

Memorization or understanding: are we teaching the right thing?



Singapore Polytechnic
Singapore, 16 March 2015



Memorization or understanding: are we teaching the right thing?

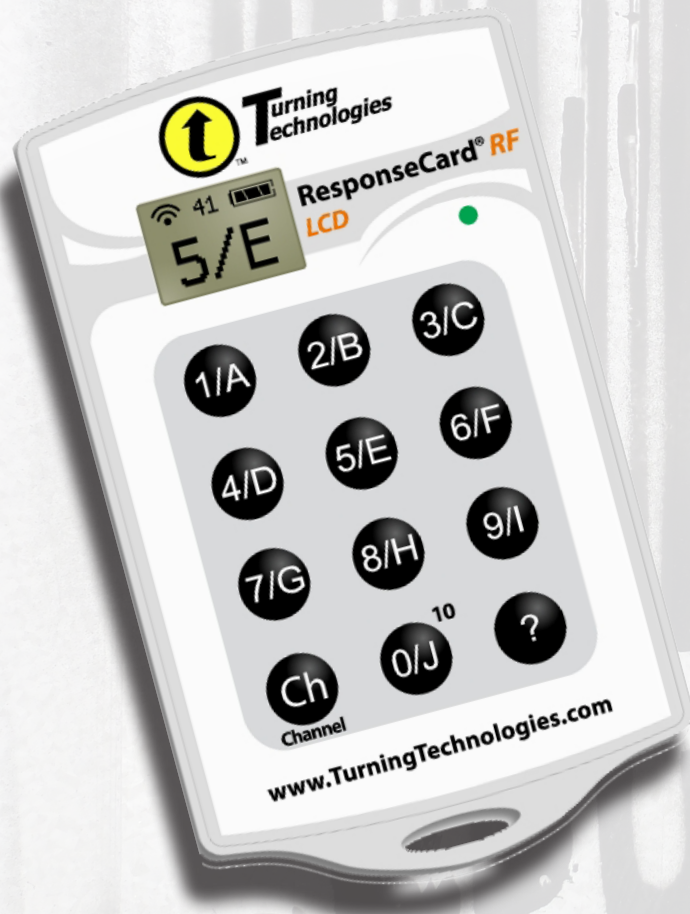


@eric_mazur



Singapore Polytechnic
Singapore, 16 March 2015





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



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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**





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

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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



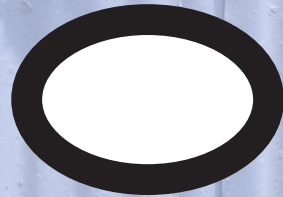
**better pay
attention!**

1 education

2 PI

3 test

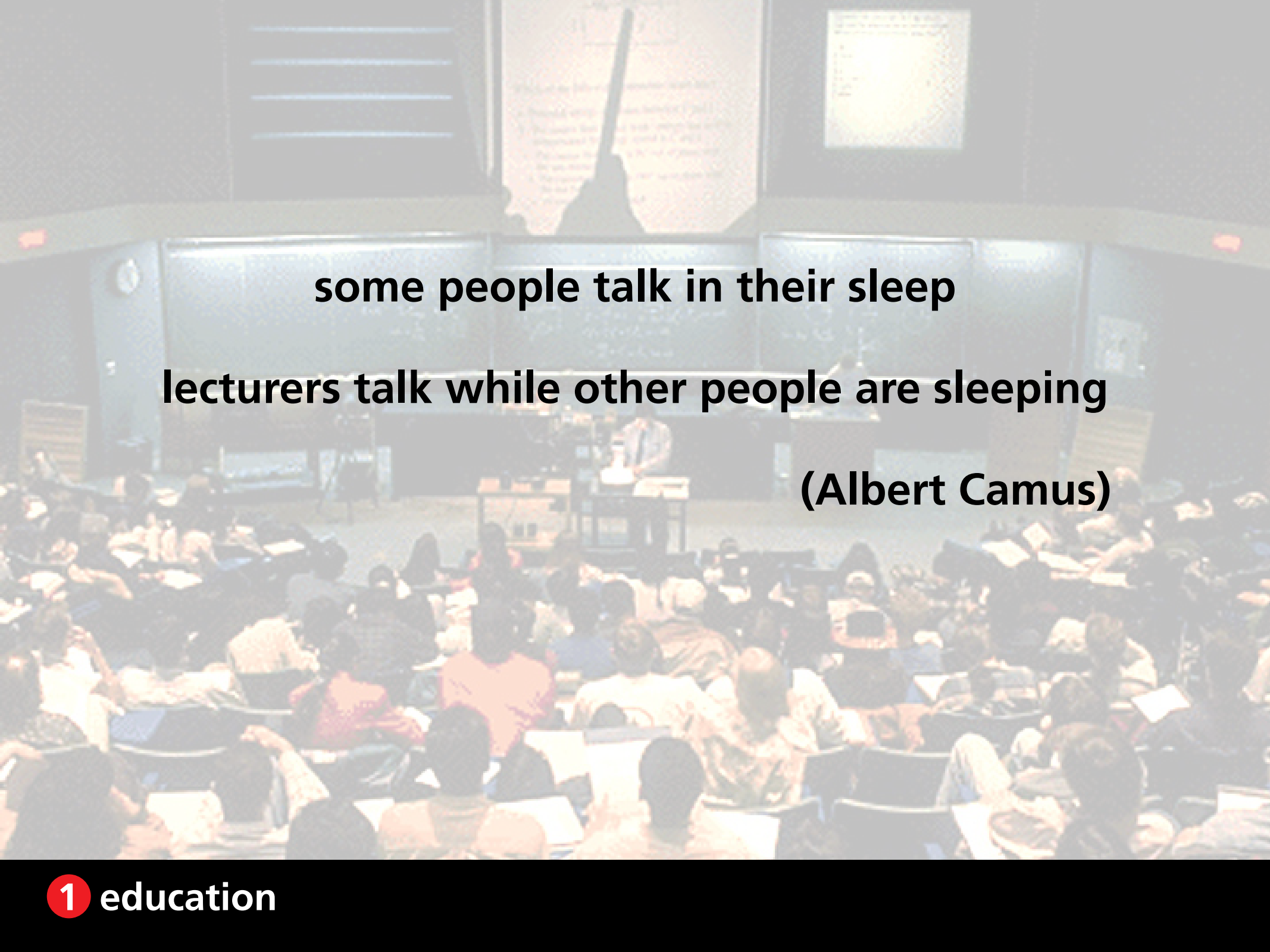
**What happens
in a lecture?**





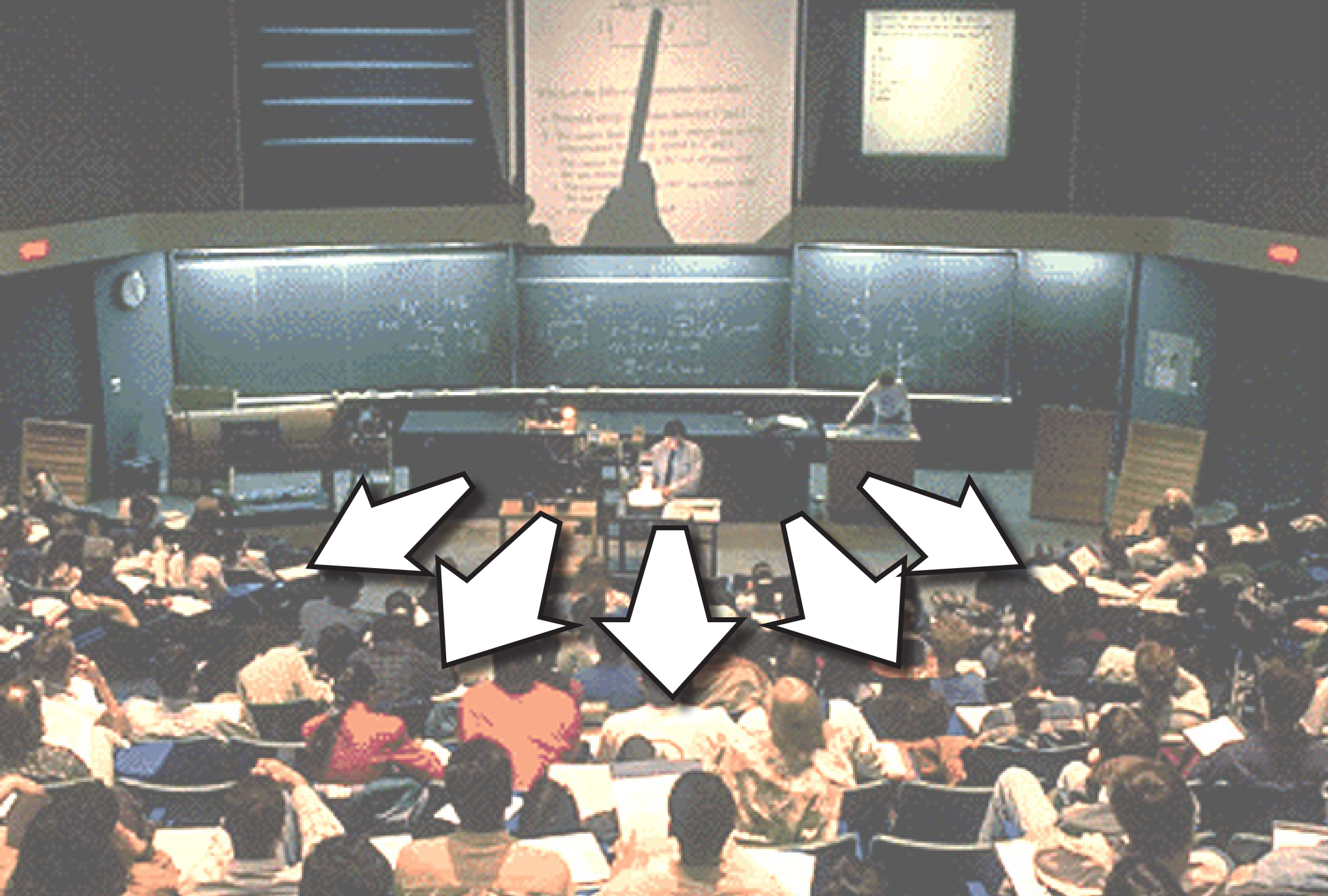
A large lecture hall with a professor at a podium and students in the audience. The professor is standing at a podium on the stage, facing the audience. The audience is seated in rows of chairs, facing the stage. The room has a curved wall and a large screen at the front. The text "some people talk in their sleep" is overlaid on the image.

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, many of whom appear to be sleeping or resting. The lecturer is standing at a podium in the center of the stage, facing the audience. The audience is seated in rows of chairs, and many people have their heads down or are looking away from the lecturer. The room has a high ceiling and large windows. The text is overlaid on the image in a bold, black font.

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





The result?

EDUCACION

Lack of learning

EDUCACION

Lack of learning

Lack of retention

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



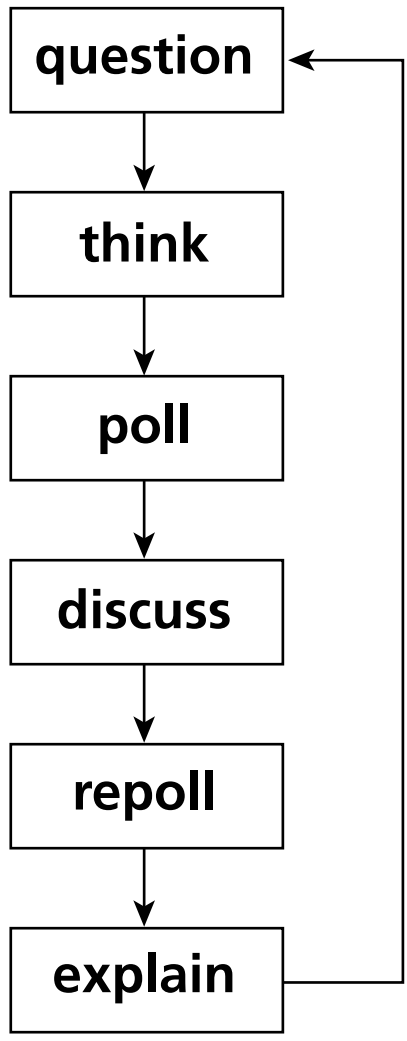
discuss

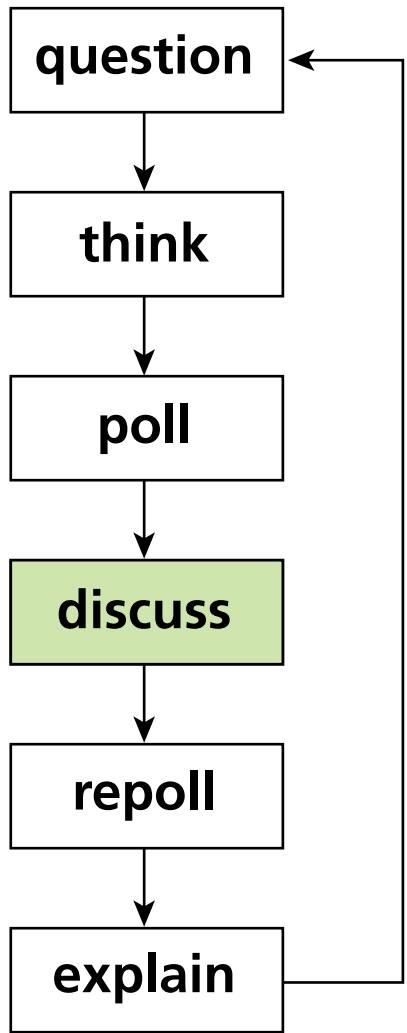


repoll



explain





1 education

2 PI

Let's try it!

QUESTION

think

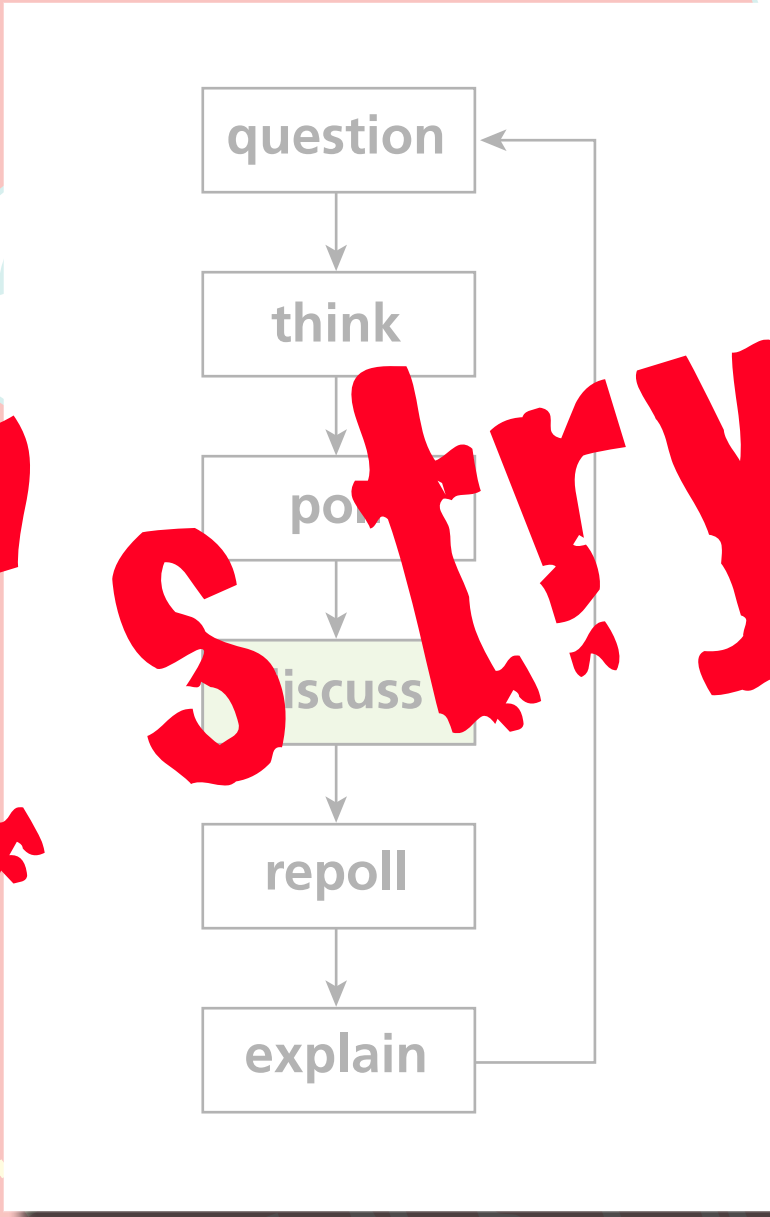
poll

discuss

repoll

explain

ACTION

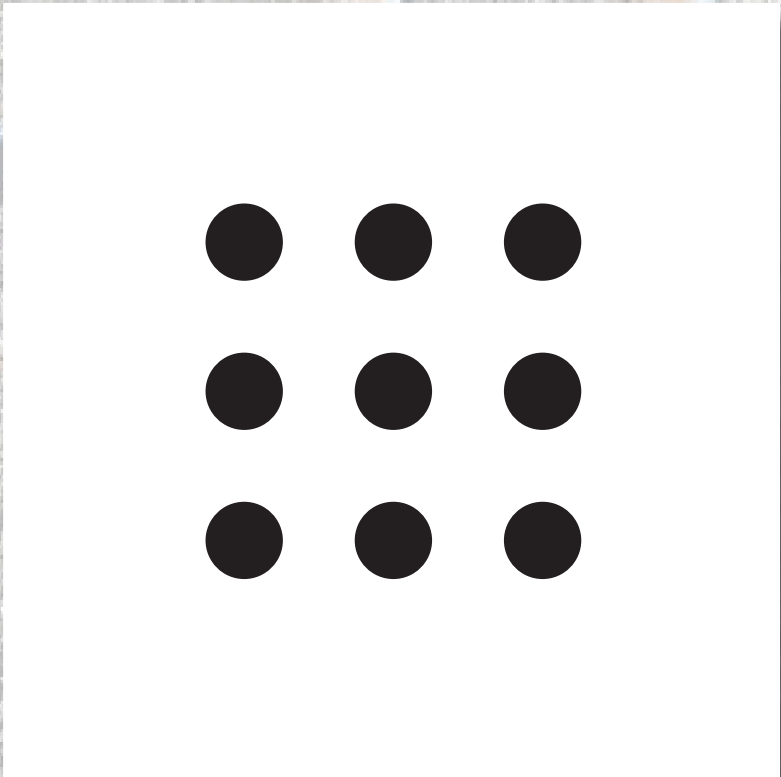


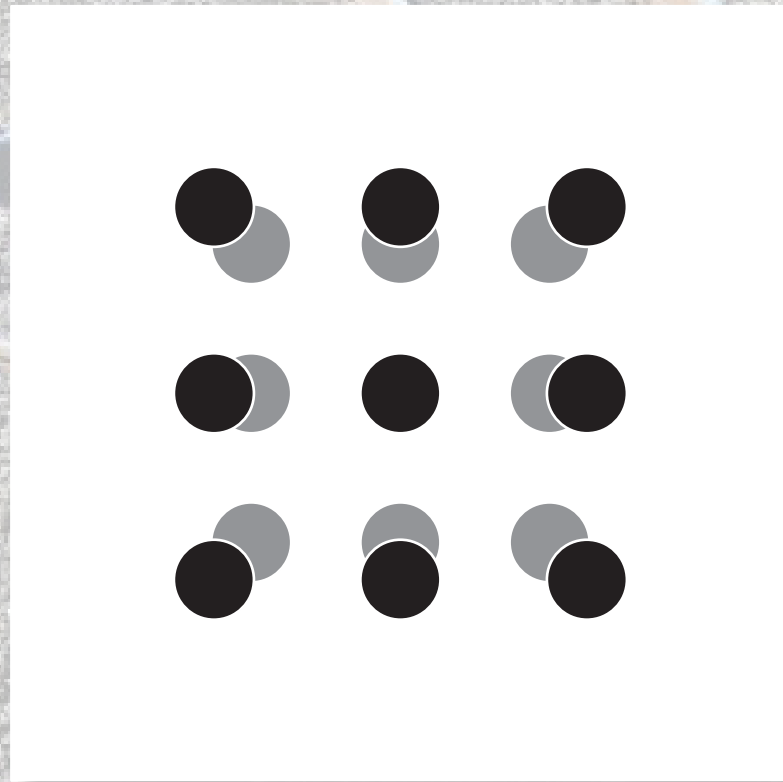
1 education

2 PI

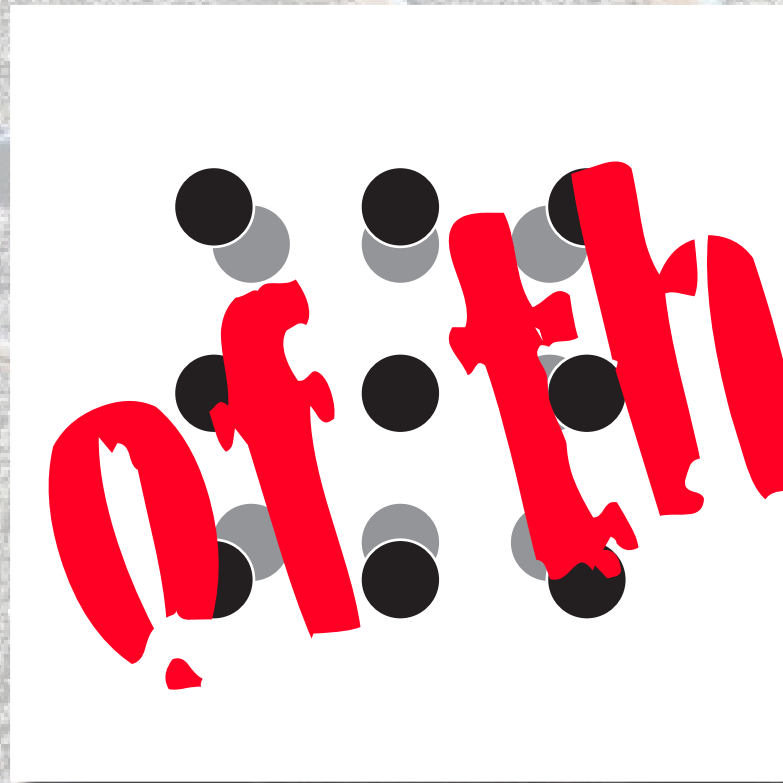
A photograph of a gravel path with a blue wavy line drawn on it, illustrating thermal expansion. The path is made of grey gravel and is bordered by green grass on both sides. The blue line is a thick, wavy line that follows the path's edge, showing how it would expand and contract with temperature changes. The text "thermal expansion" is overlaid on the path.

thermal expansion





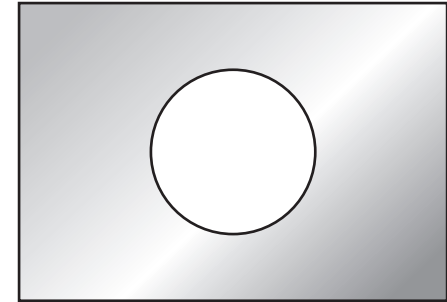
all of them!



1 education

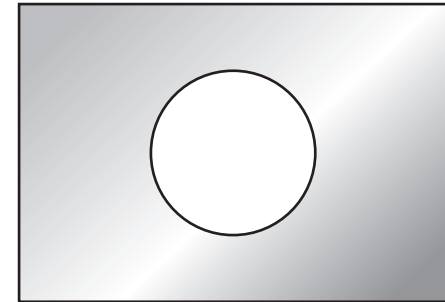
2 PI

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



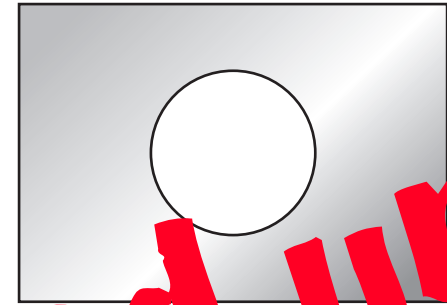
Consider a rectangular metal plate with a circular hole in it.

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.



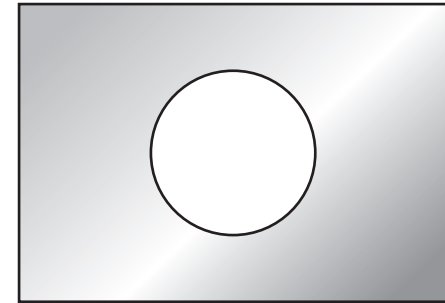
When the plate is uniformly heated, the diameter of the hole

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**

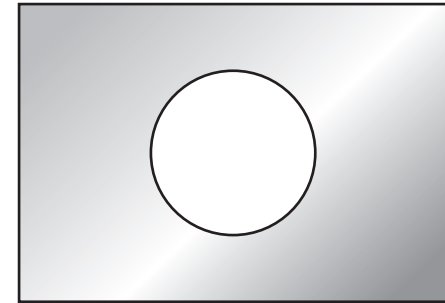
Before I tell you the answer, let's analyze what happened.

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**

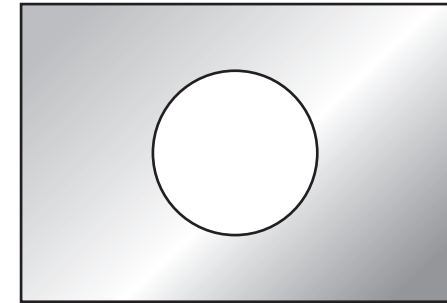
Consider a rectangular metal plate with a circular hole in it.

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



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

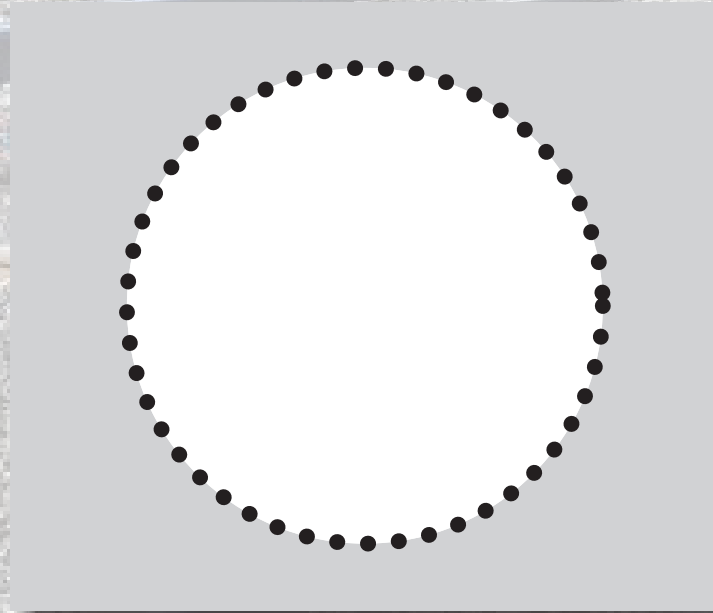
Consider a rectangular metal plate with a circular hole in it.



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

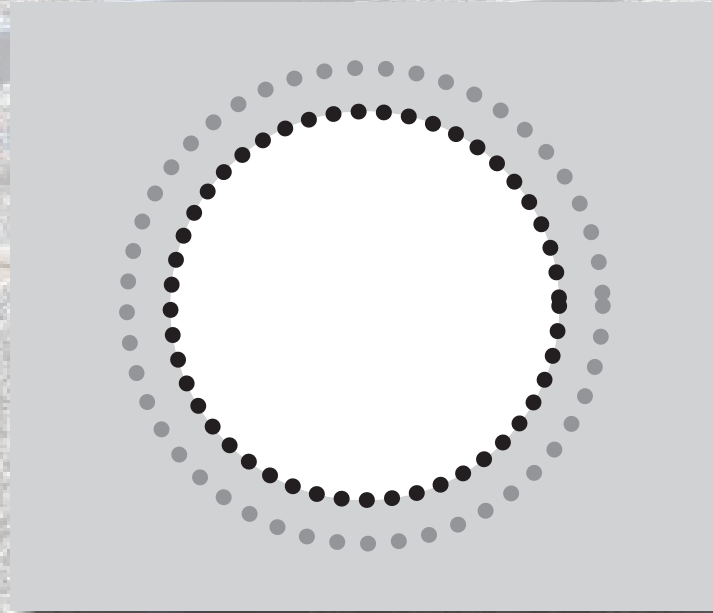


1 education

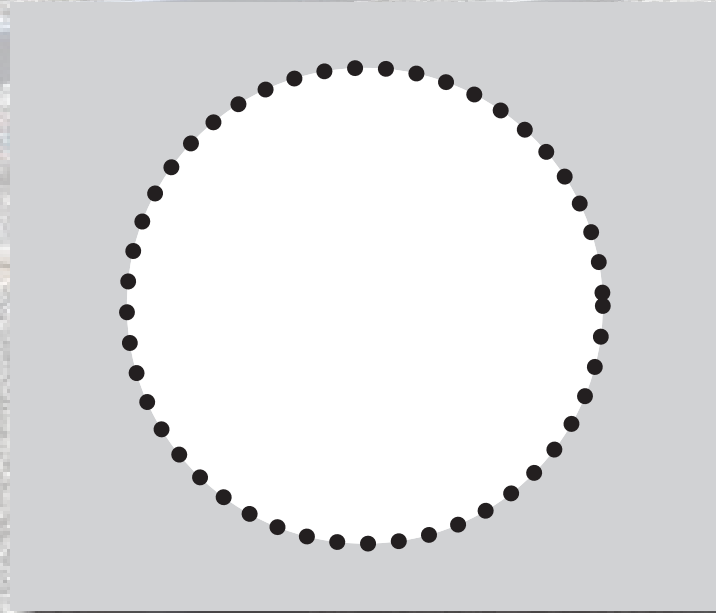
2 PI

3 test

consider atoms at rim of hole



consider atoms at rim of hole

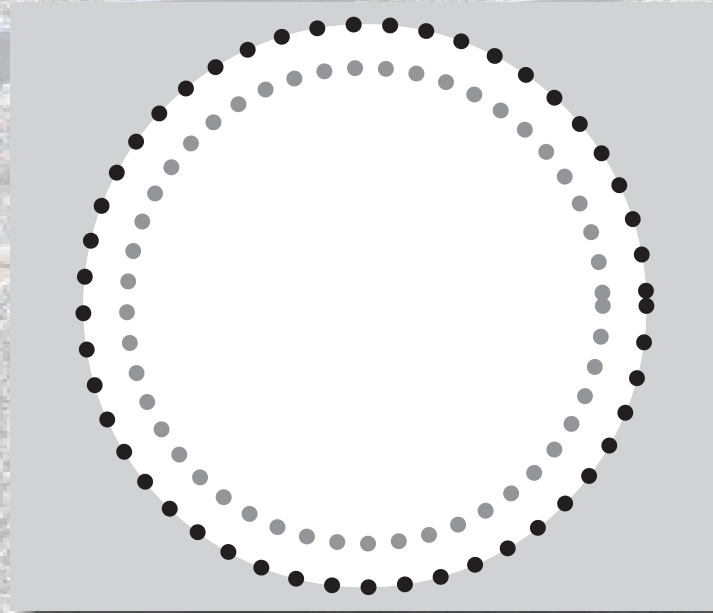


1 education

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



1 education

2 PI

3 test

Peer

back to pi

INSTRUCTION

1 education

2 PI

3 test

Peer
Greater learning gains

INSTRUCTION

1 education

2 PI

3 test

Peer
Greater learning gains

Better retention

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

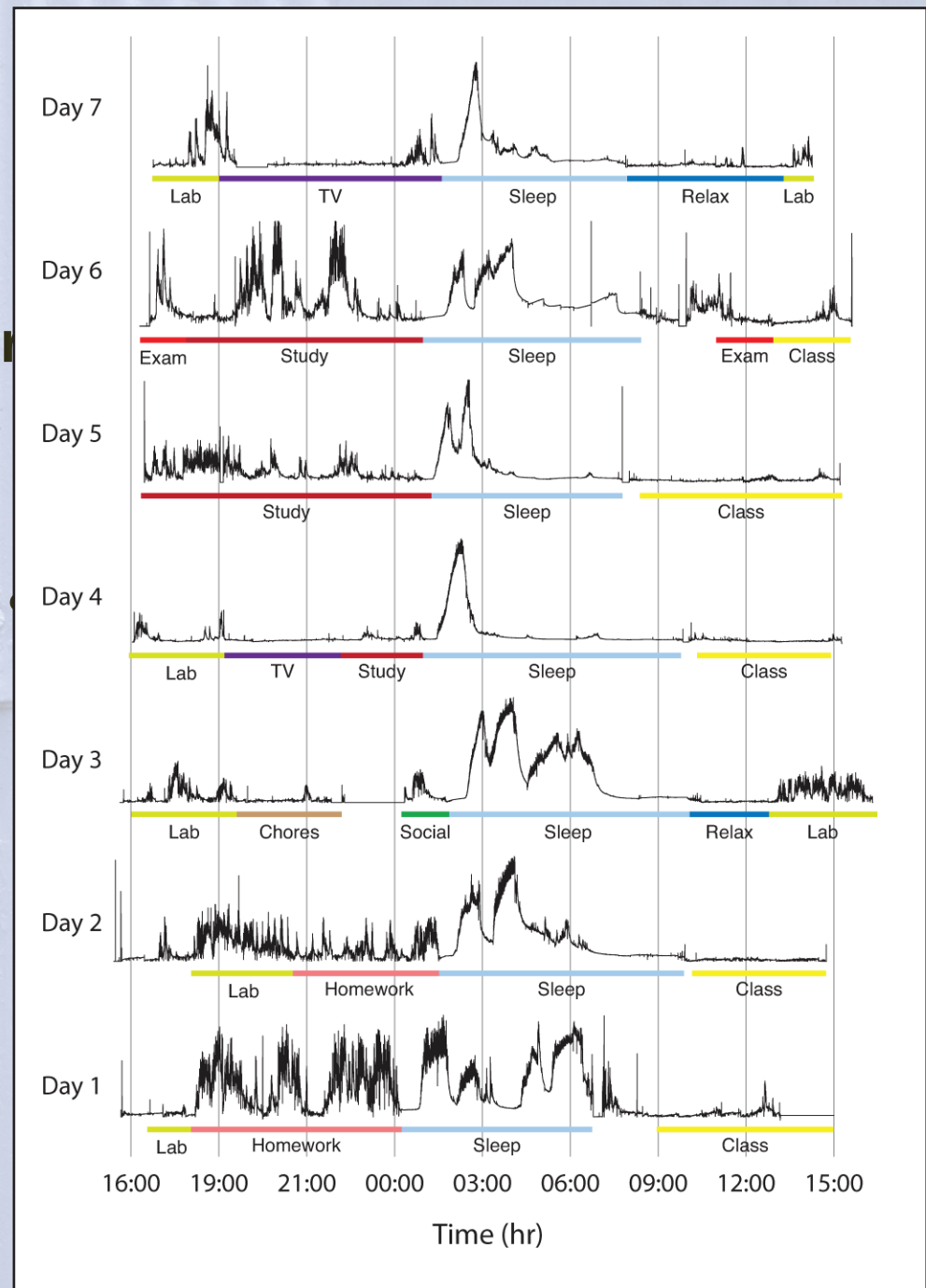
1 education

2 PI

3 test

in a lecture

1. don't pay utmost



doi: 10.1109/TBME.2009.2038487

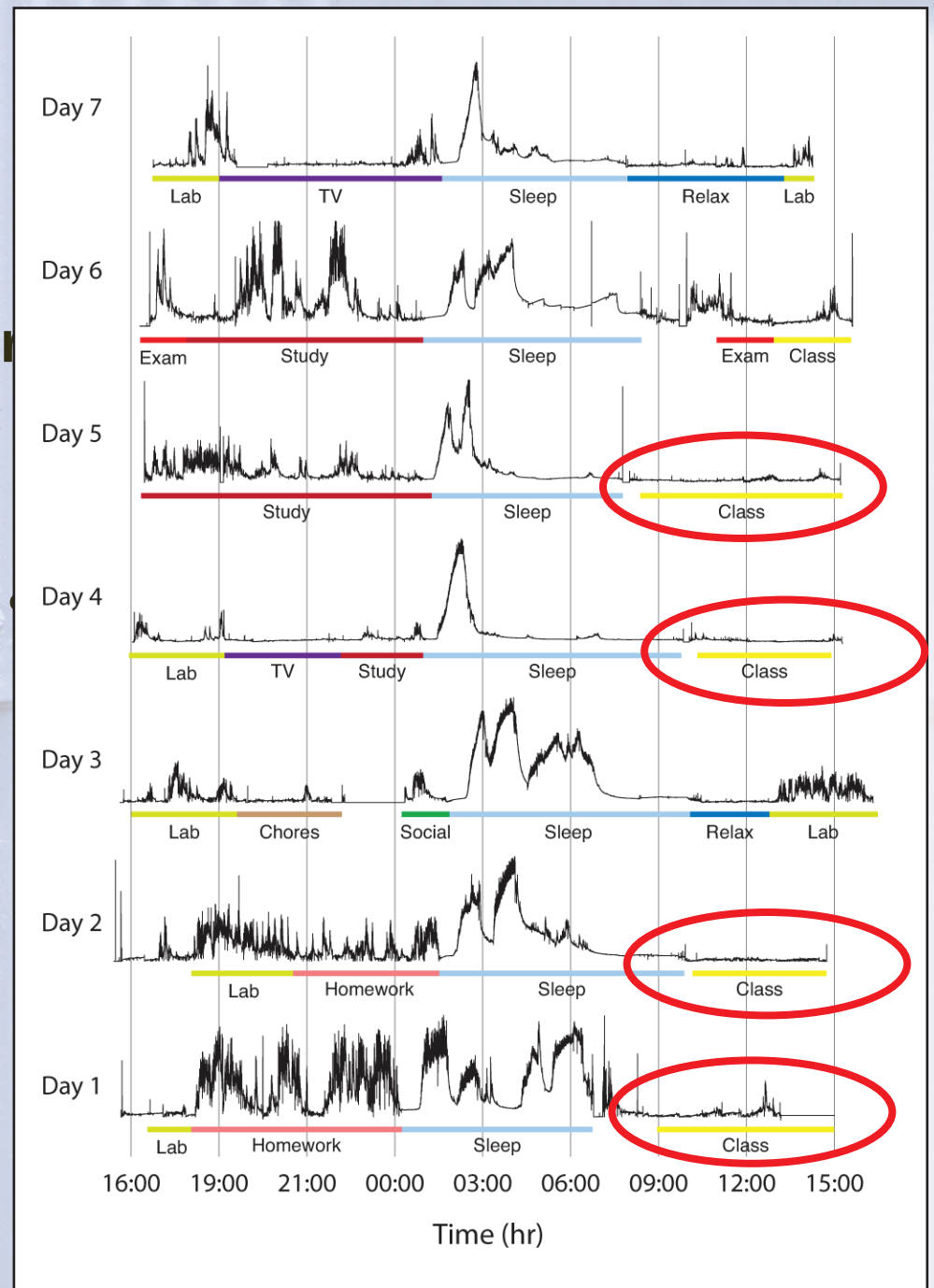
1 education

2 PI

3 test

in a lecture

1. don't pay utmost



doi: 10.1109/TBME.2009.2038487

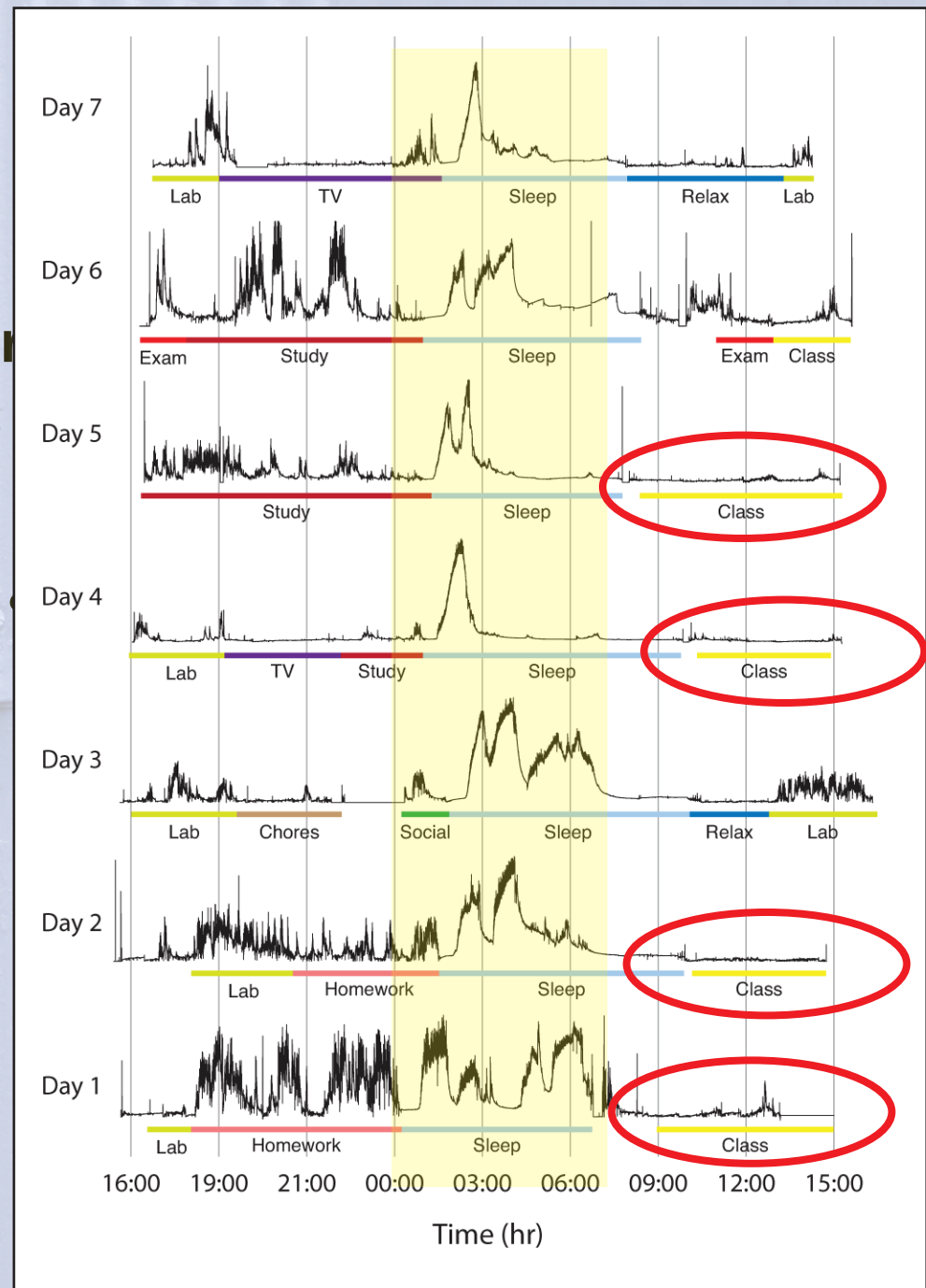
1 education

2 PI

3 test

in a lecture

1. don't pay utmost



doi: 10.1109/TBME.2009.2038487

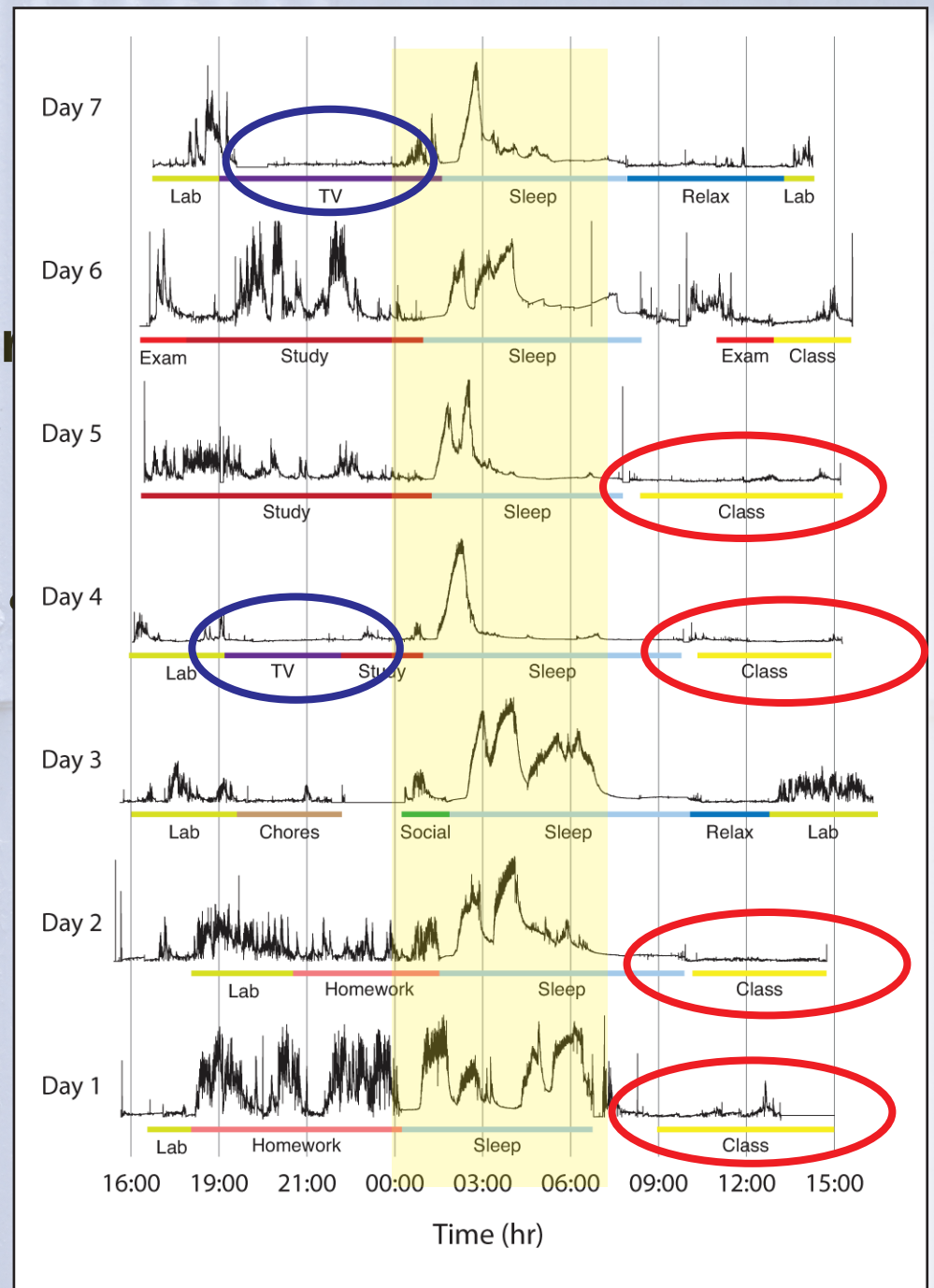
1 education

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**

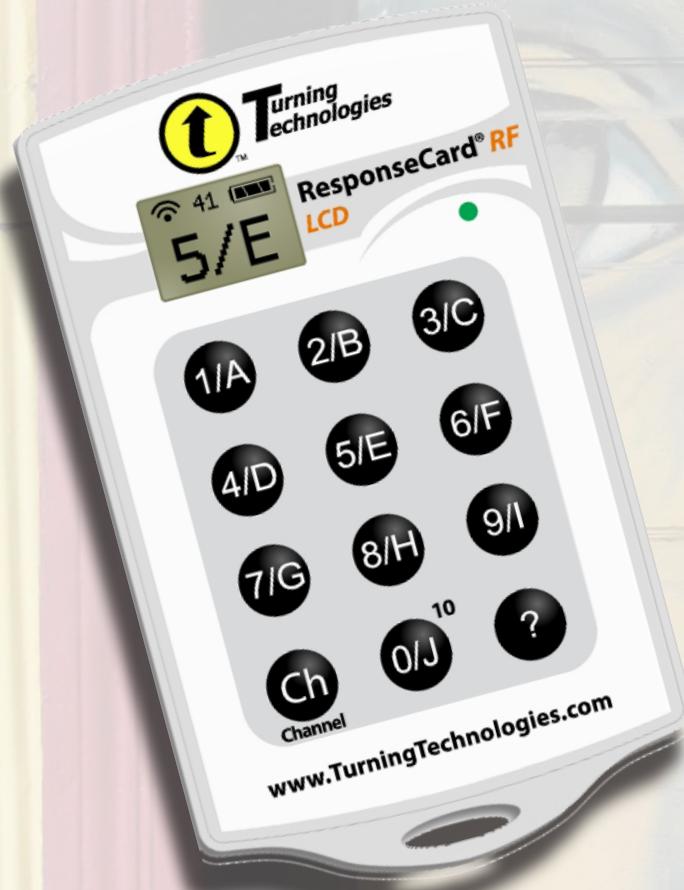
active participation a must!



Join now!

PeerInstruction.net

PLEASE LEAVE CLICKER ON SEAT



1 education

2 PI

3 test

Funding:

National Science Foundation

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