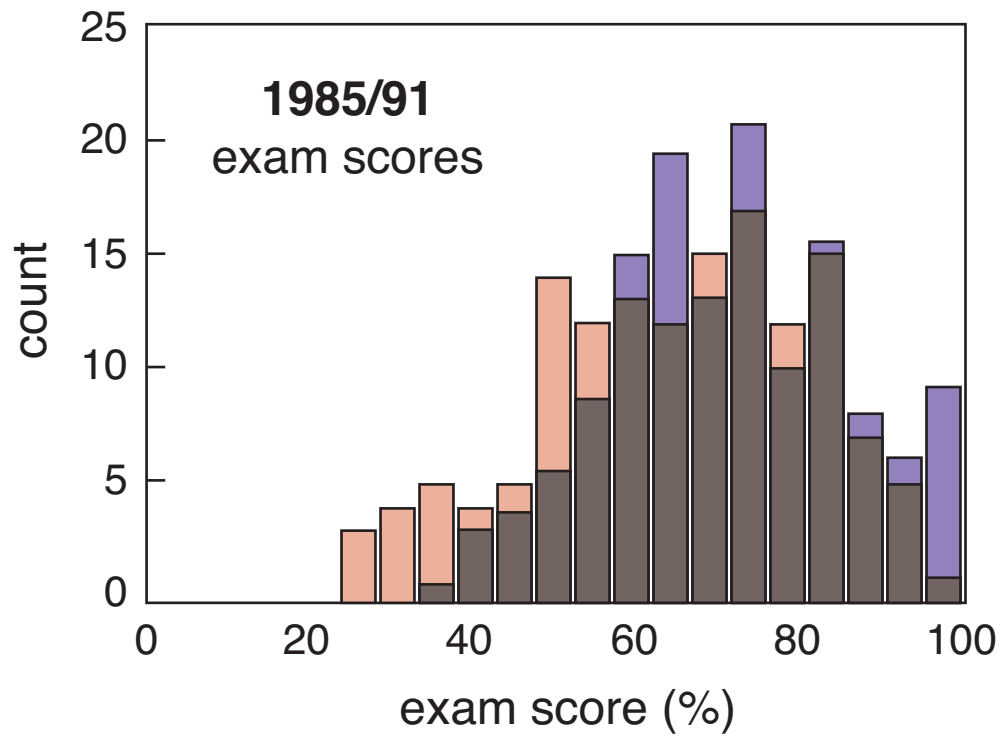
3 test



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

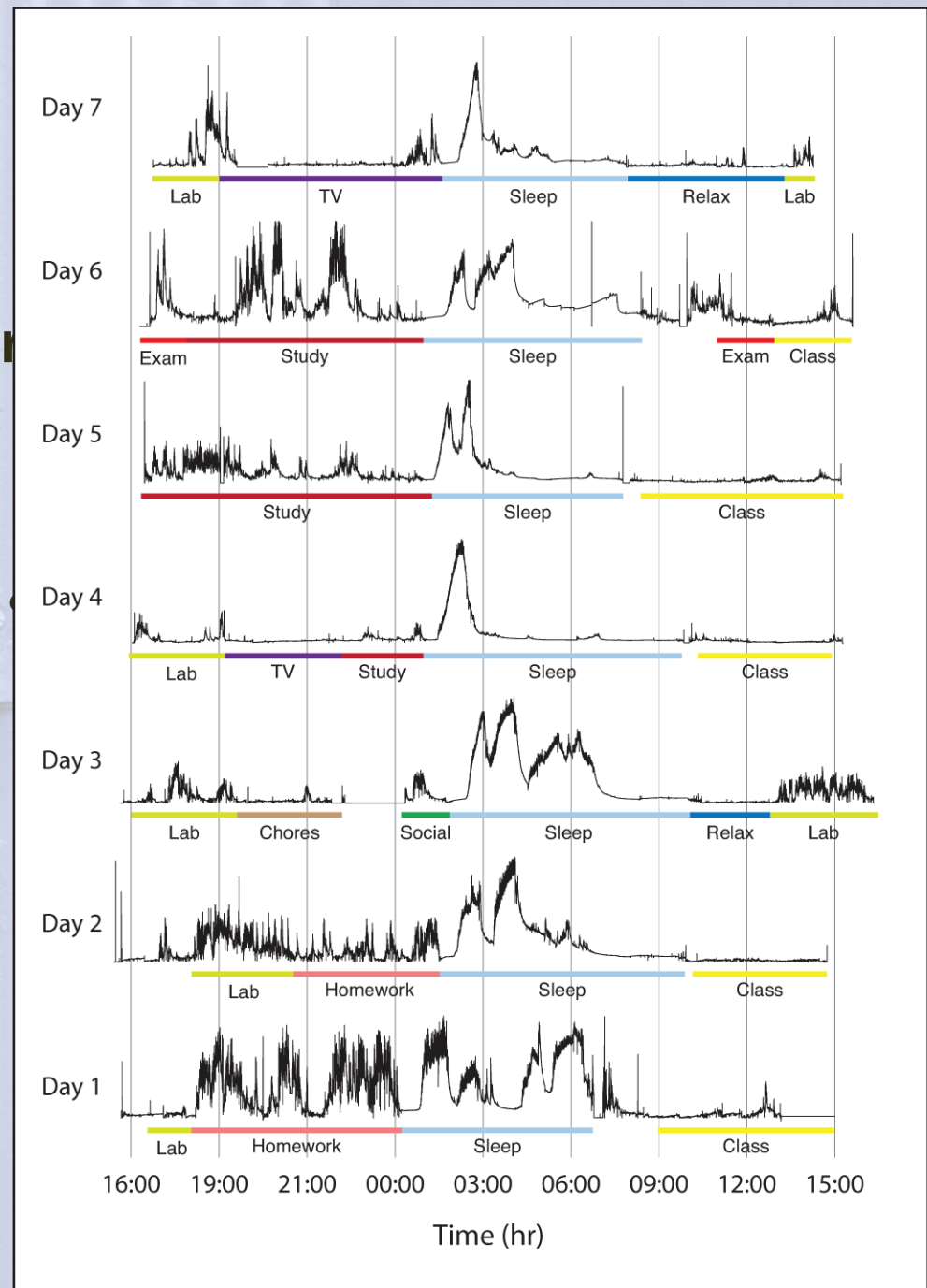
1 education

2 PI

3 test

in a lecture

1. don't pay utmost



doi: 10.1109/TBME.2009.2038487

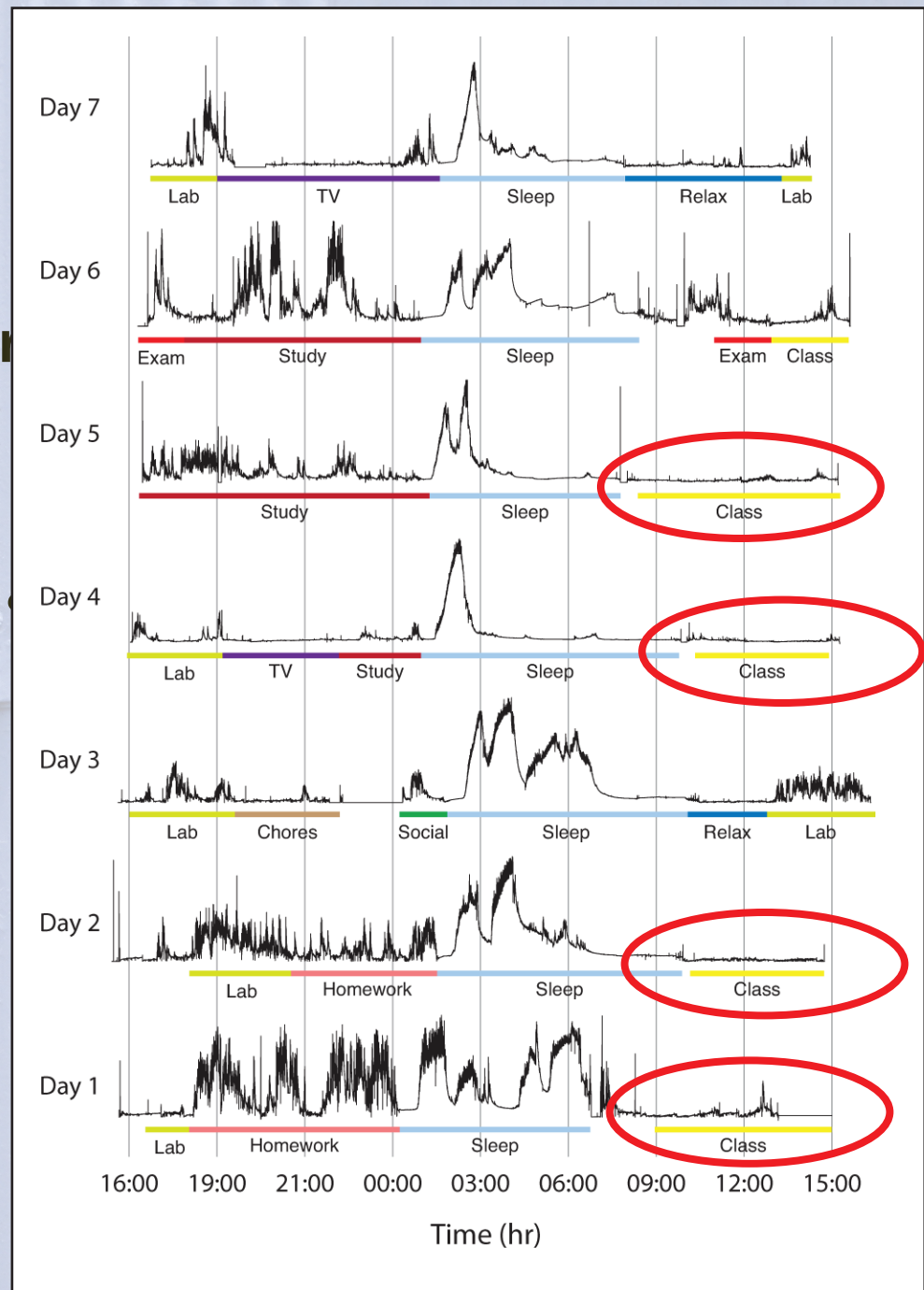
1 education

2 PI

3 test

in a lecture

1. don't pay utmost



doi: 10.1109/TBME.2009.2038487

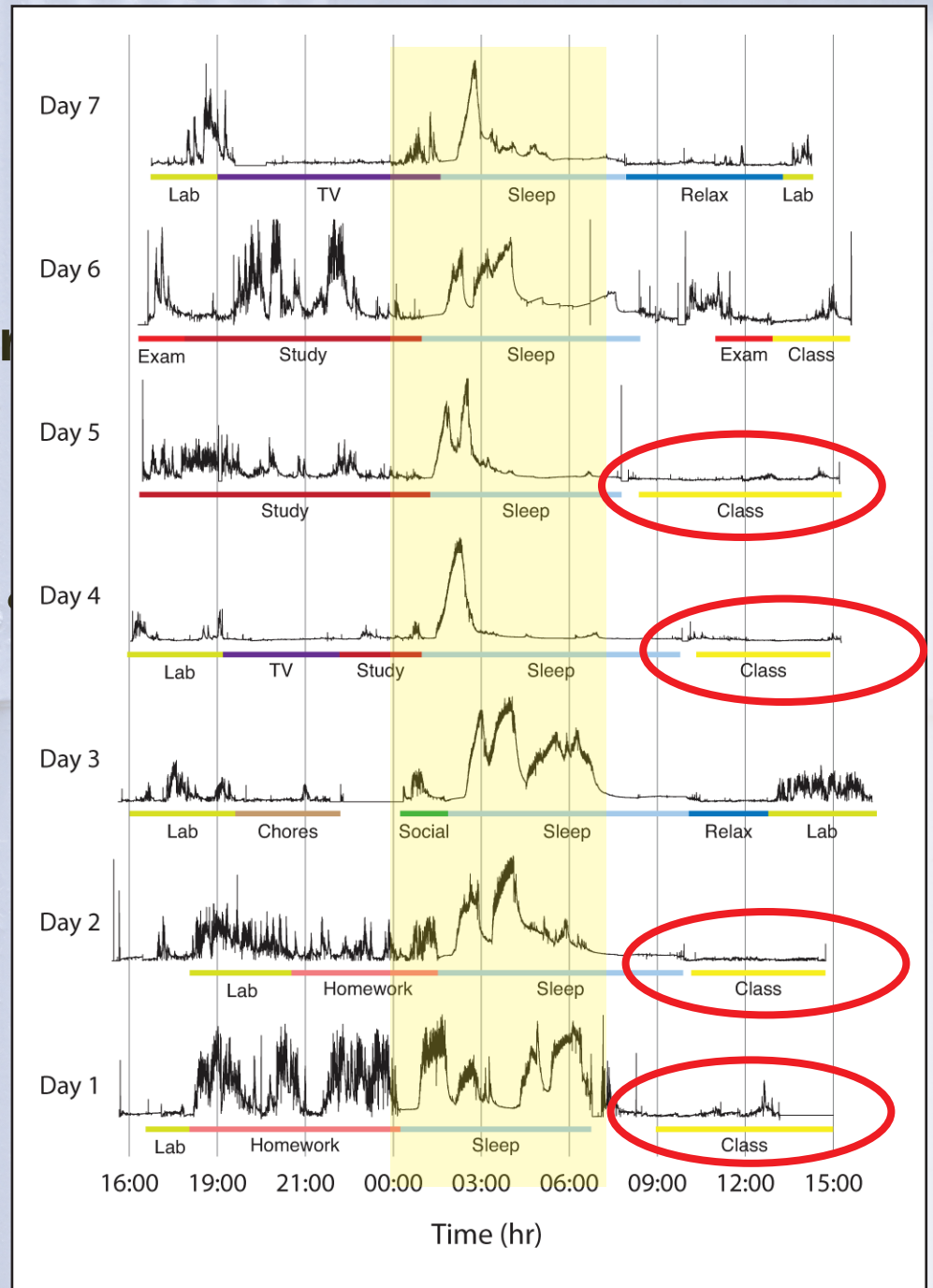
1 education

2 PI

3 test

in a lecture

1. don't pay utmost



doi: 10.1109/TBME.2009.2038487

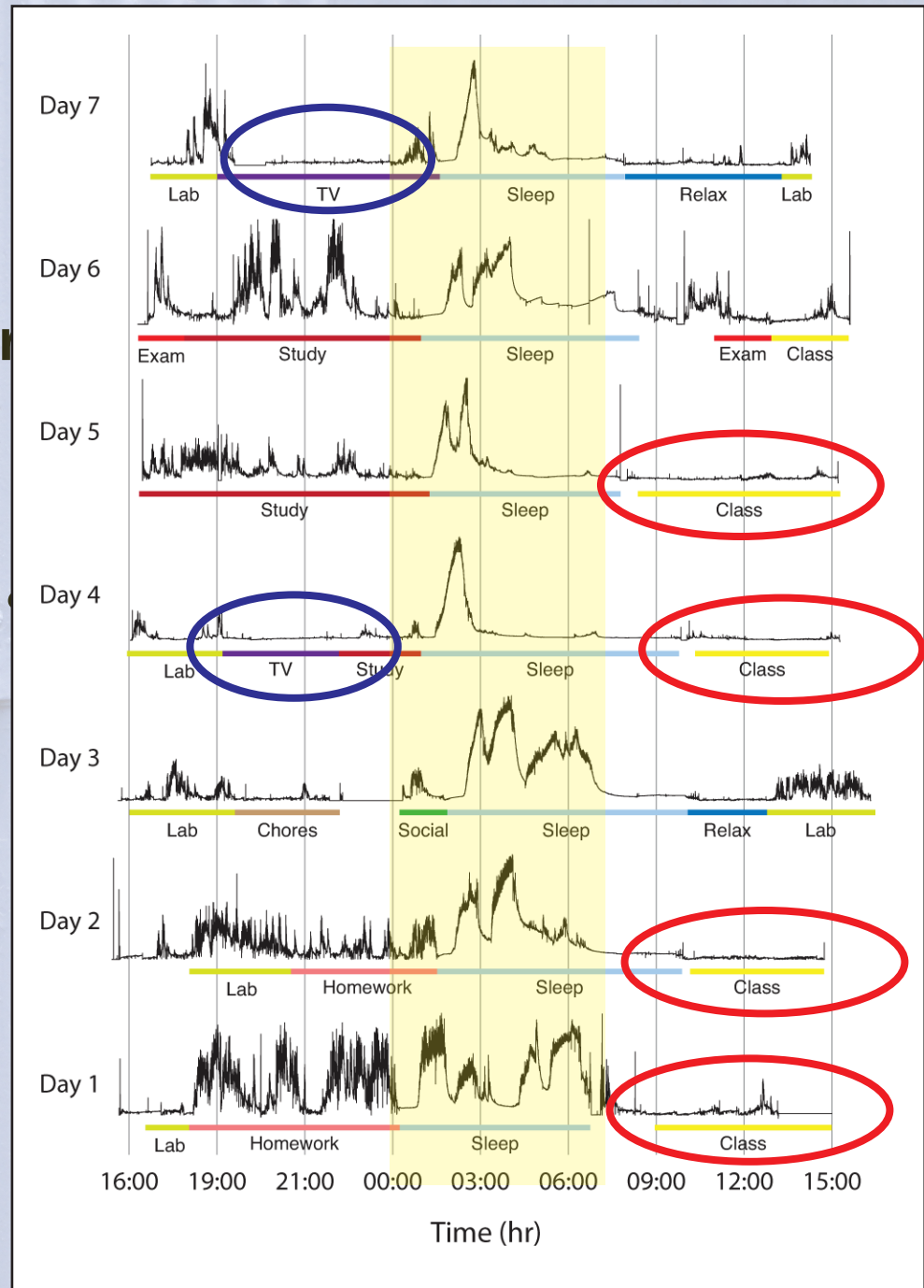
1 education

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



<http://www.babble.com>

1 education

2 PI

3 test

A close-up photograph of a calico cat's face, showing its green eyes and orange, white, and black fur. The image is slightly faded to allow text to be overlaid.

2 short video lectures on calico cats, same content

doi: [10.3758/s13423-013-0442-z](https://doi.org/10.3758/s13423-013-0442-z)

1 education

2 PI

3 test

2 short video lectures on calico cats, same content

fluent video



speaks fluidly w/o notes

upright

maintains eye contact

doi: [10.3758/s13423-013-0442-z](https://doi.org/10.3758/s13423-013-0442-z)

1 education

2 PI

3 test

2 short video lectures on calico cats, same content

fluent video



**speaks fluidly w/o notes
upright
maintains eye contact**

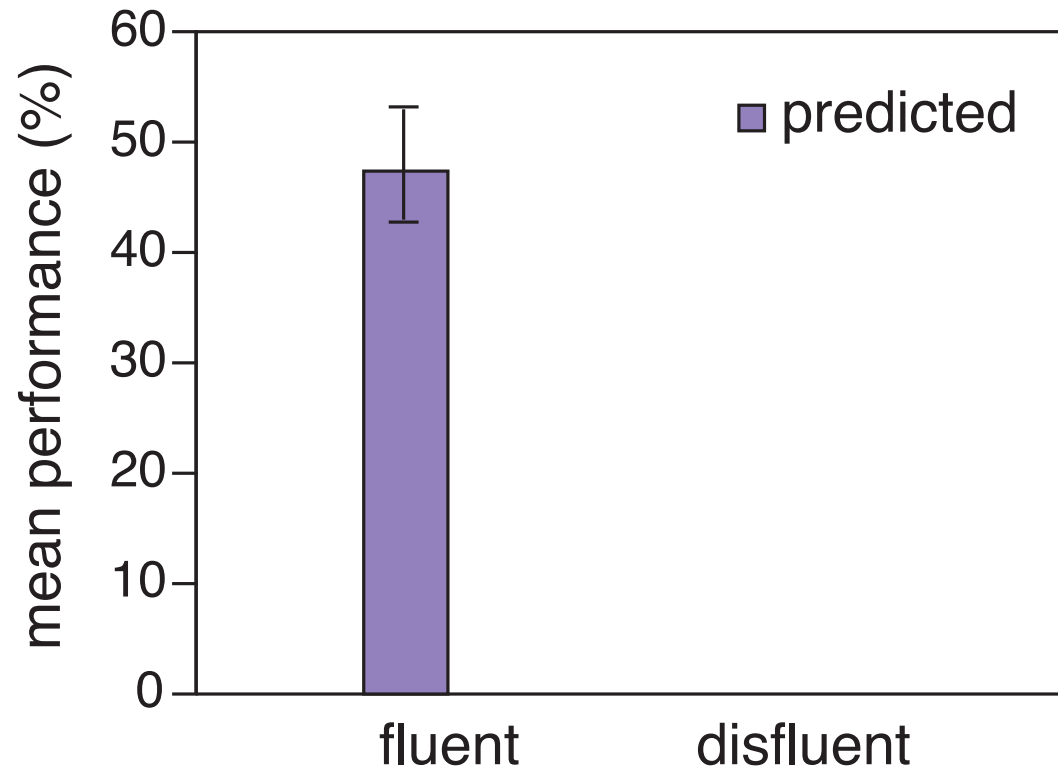
disfluent video



**speaks haltingly from notes
slumped
looks away**

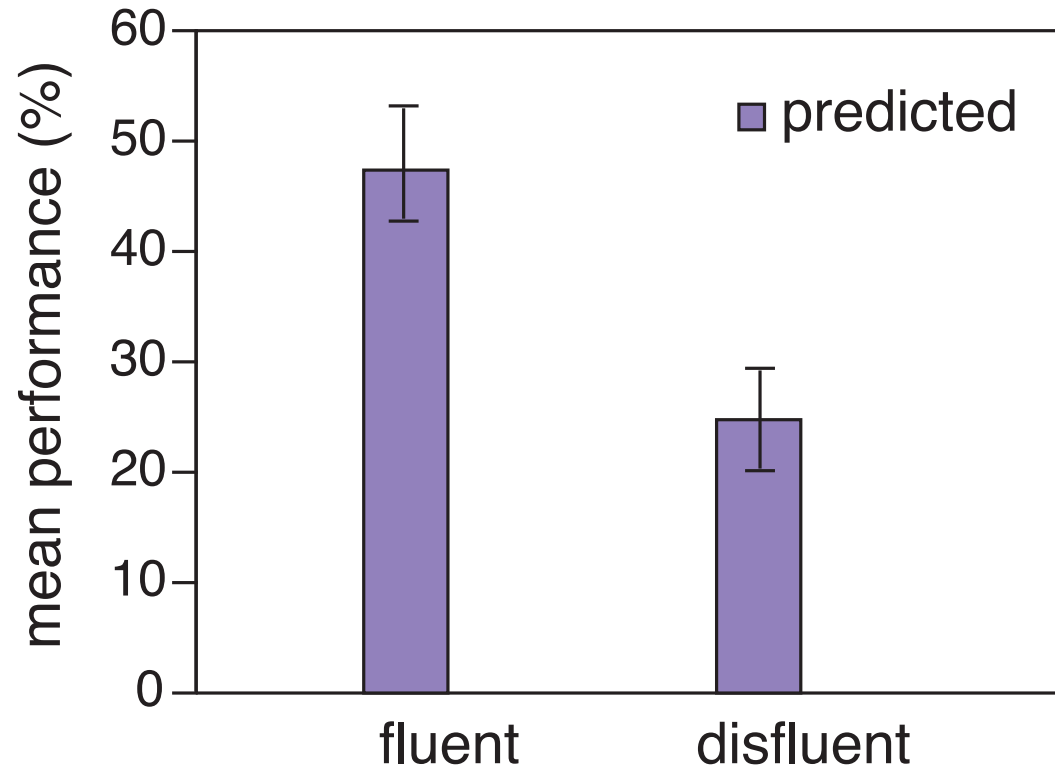
doi: 10.3758/s13423-013-0442-z

judgement of learning



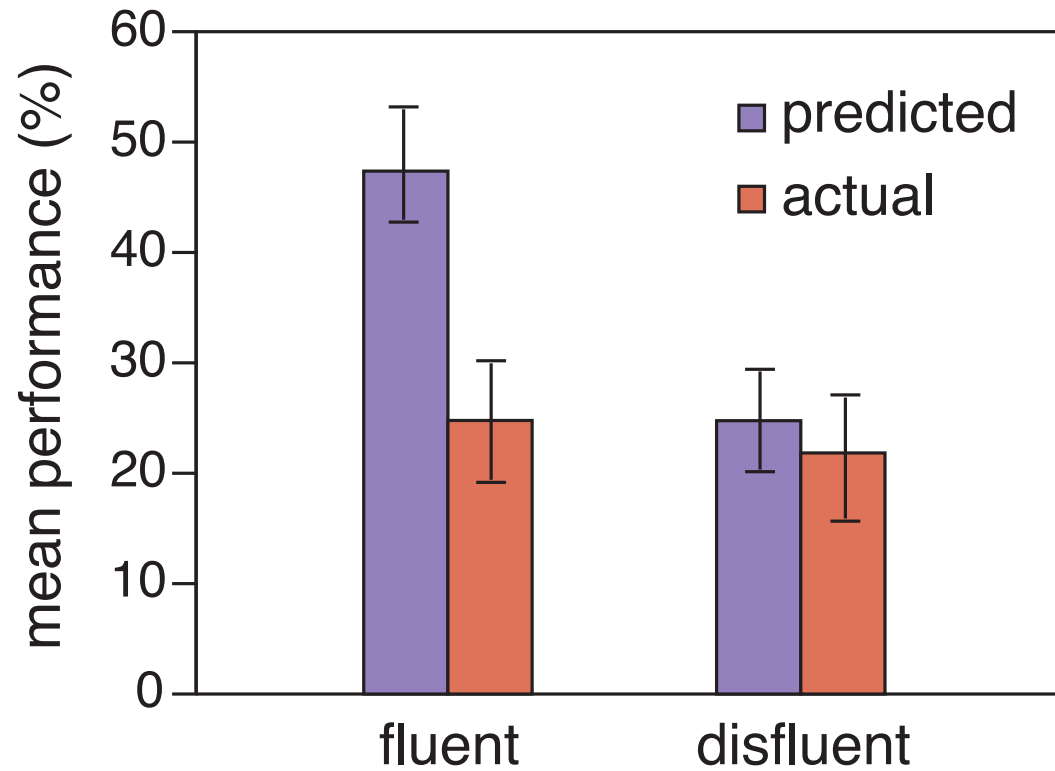
doi: 10.3758/s13423-013-0442-z

judgement of learning



doi: 10.3758/s13423-013-0442-z

judgement of learning



doi: 10.3758/s13423-013-0442-z

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

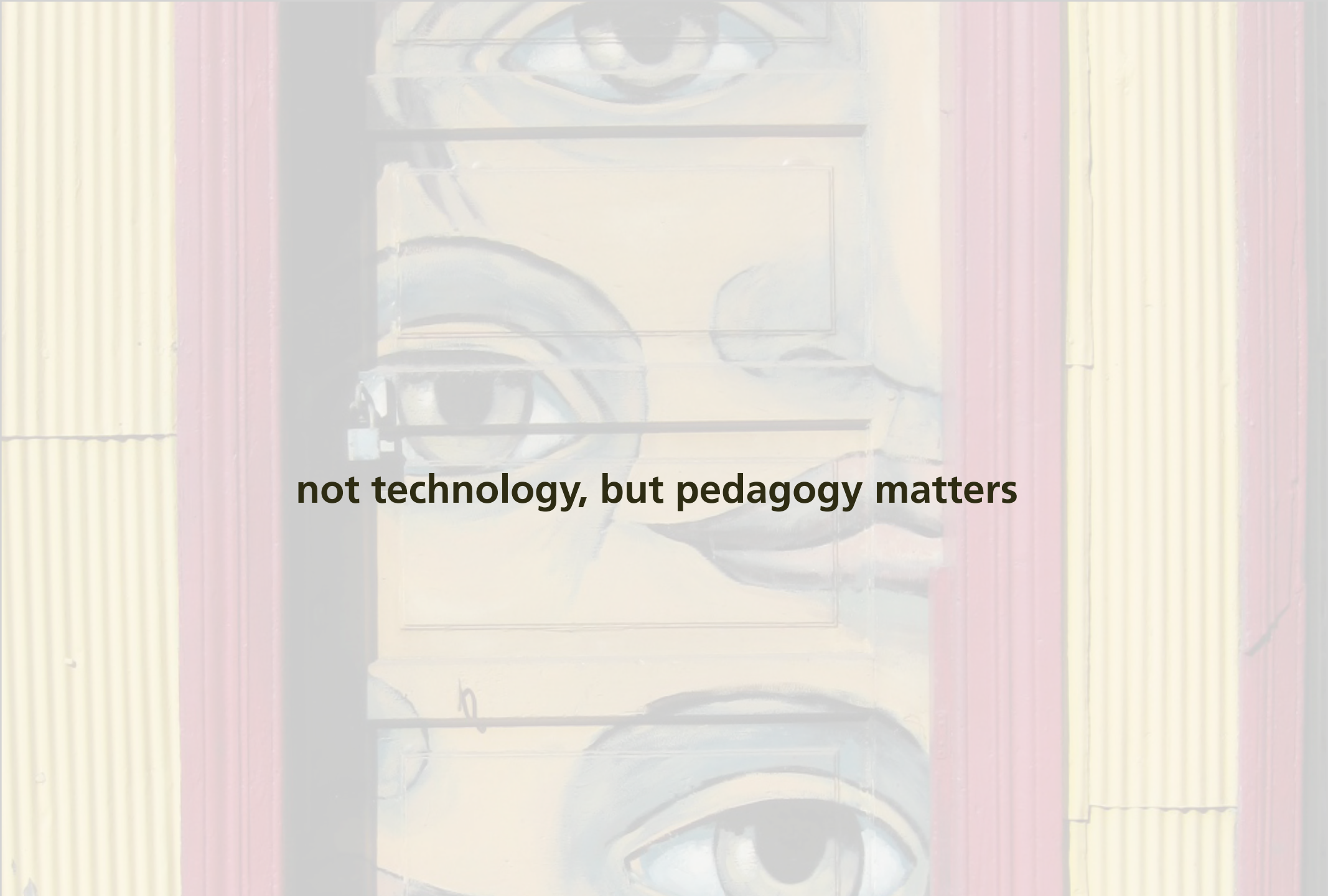
3 test



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



Join now!

PeerInstruction.net

Funding:

National Science Foundation

for a copy of this presentation:

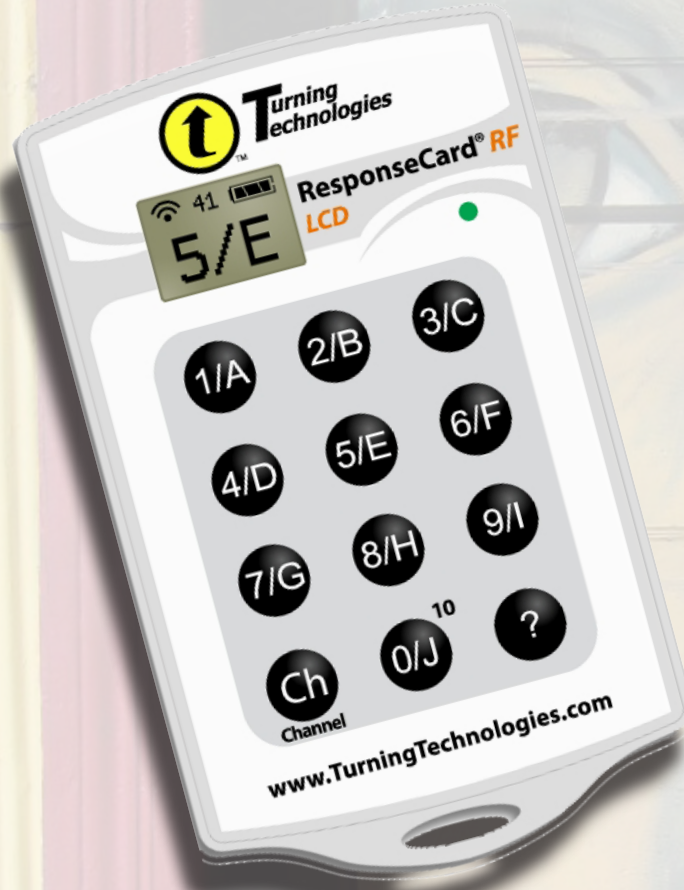
ericmazur.com

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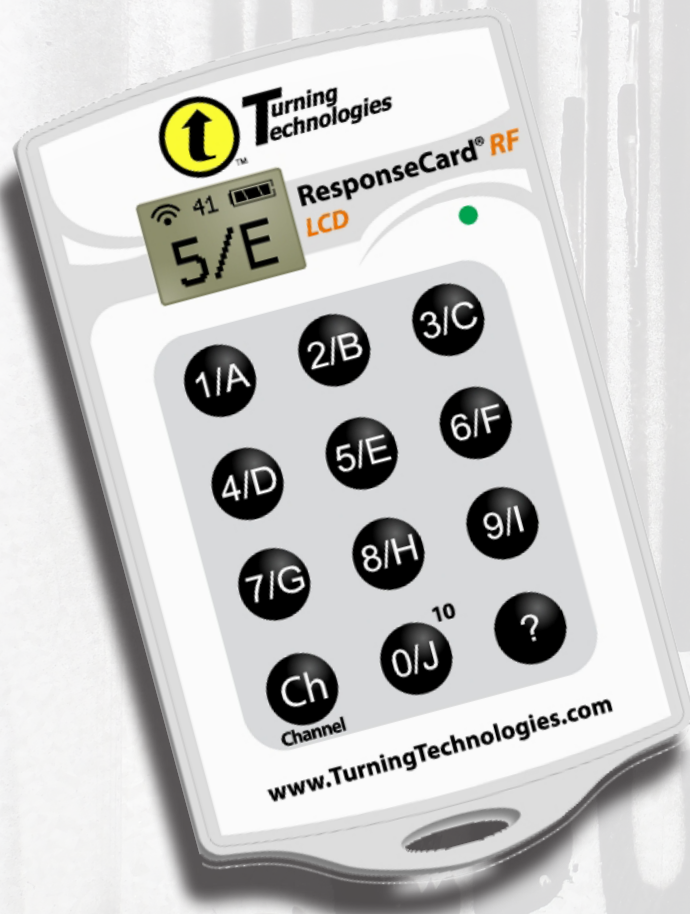
PLEASE RETURN CLICKER



1 education

2 PI

3 test



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



www.TurningTechnologies.com



unique ID on back of clicker