

# Flip the classroom and catalyze the learning



EDUCACION

EDUCAUSE Webinar  
27 September 2012



# Flip the classroom and catalyze the learning



@eric\_mazur

EDUCAUSE Webinar  
27 September 2012



**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:**

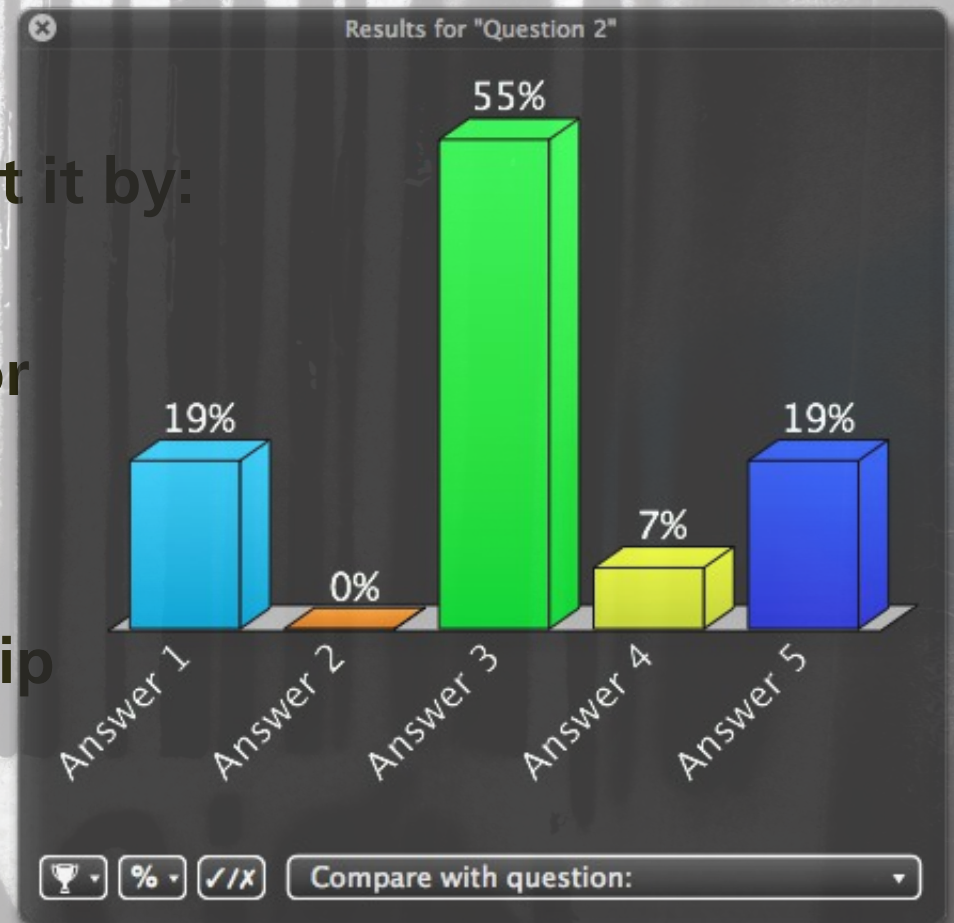
- 1. trial and error**
- 2. lectures**
- 3. practicing**
- 4. apprenticeship**
- 5. other**

**EDUCACION**



Became good at it by:

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







**1** lecture





What are the following...  
A...  
The...  
The...  
The...  
The...

...  
...  
...  
...  
...

1 lecture

2 PI



**1** lecture

**2** PI

**3** PI 2.0



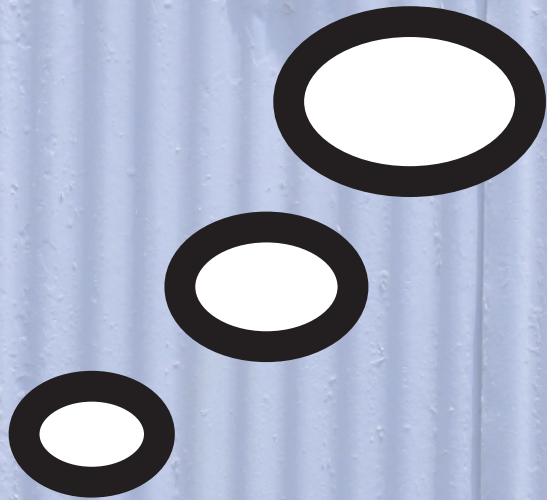
**EXCITING  
stuff!**

**1** lecture

**2** PI

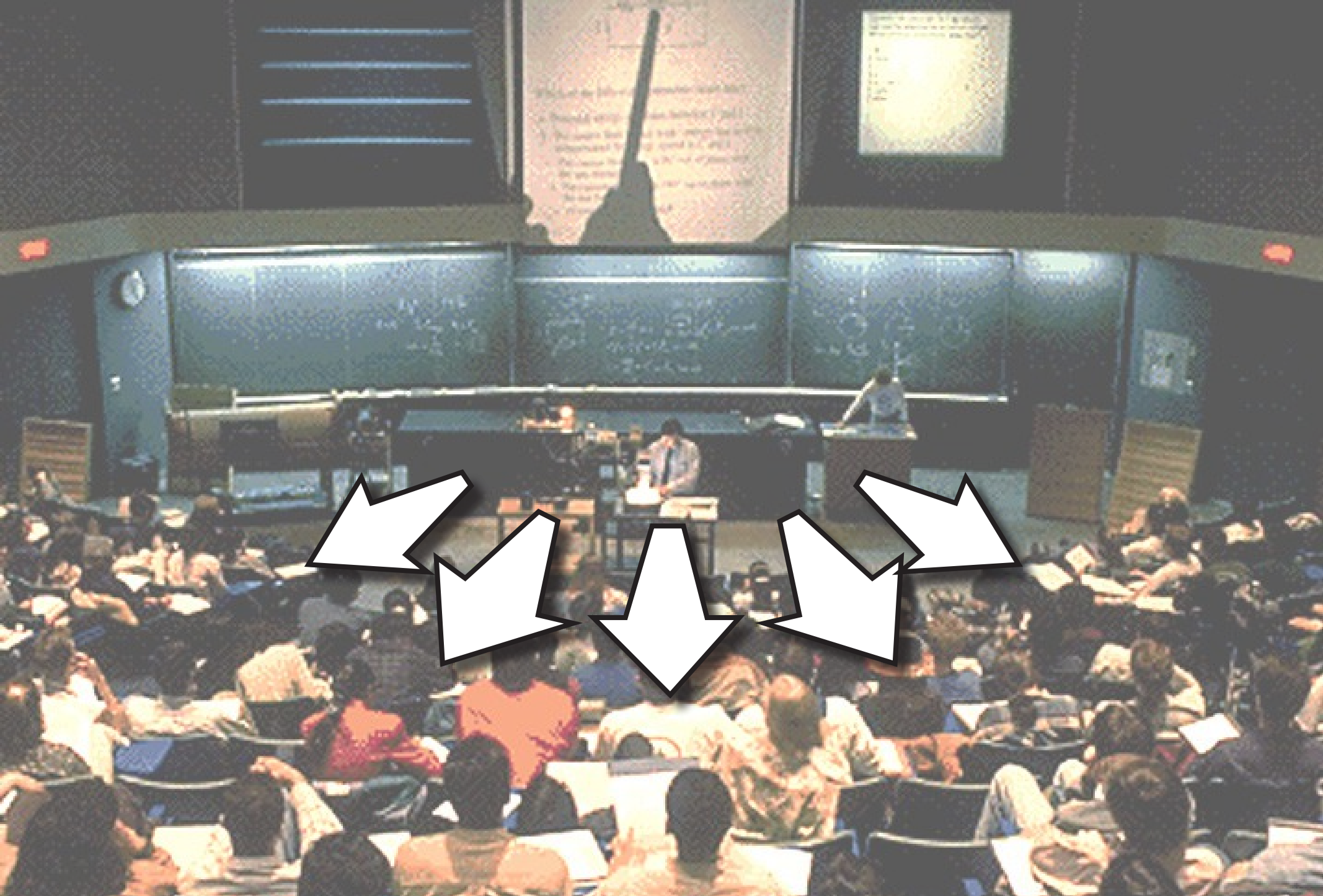
**3** PI 2.0

**What happens  
in a lecture?**





**1** lecture



The result?

EDUCACION

**Lack of learning**

EDUCACION



**Lack of learning**

**Lack of retention**



1 lecture

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)

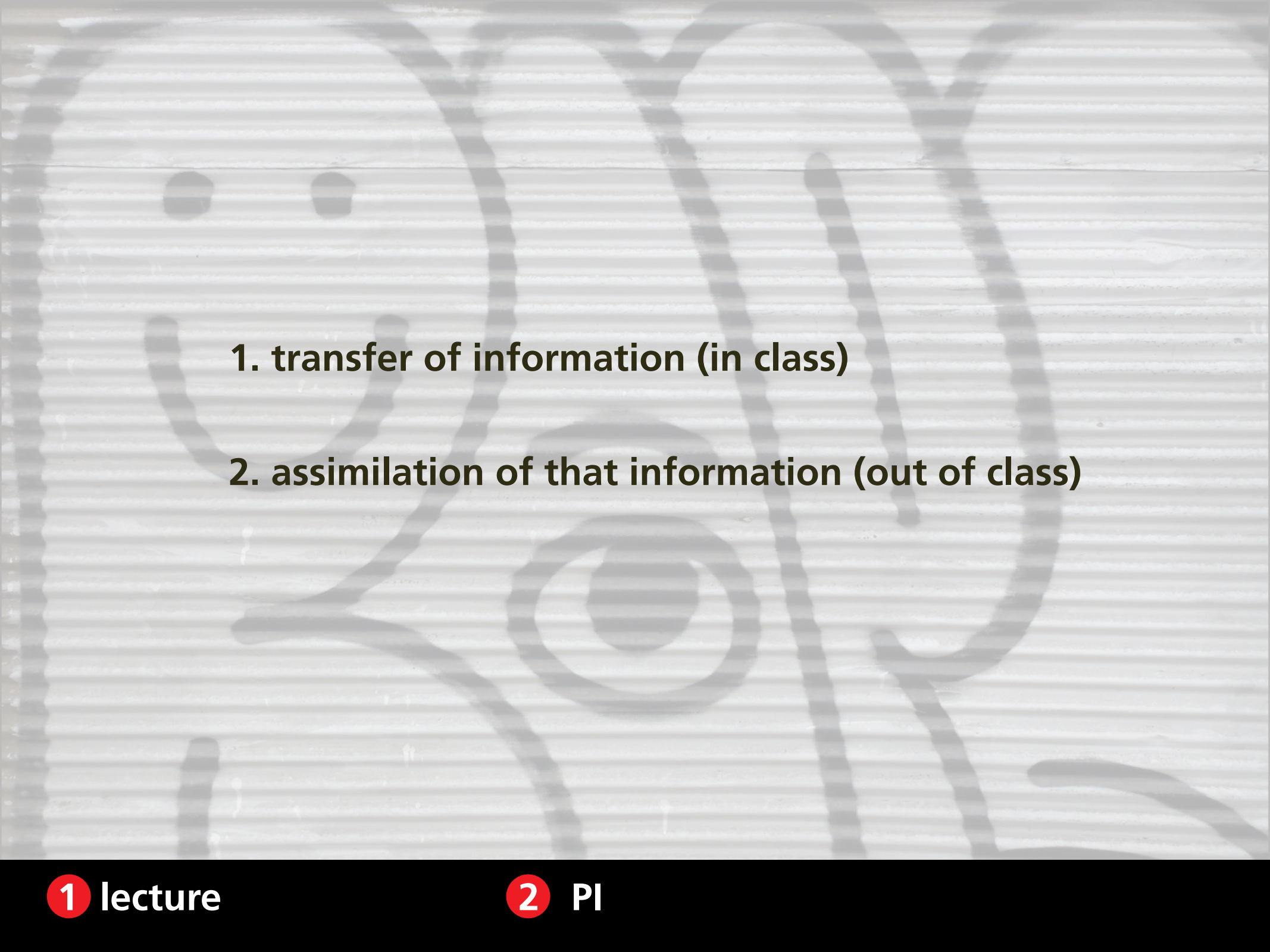
2. assimilation of that information (out of class)



**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)**





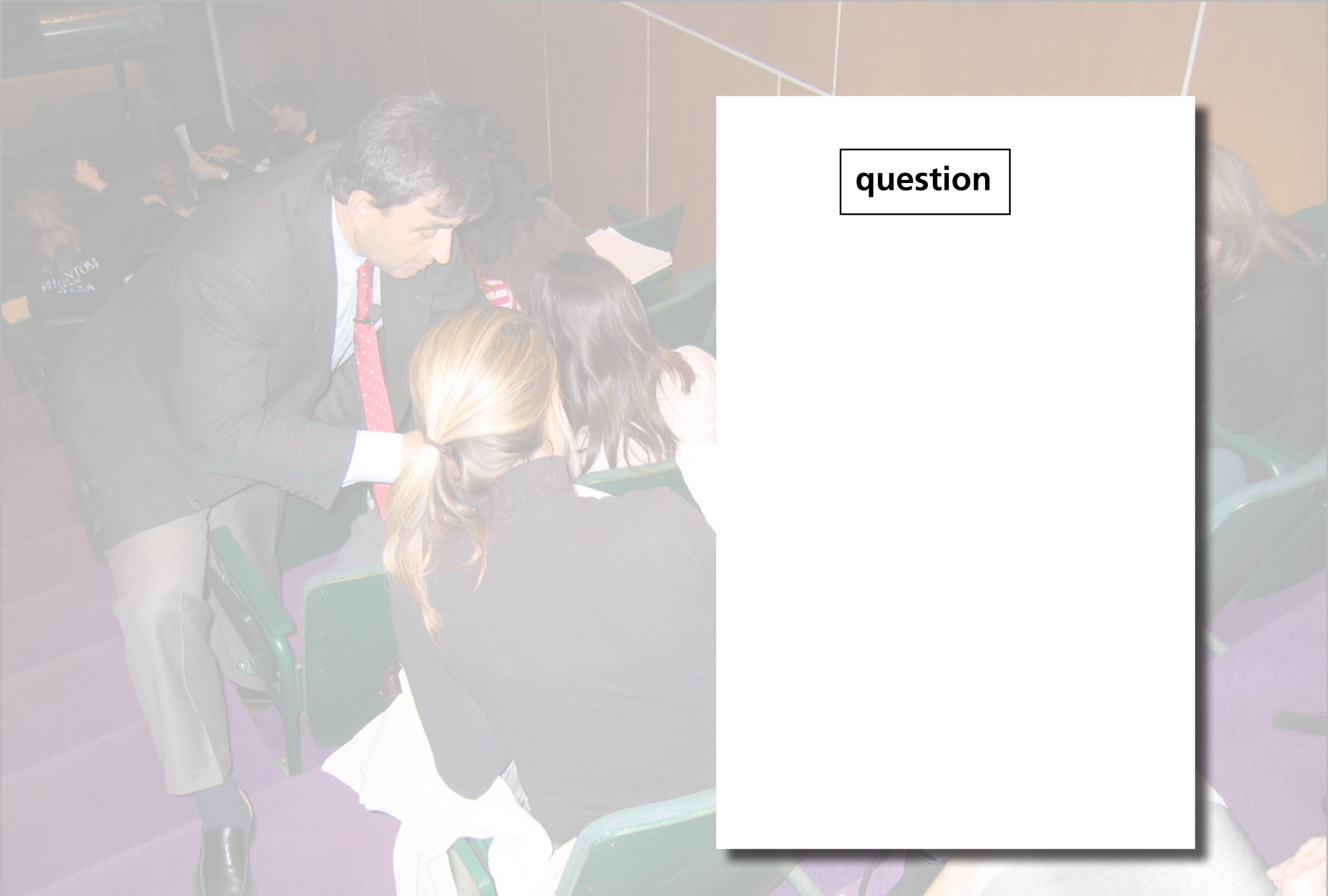
**1. transfer of information (out of class)**

**2. assimilation of that information (in class)**

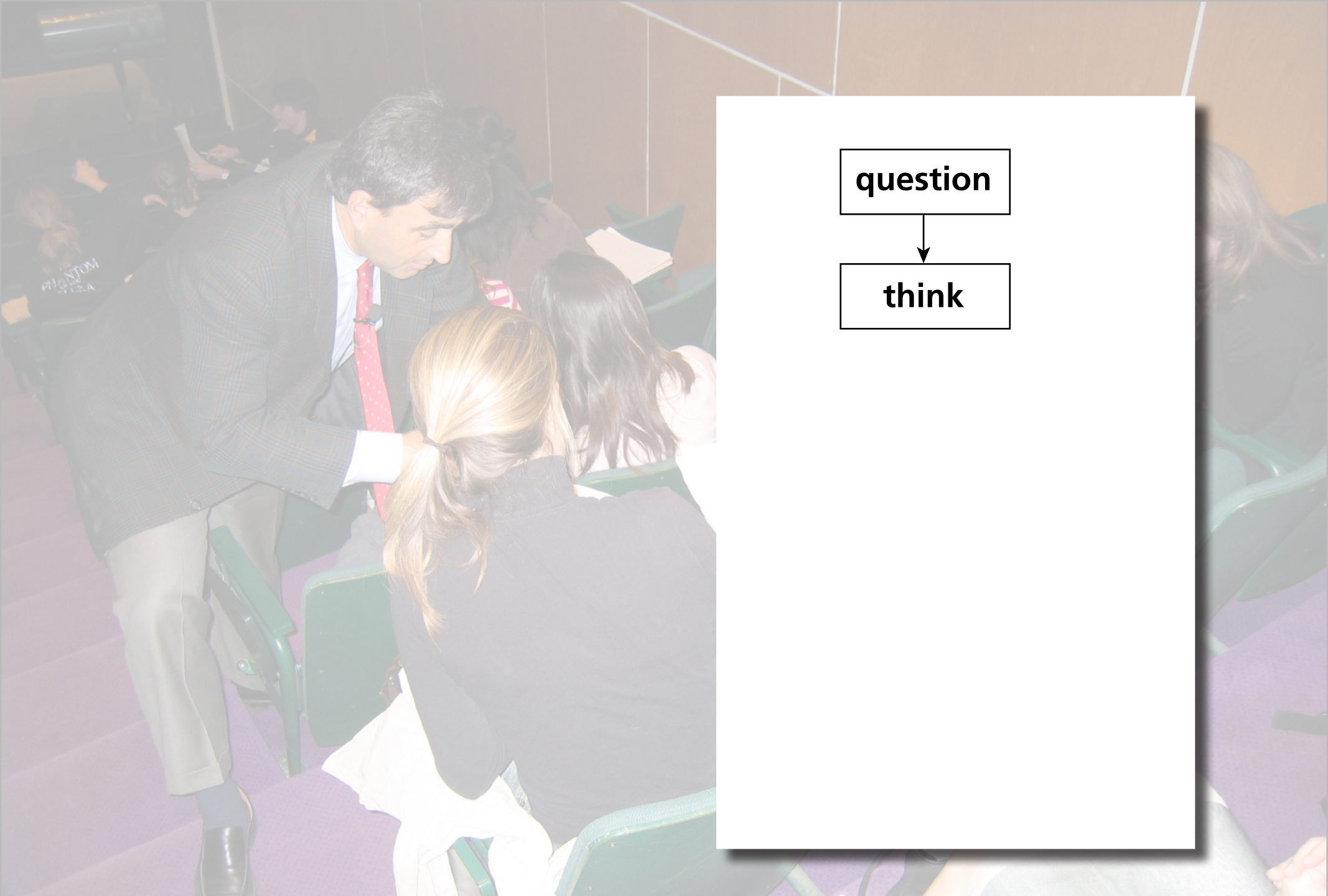
A photograph of a man in a dark suit and red tie leaning over a group of students in a lecture hall. He is pointing at a document held by one of the students. The students are seated in green chairs with purple carpeting. The background shows other students and a wooden wall.

1. transfer of information (out of class)

2. assimilation of that information (in class)



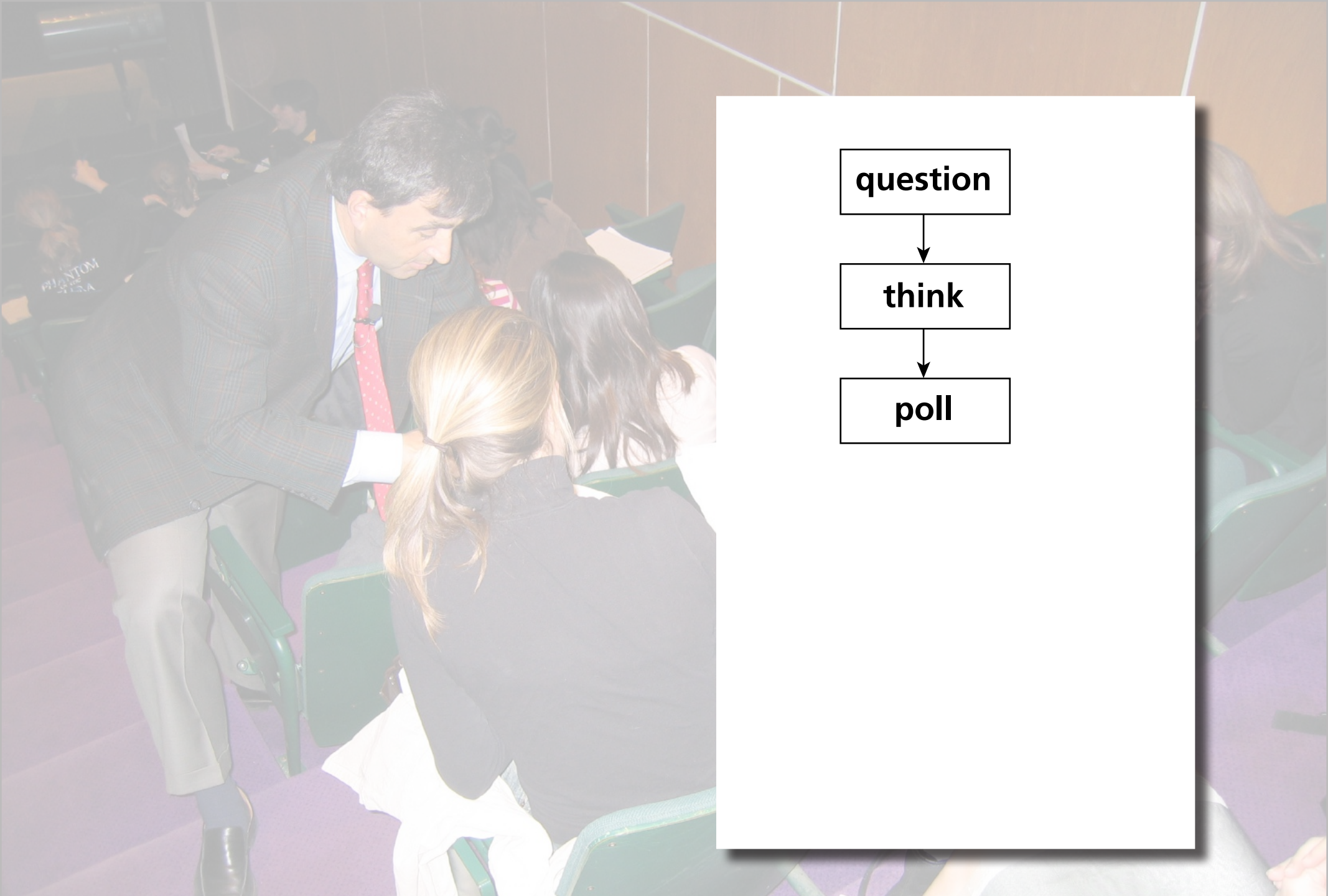
question



question



think



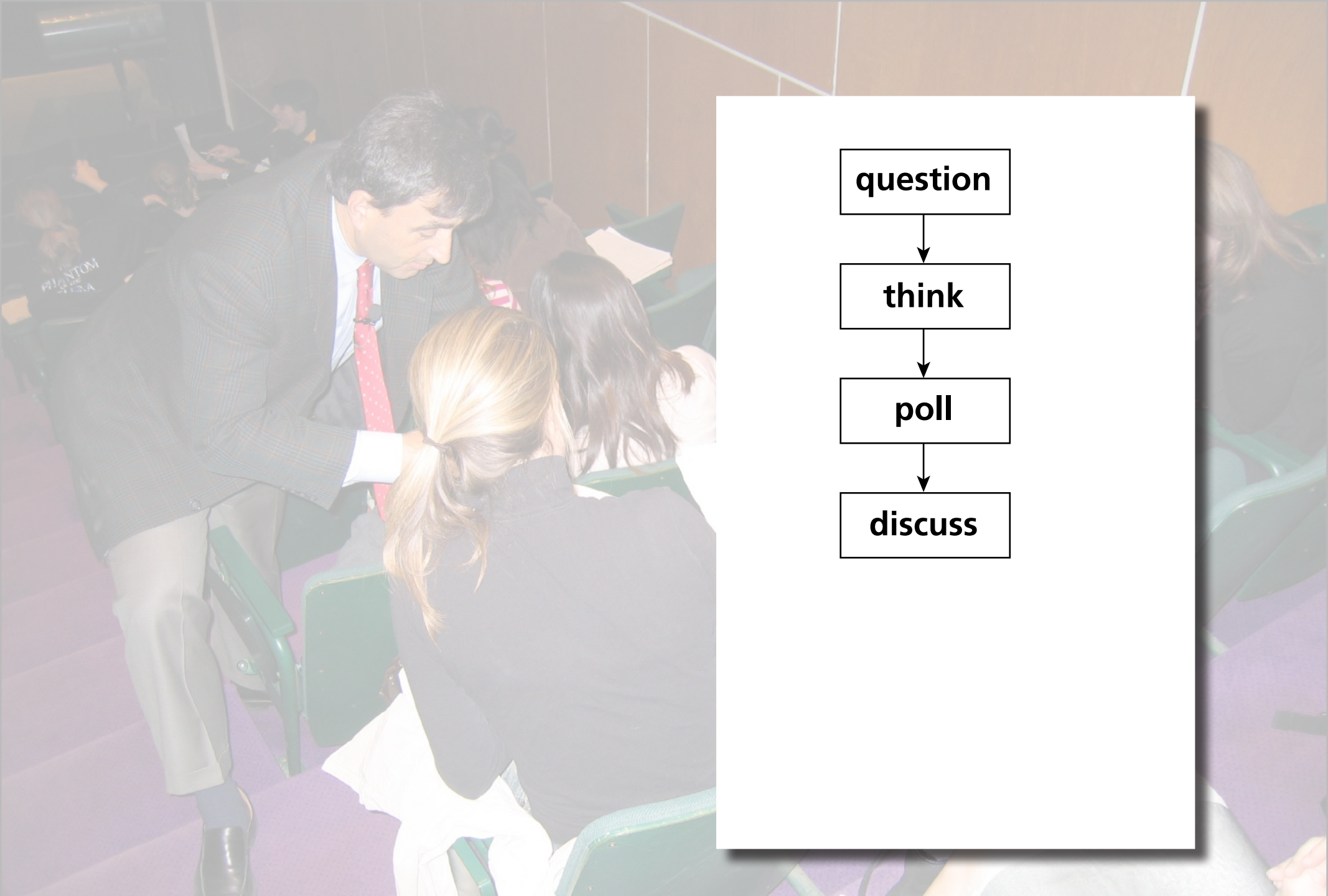
question



think



poll



**question**



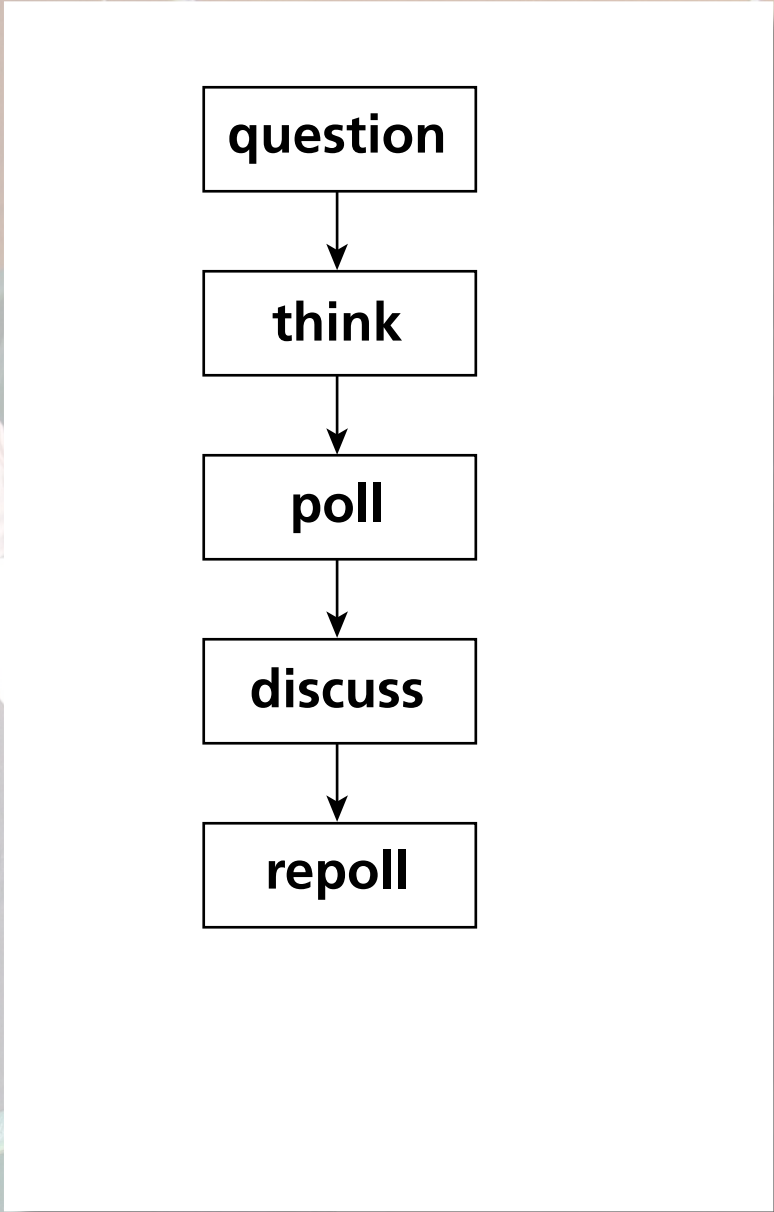
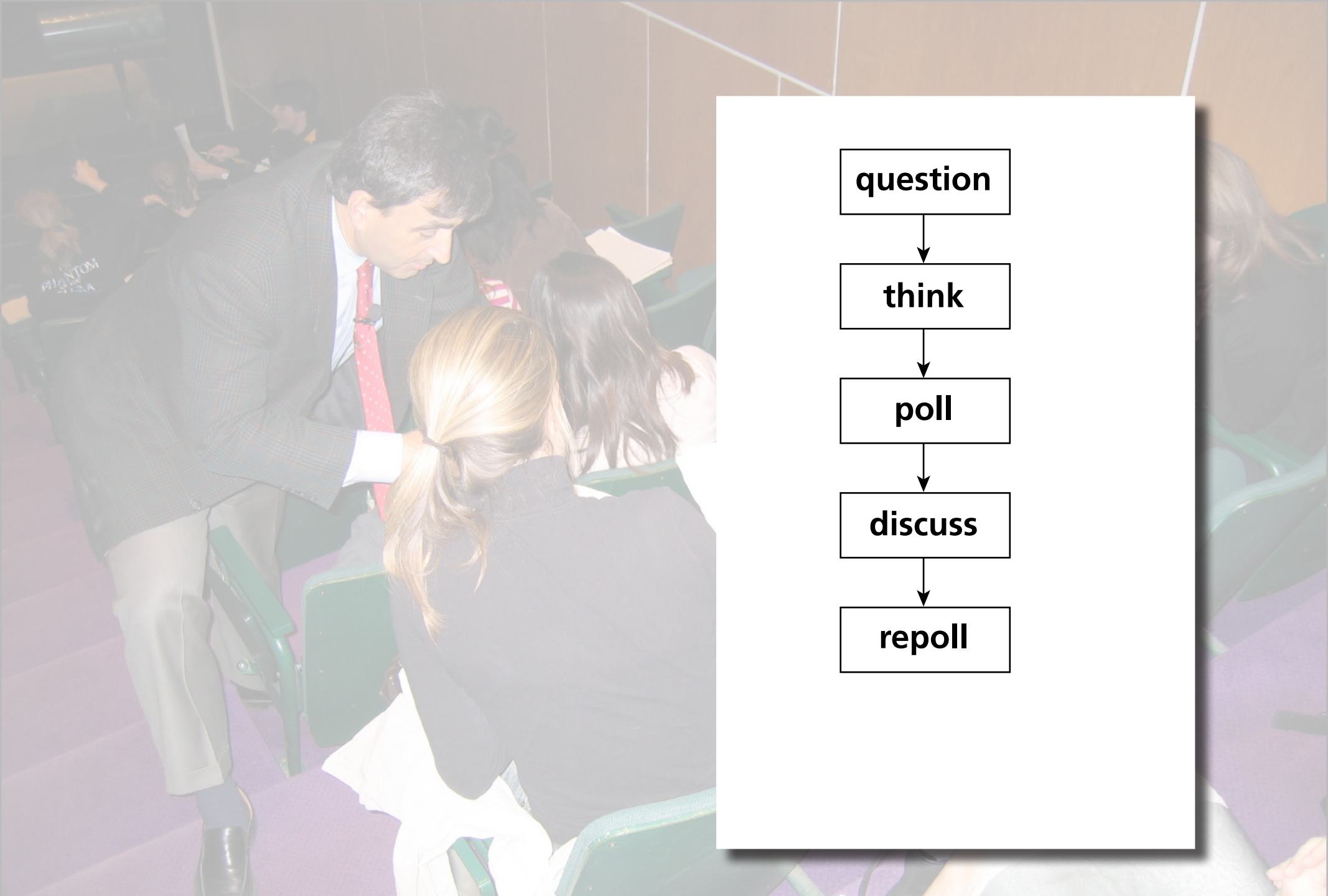
**think**

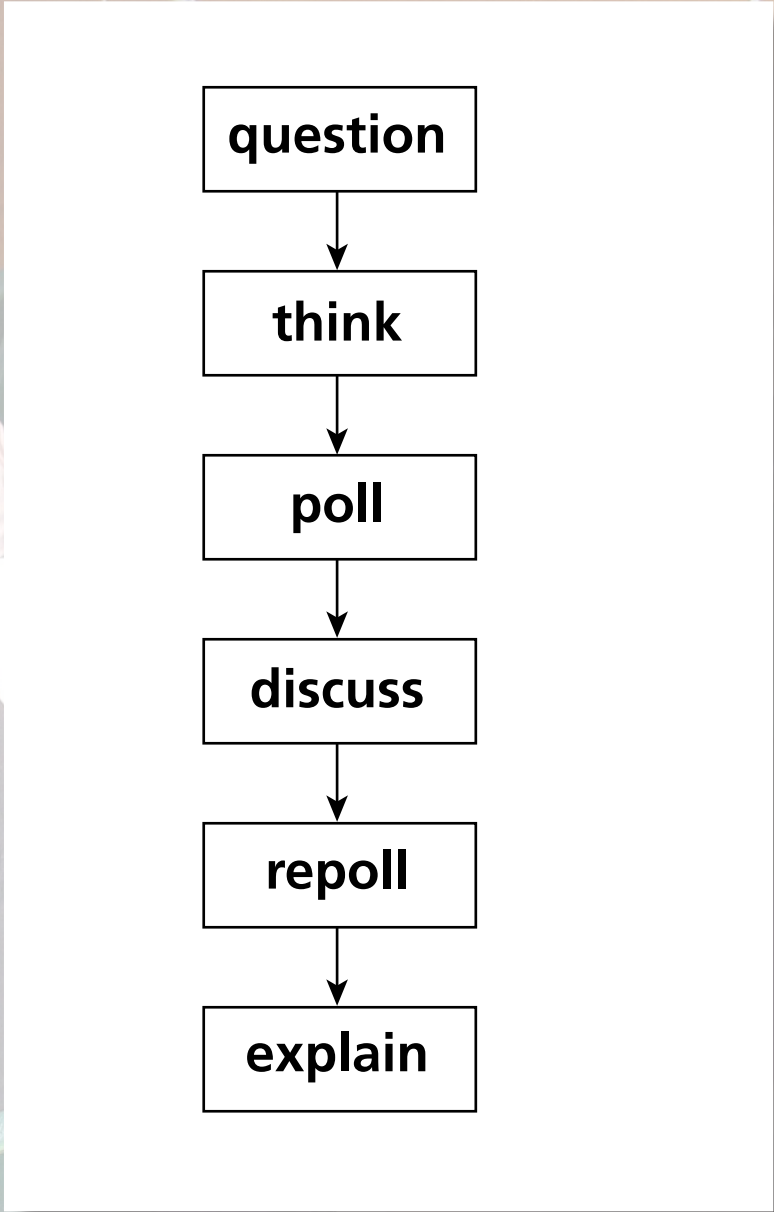
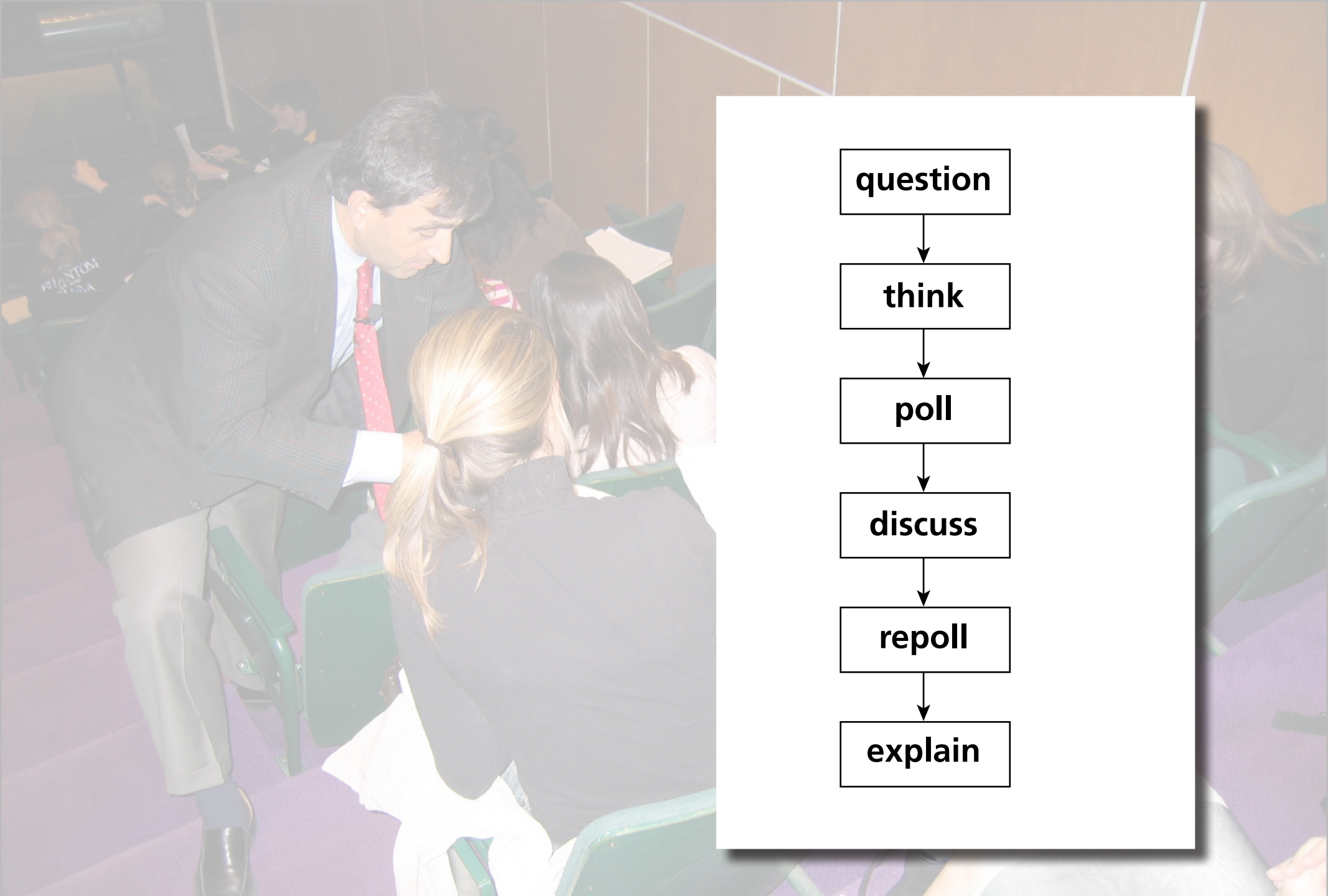


**poll**

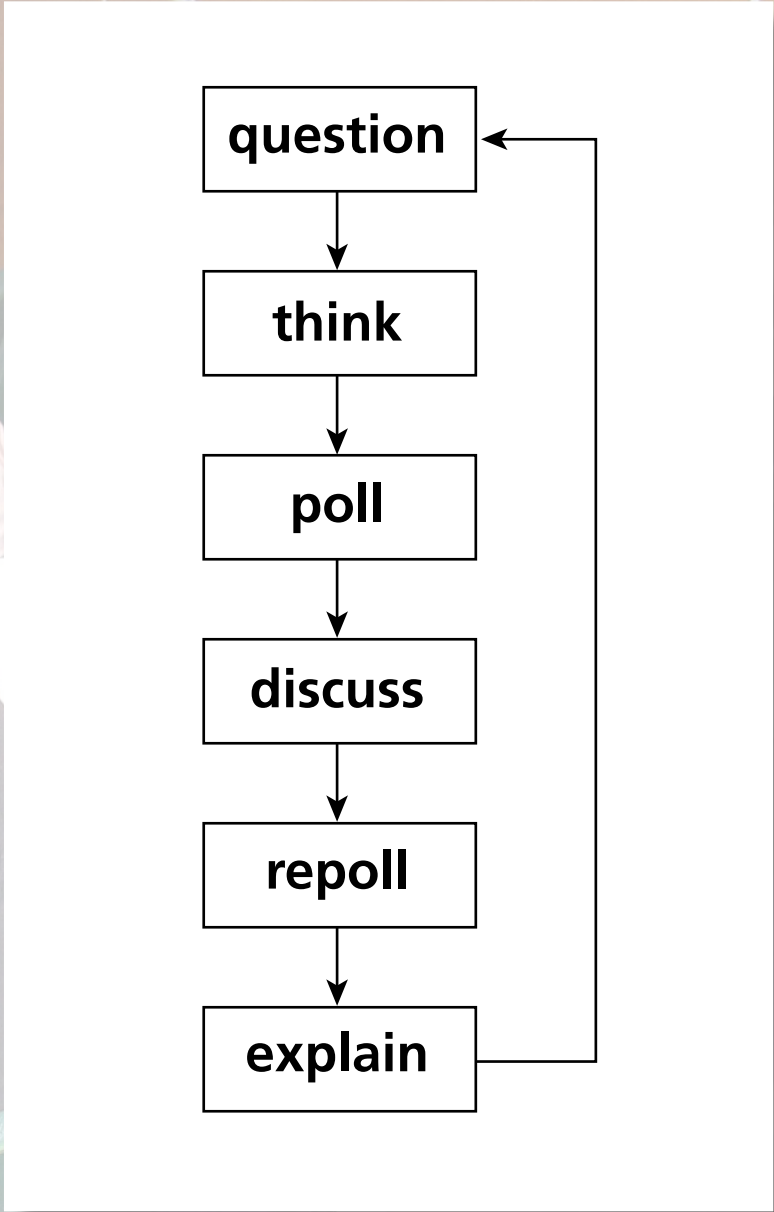


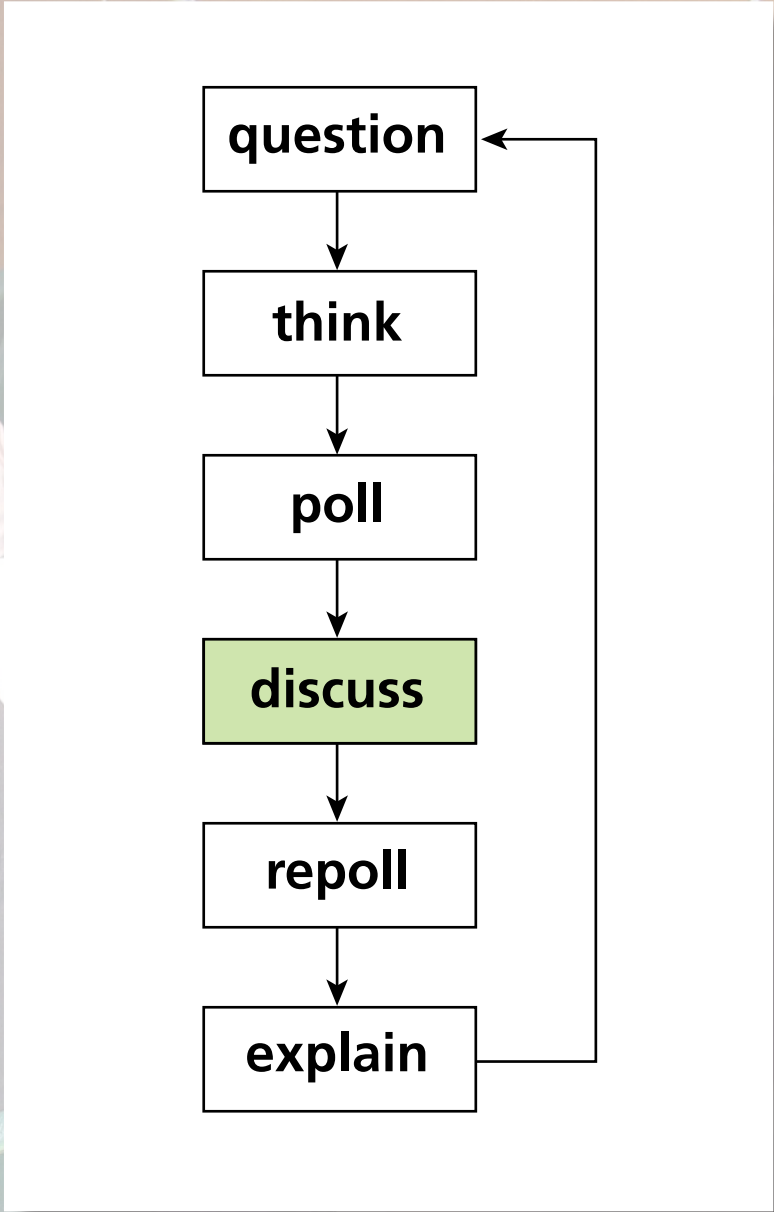
**discuss**











# Peer

is it any good?

# INSTRUCTION

# Peer INSTRUCTION

The title 'Peer INSTRUCTION' is displayed in a large, white, sans-serif font. The word 'Peer' is written in lowercase, while 'INSTRUCTION' is in uppercase. The letters have a light blue outline. A dashed yellow line with arrowheads forms a path that starts at the bottom left, curves around the 'P', loops around the 'ee', and then extends upwards and to the right, ending near the 'r'. A dotted blue line starts from the 'r' and extends downwards and to the right, following the slope of the word 'INSTRUCTION'. The background is a light red color with a blue vertical stripe on the left side.

1 lecture

2 PI

Peer  
**Higher learning & gains**

INSTRUCTION

1 lecture

2 PI

# Peer

**Higher learning gains**

**Better retention**

INSTRUCTION



**1** lecture

**2** PI

**3** PI 2.0

**feedback**

**1** lecture

**2** PI

**3** PI 2.0





1991

1 lecture

2 PI

3 PI 2.0



1993

A black handheld remote control with a numeric keypad (1-9, 0, \*, #) and a green logo that reads "FRS". The remote is positioned diagonally on a white background. The year "1998" is overlaid in large white text in the center of the remote.

# 1998



1 lecture

2 PI

3 PI 2.0



# technology

1 lecture

2 PI

3 PI 2.0



How do I...

- design good questions?
- optimize the discussions?
- manage time?

Use intelligent algorithms and data analytics to...

- improve questioning
  - manage discussions
  - facilitate time management/flow
- learning | catalytics

- lowest
- a. A 30-year fixed rate mortgage at 12%
  - b. A 15-year fixed rate mortgage at 12%
  - c. A 30-year fixed rate mortgage at 12%
  - d. A 15-year fixed rate mortgage at 12%
2. The biggest factor that leads American companies to manufacture their products overseas in India is:
- a. Higher quality of craftsmanship
  - b. Lower labor costs
  - c. Decreased transportation costs
  - d. Effective legal systems
3. Which of the following correctly summarizes the accounting equation for a sole proprietorship?
- a.  $\text{Assets} = \text{Liabilities} + \text{Owners' equity}$
  - b.  $\text{Liabilities} = \text{Assets} + \text{Owners' equity}$
  - c.  $\text{Owner's equity} = \text{Assets} + \text{Liabilities}$
  - d.  $\text{Revenue} = \text{Assets} - \text{Liabilities}$
4. In order to present a business plan to a group of potential investors, a businessperson would most likely use which of the following?
- a. Powerpoint
  - b. Quickbooks
  - c. Peoplesoft
  - d. Excel
5. In order to start an online business, and individual would need all but which of the following:
- a. business model
  - b. depreciation?



## extensible plug-in architecture for question types

- a. A 30-year fixed rate mortgage at 12%
- b. A 15-year fixed rate mortgage at 12%
- c. A 30-year fixed rate mortgage at 12%
- d. A 15-year fixed rate mortgage at 12%

2. The biggest factor that leads American companies to manufacture their products over India is:

- a. Higher quality of craftsmanship
- b. Lower labor costs
- c. Decreased transportation costs
- d. Effective legal systems

3. Which of the following correctly summarizes the accounting equation for a sole proprietorship?

- a.  $Assets = Liabilities + Owners' equity$
- b.  $Liabilities = Assets + Owners' equity$
- c.  $Owner's equity = Assets + Liabilities$
- d.  $Revenue = Assets - Liabilities$

4. In order to present a business plan to a group of potential investors, a businessperson should most likely use which of the following?

- a. Powerpoint
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- c. Peoplesoft
- d. Excel

5. In order to start an online business, an individual would need all but which of the following:

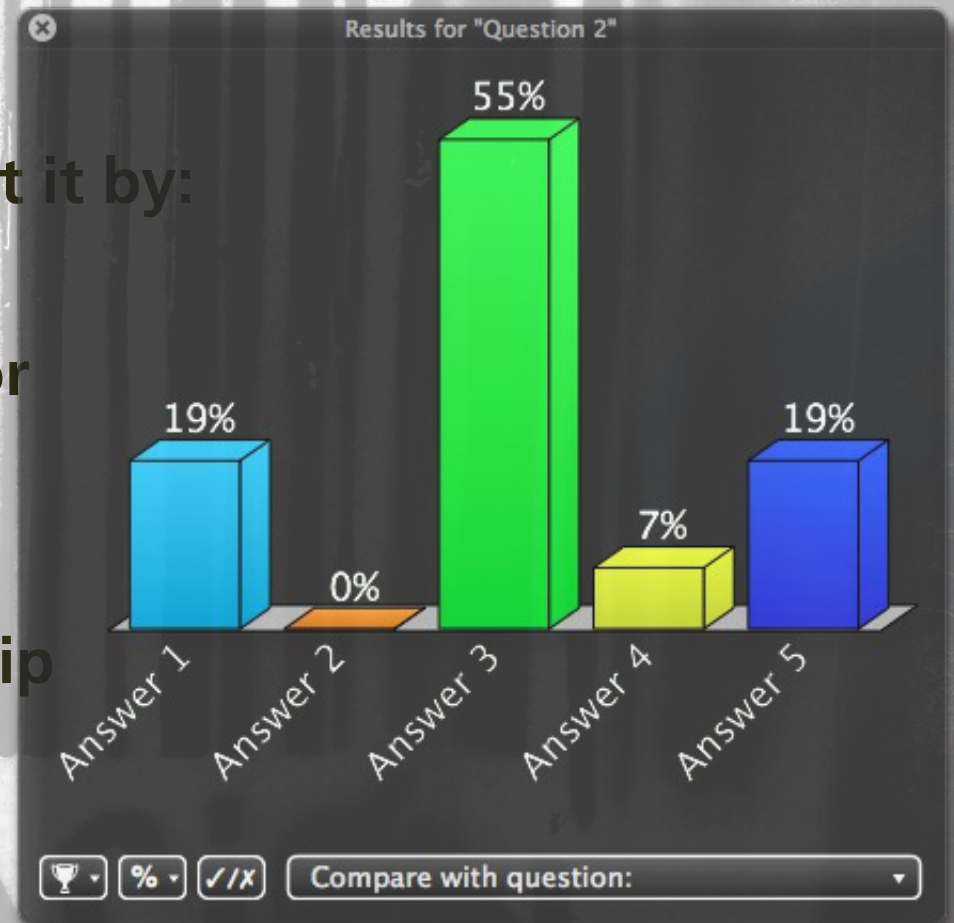
business model

## Sample question types:

- direction
- expression
- long answer, short answer, word cloud (fill in text)
- multiple-choice, many-choice
- numerical (enter a number)
- ranking
- region (select point on image)
- sketch

Became good at it by:

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





Carrier



10:24 PM



Leave

session 123456

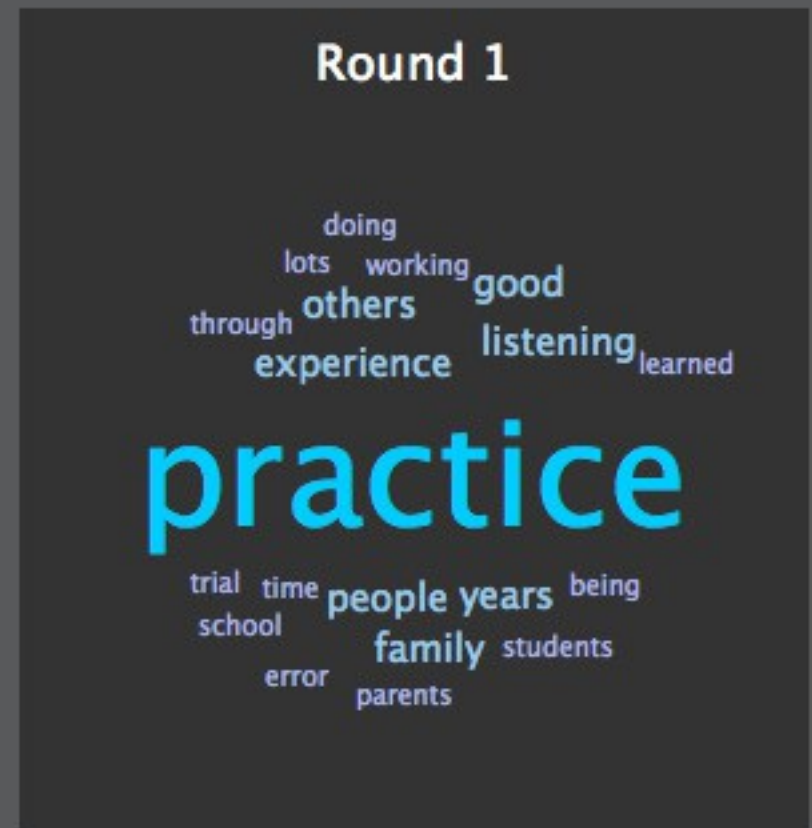
Logout

Now describe in a couple of words how you became good at whatever it is you entered in the previous question.

Submit response

## Class session: 123456

Now describe in a couple of words how you became good at whatever it is you entered in the previous question.





**1** education

**2** PI

**3** PI 2.0

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**4.** **direction** This image shows Oahu as seen from the Space Shuttle. The image provides several clues about the direction of prevailing winds in Oahu. Indicate this direction by drawing an arrow on your screen. [Deliver](#) [Show all results](#)

**1** education

**2** PI

**3** PI 2.0

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4. direction of prevailing winds. The image provides several clues about the direction of prevailing winds in Oahu. Indicate this direction by drawing an arrow on your screen. [Deliver](#) [Show all results](#)



1 educa

3 PI 2.0



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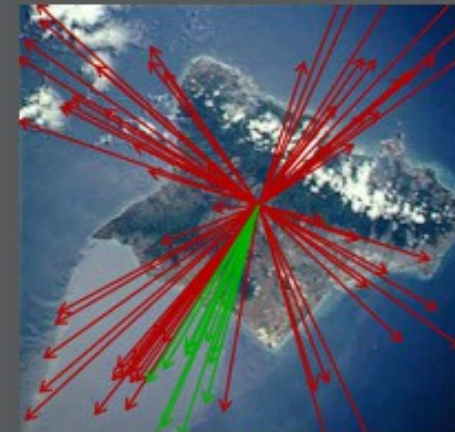
4. direction  
prevailing

...le. The image provides several clues about the direction of  
...on your screen.

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Round 1

77 responses, 16% correct



17 get it now  
 3 still don't get it



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optics i

current session: **766079** | 69 students

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Jump to ▾

1

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14

15



4. direction Light enters horizontally into the combination of two perpendicular mirrors as shown below.

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Indicate the direction of the incident light after it reflects off of both mirrors.



feedback & support

1 education

2 PI

3 PI 2.0

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current session: **766079** | 69 students

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6 7 8 9 10 11 12 13 14 15

perpendicular mirrors as shown below.

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[feedback & support](#)



1 educa

3 PI 2.0

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current session: **766079** | 69 students

[Map](#) [Show floating session ID](#) [Edit](#) [Delete](#)

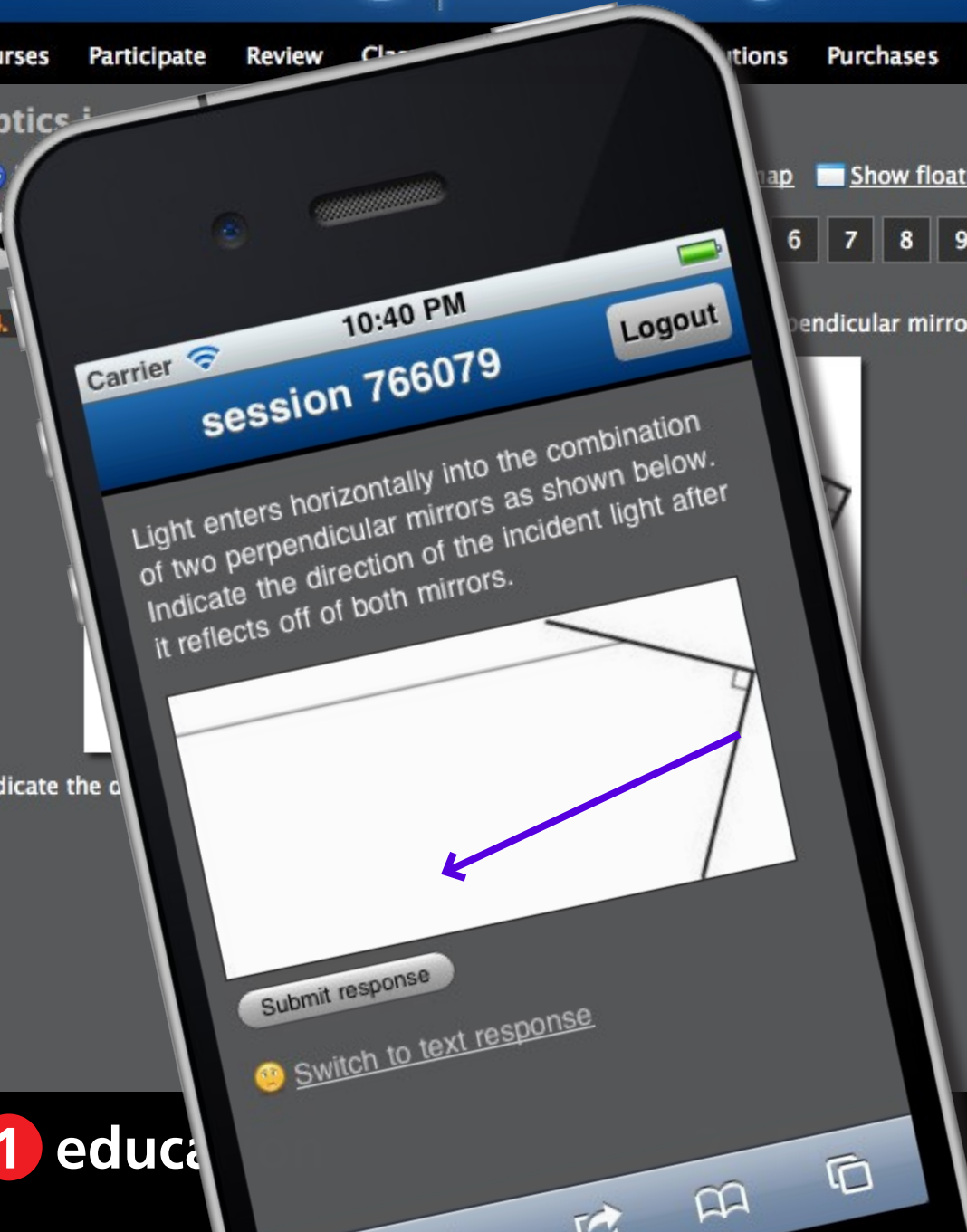
6 7 8 9 10 11 12 13 14 15

perpendicular mirrors as shown below.

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Indicate the d



# learning | catalytics

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[Map](#) [Show floating session ID](#) [Edit](#) [Delete](#)

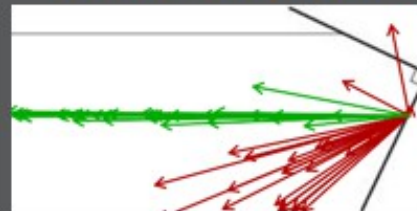
6 7 8 9 10 11 12 13 14 15

perpendicular mirrors as shown below.

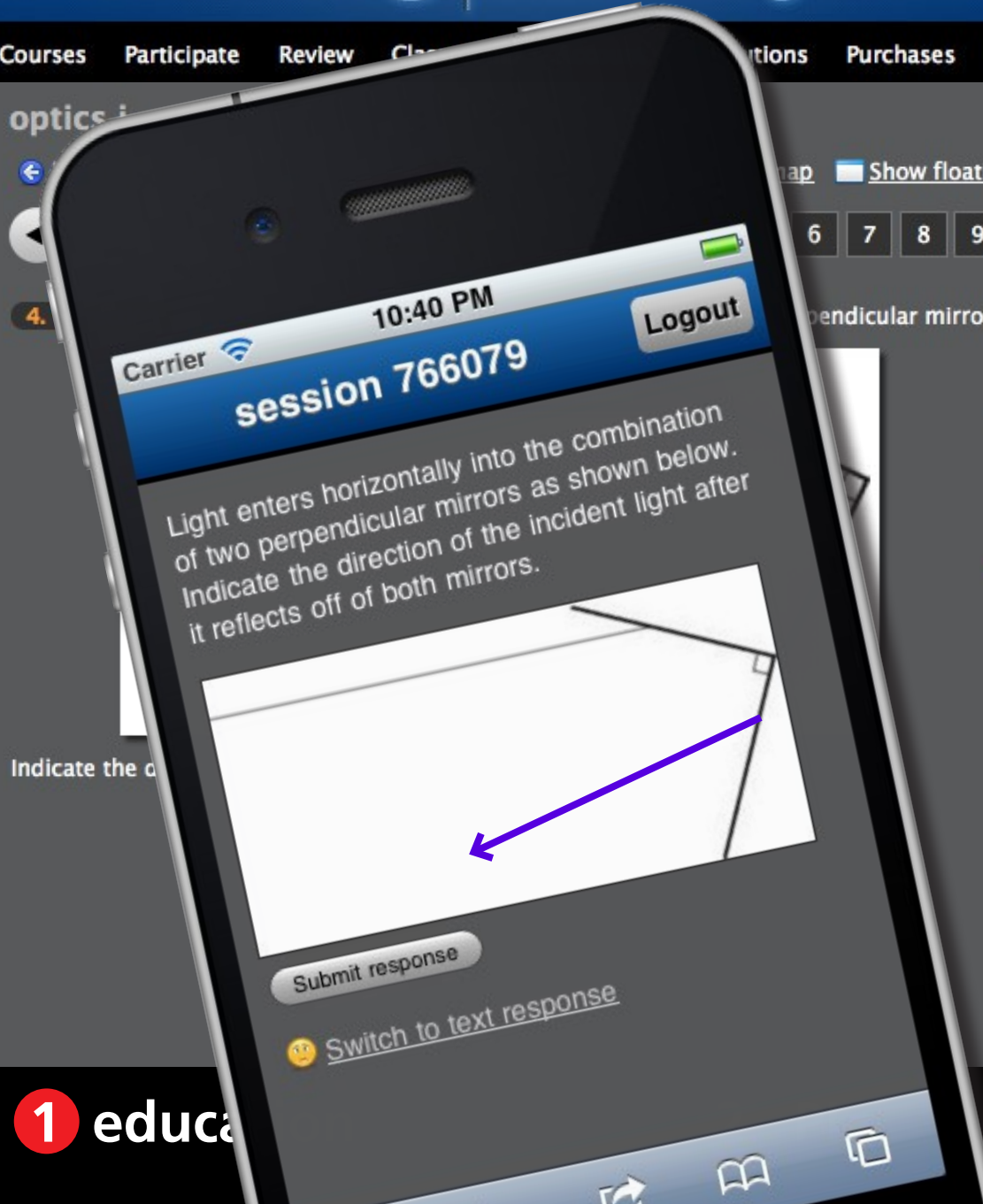
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Round 1 ✖  

57 responses, 58% correct



 [feedback & support](#)



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current session: **766079** | 69 students

Map  Show floating session ID  Edit  Delete

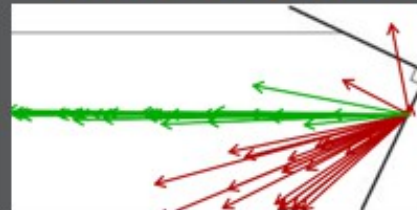
6 7 8 9 10 11 12 13 14 15

perpendicular mirrors as shown below.

Deliver  Show all results

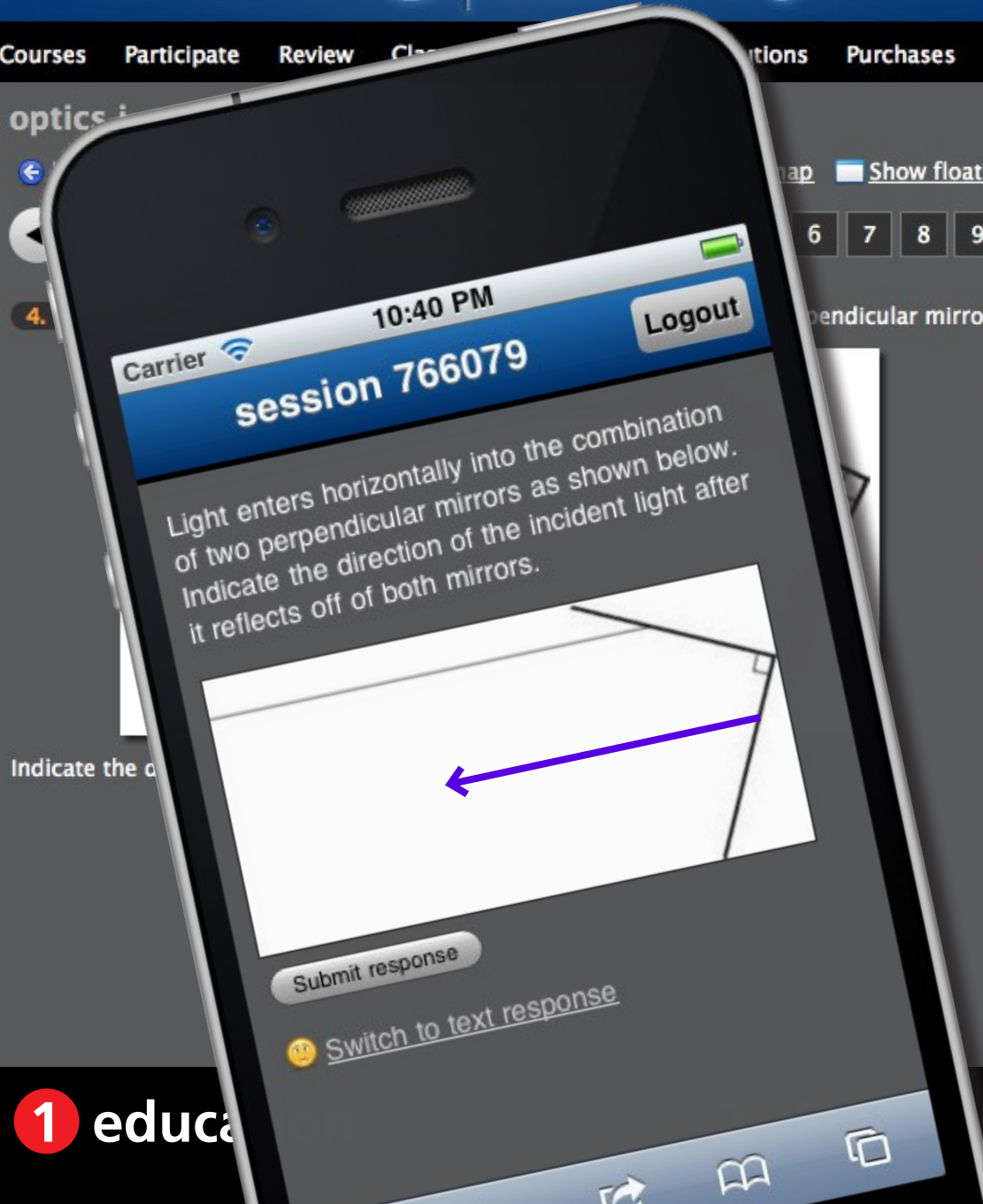
Round 1     
● 57 responses, 58% correct

Round 2     
● 51 responses, 73% correct



✓ 8 get it now  
✗ 0 still don't get it

feedback & support



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arlington school district

current session: **48222** | 24 students

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Jump to ▾

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5. region Where is Tanzania?

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feedback & support

1 education

2 PI

3 PI 2.0

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arlington school district

current session: **48222** | 24 students

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Jump to 1 2 3 4 5

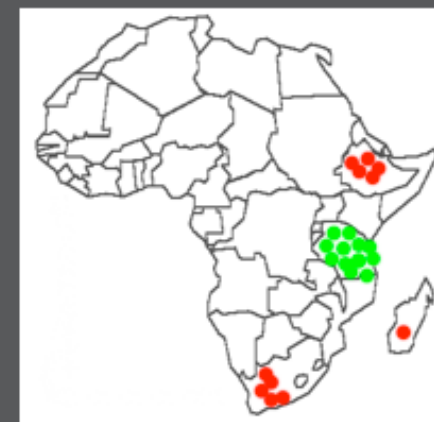


5. region Where is Tanzania?

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Round 1 ✕   
● 24 responses, 75% correct



feedback & support

1 education

2 PI

3 PI 2.0



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## transformations of parabolas

current session: **773885** | 9 students

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Jump to ▼

1

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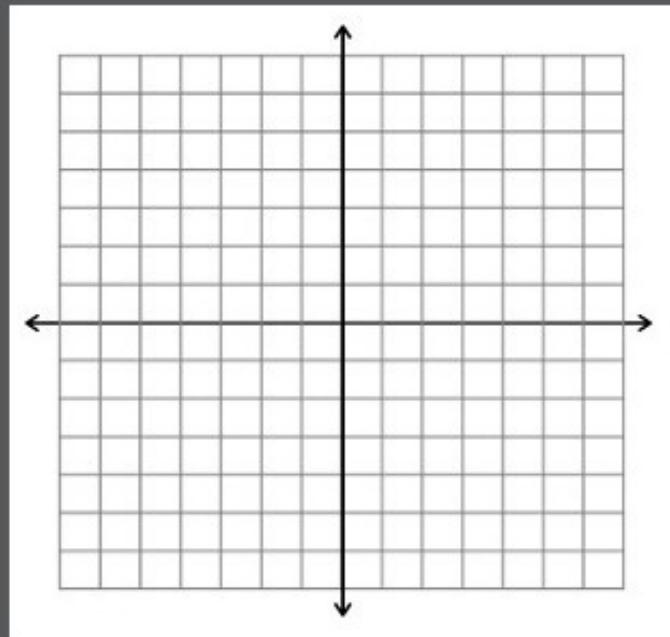
3

4



4. sketch Sketch a graph of the function  $f(x) = (x - 3)^2 + 2$ .

[✖ Stop delivery](#) [🔄 Deliver again](#) [👥 Assign groups](#) [📊 Show all results](#)



1 education

2 PI

3 PI 2.0

# learning | catalytics

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## transformations of parabolas

current session: **773885** | 9 students

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Jump to ▾

1

2

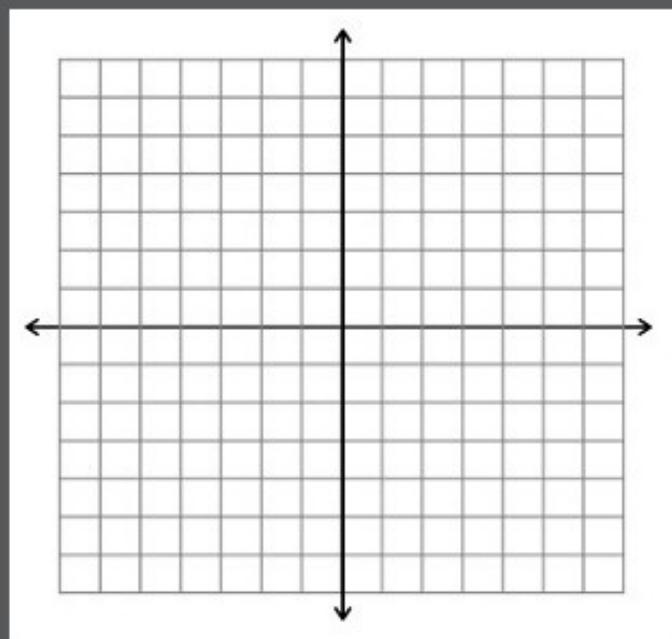
3

4



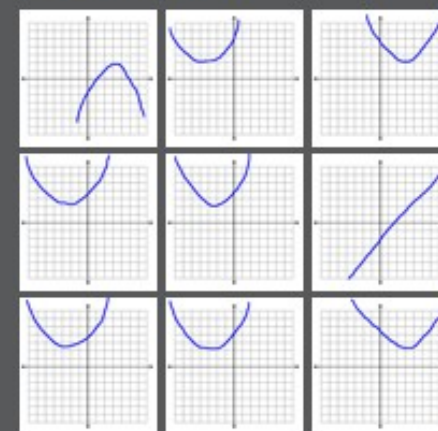
4. sketch Sketch a graph of the function  $f(x) = (x - 3)^2 + 2$ .

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### Round 1

9 responses



1 education

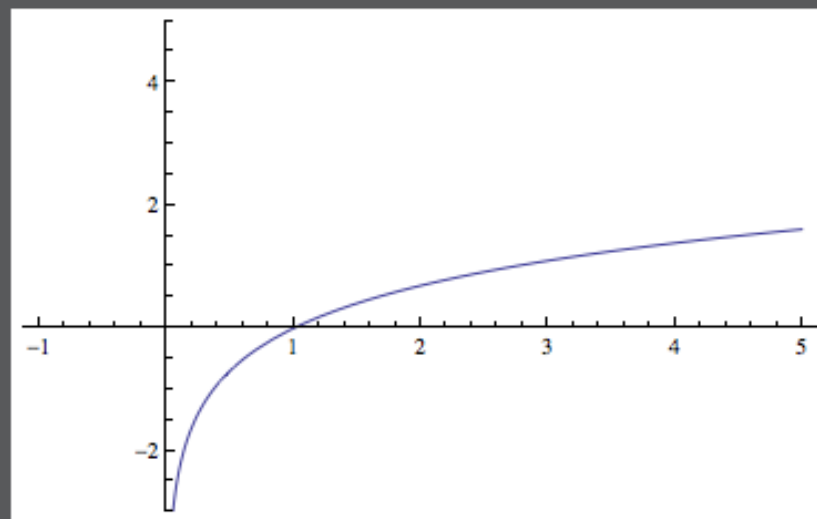
2 PI

3 PI 2.0

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This is a graph of  $f(x) = \ln x$ . Sketch a graph of the derivative  $f'(x)$ .



1 education

2 PI

3 PI 2.0

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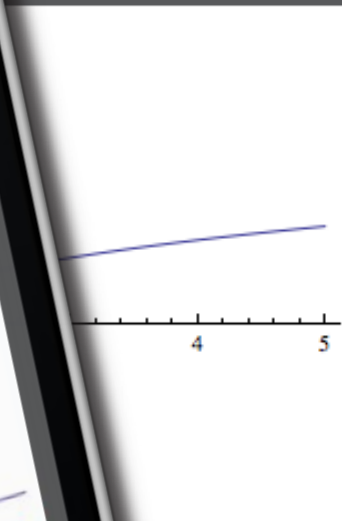
[Courses](#) [Participate](#)[ases](#) [Users](#) [Tour](#) [Help](#)This is a graph of  $f(x) =$ **1** education**3** PI 2.0

# learning | catalytics

Courses Participate

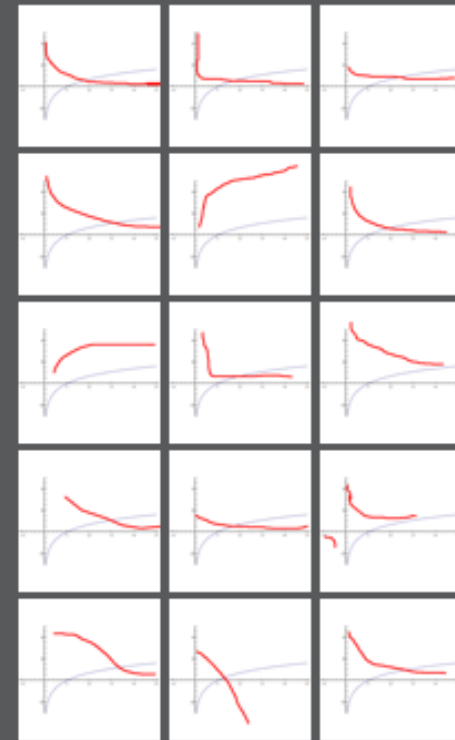
ases Users Tour Help

This is a graph of  $f(x) =$



Round 1

15 responses



✓ 6 get it now  
 ✗ 0 still don't get it

1 education

3 PI 2.0

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1. highlighting What do you see as the most important part of this Shakespeare sonnet? [Stop delivery](#) [Deliver again](#) [Assign groups](#) [Show all results](#)

For shame! deny that thou bear'st love to any,  
Who for thyself art so unprovident.  
Grant, if thou wilt, thou art beloved of many,  
But that thou none lovest is most evident;  
For thou art so possess'd with murderous hate  
That 'gainst thyself thou stick'st not to conspire.  
Seeking that beauteous roof to ruinate  
Which to repair should be thy chief desire.  
O, change thy thought, that I may change my mind!  
Shall hate be fairer lodged than gentle love?  
Be, as thy presence is, gracious and kind,  
Or to thyself at least kind-hearted prove:  
Make thee another self, for love of me,  
That beauty still may live in thine or thee.

1 education

2 PI

3 PI 2.0

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1. highlighting  
sonnet?

this Shakespeare

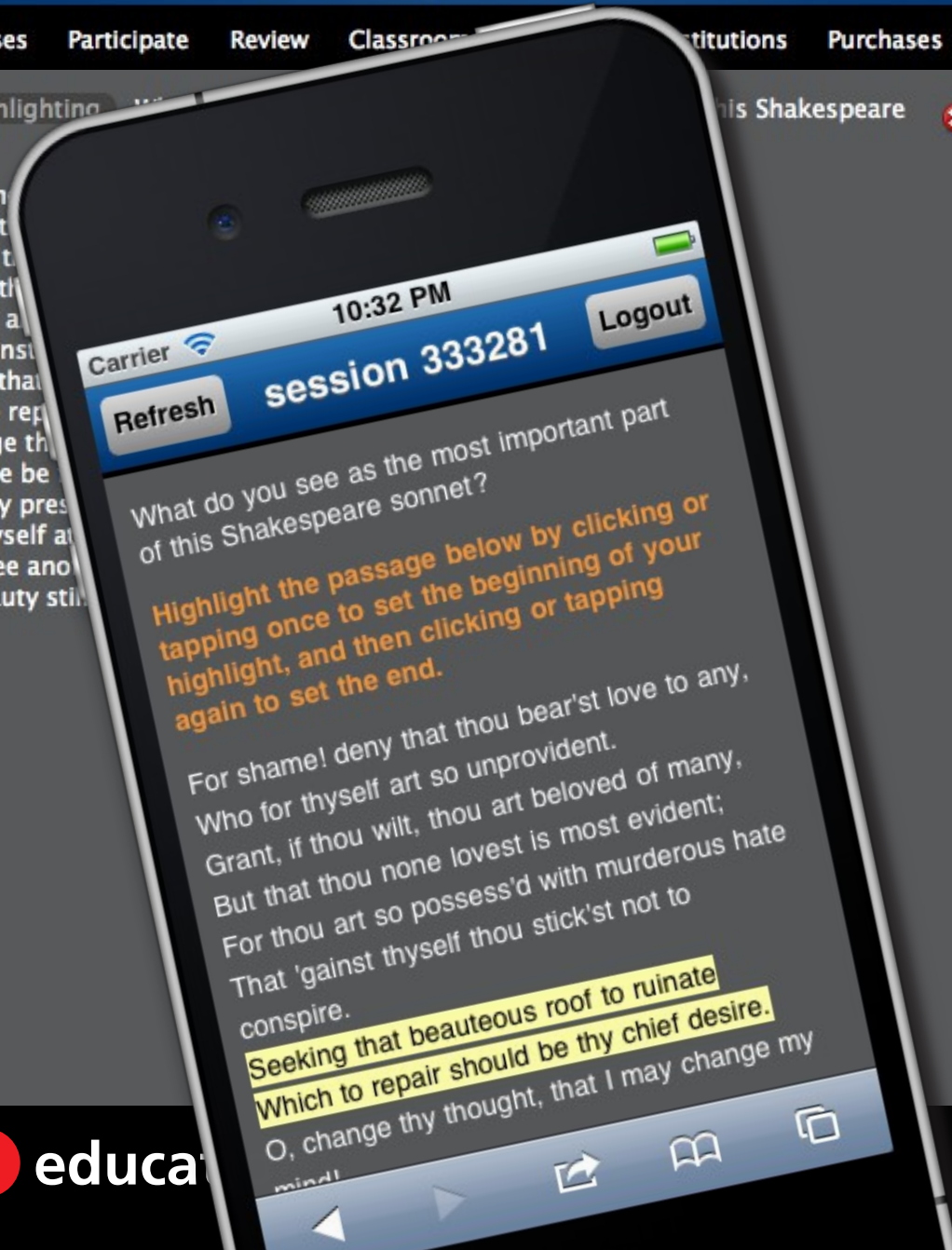
[Stop delivery](#)

[Deliver again](#)

[Assign groups](#)

[Show all results](#)

For shame  
Who for t  
Grant, if t  
But that th  
For thou a  
That 'gainst  
Seeking tha  
Which to rep  
O, change th  
Shall hate be  
Be, as thy pres  
Or to thyself a  
Make thee ano  
That beauty stil



1 educa

3 PI 2.0

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1. highlighting  
sonnet?

this Shakespeare

[Stop delivery](#)

[Deliver again](#)

[Assign groups](#)

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### Round 1

3 responses

For shame! deny that thou bear'st  
love to any,  
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beloved of many,  
But that thou none lovest is most  
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For thou art so possess'd with  
murderous hate  
That 'gainst thyself thou stick'st  
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**Seeking that beauteous roof to  
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Which to repair should be thy  
chief desire.  
O, change thy thought, that I may  
change my mind!  
Shall hate be fairer lodged than  
gentle love?  
Be, as thy presence is, gracious  
and kind,



**1** educa

**3** PI 2.0



## Sample question types:

- direction
- expression
- long answer, short answer, word cloud (fill in text)
- multiple choice, multiple choice
- numerical (enter a number)
- ranking
- region (select point on image)
- sketch

**data analytics**



1 lecture

2 PI

3 PI 2.0



# human interaction

1 lecture

2 PI

3 PI 2.0

Carrier 9:31 PM 100%

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skywalker.seas.harvard.edu/class\_sessions/399757/review\_results

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### review results for session 399757 in electrostatic work and energy ii

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Jump to 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

A positively charged rod is held near a neutral conducting sphere as illustrated below. A positively charged particle is moved from point A to point B



Round 1 74 responses, 61% correct

A. 61%
B. 4%
C. 35%
D. 0%
E. 0%

Round 2 75 responses, 83% correct

A. 83%
B. 0%
C. 17%
D. 0%
E. 0%

A. positive  
B. zero  
C. negative  
D. depends on the path taken from A to B  
E. cannot be determined without knowing more about the polarization induced in the sphere

Search:

1 lecture

2 PI

3 PI 2.0

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# learning catalytics





A positively charged rod is held near a neutral conducting sphere as illustrated below. A positively charged particle is moved from point A to point B. The potential difference from A to B is



A. positive  
 B. zero  
 C. negative  
 D. depends on the path taken from A to B  
 E. cannot be determined without knowing more about the polarization induced in the sphere

**Round 1**  
 74 responses, 61% correct

A. 61%
B. 4%
C. 35%
D. 0%
E. 0%

**Round 2**  
 75 responses, 83% correct

A. 83%
B. 0%
C. 17%
D. 0%
E. 0%

Search: \_\_\_\_\_

1 lecture

2 PI

3 PI 2.0

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## review results for session 399757 in electrostatic work and energy ii

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Round 1 74 responses, 61% correct

A. 61%
B. 4%
C. 35%
D. 0%
E. 0%

Round 2 75 responses, 83% correct

A. 83%
B. 0%
C. 17%
D. 0%
E. 0%

A positively charged rod is held near a neutral conducting sphere as illustrated below. A positively charged particle is moved from point A to point B



A. positive  
B. zero  
C. negative  
D. depends on the path taken from A to B  
E. cannot be determined without knowing more about the polarization induced in the sphere

Search: \_\_\_\_\_

1 lecture

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A positively charged rod is held near a neutral conducting sphere as illustrated below. A positively charged particle is moved from point A to point B as illustrated below. The potential difference from A to B is

A. positive  
 B. zero  
 C. negative  
 D. depends on the path taken from A to B  
 E. cannot be determined without knowing more about the polarization induced in the sphere

**Round 1**  
 74 responses, 61% correct

A. 61%  
 B. 4%  
 C. 35%  
 D. 0%  
 E. 0%

**Round 2**  
 75 responses, 83% correct

A. 83%  
 B. 0%  
 C. 17%  
 D. 0%  
 E. 0%

Search: \_\_\_\_\_

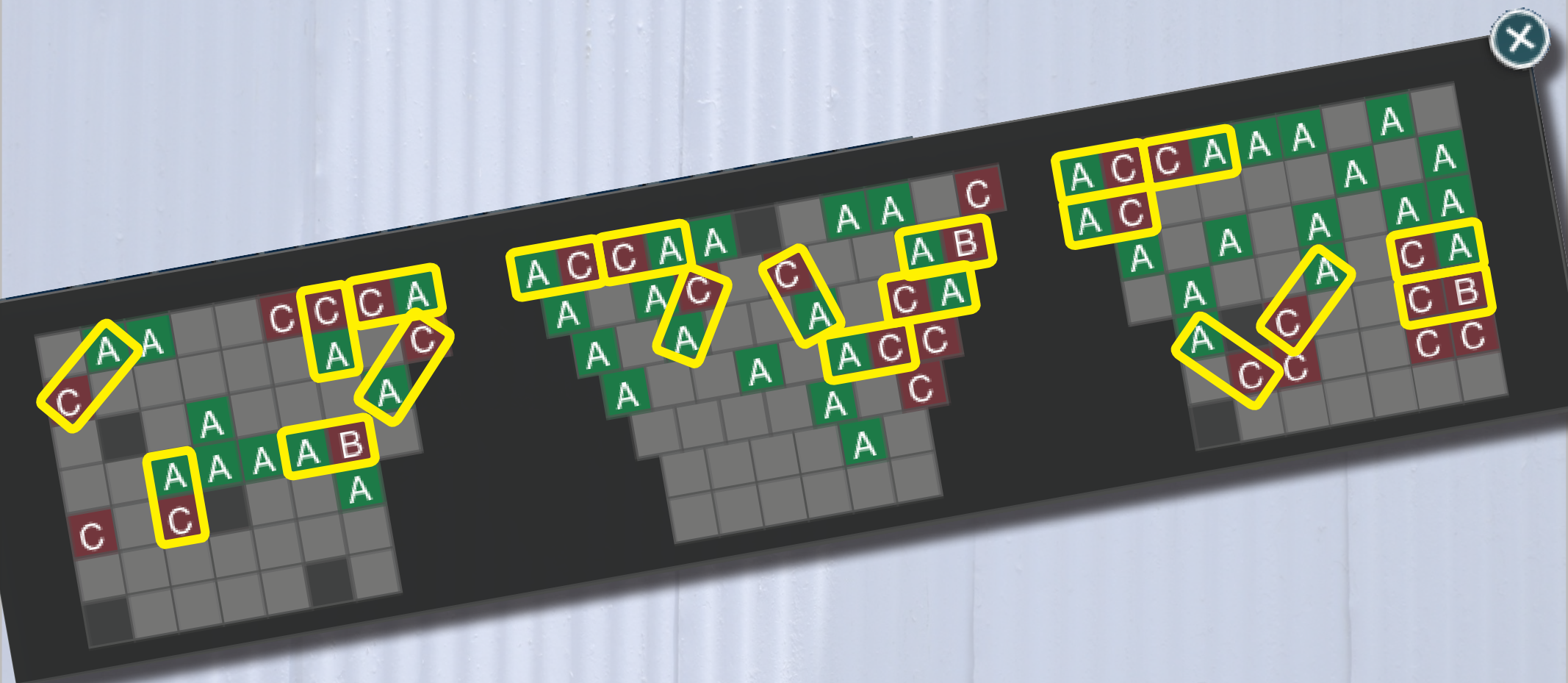
1 lecture

2 PI

3 PI 2.0

let system manage pairing





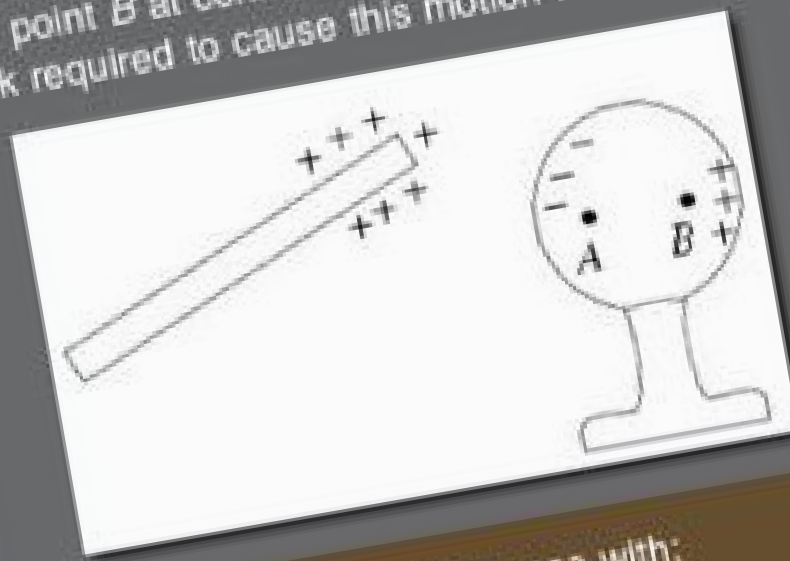
**1** lecture

**2** PI

**3** PI 2.0

Leave

A positively charged rod is held near a neutral conducting sphere as illustrated below. A positively charged particle is moved from point A to point B at constant speed. The mechanical work required to cause this motion is



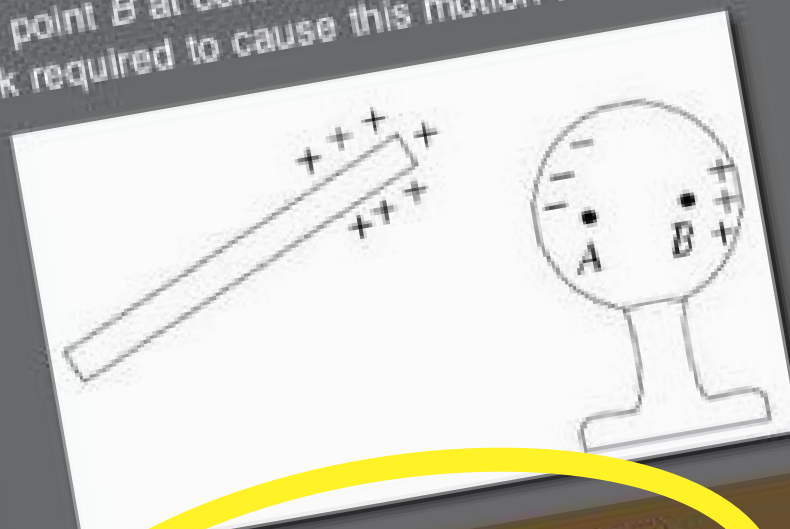
Please discuss your response with:

- Brian Lukoff (to your left)

I am talking to this person/people

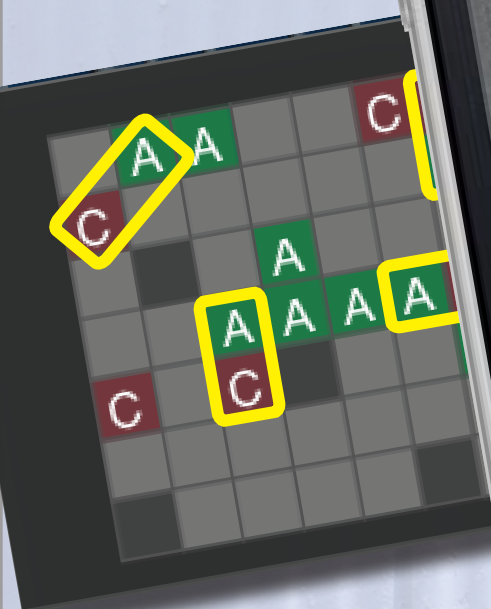
Leave

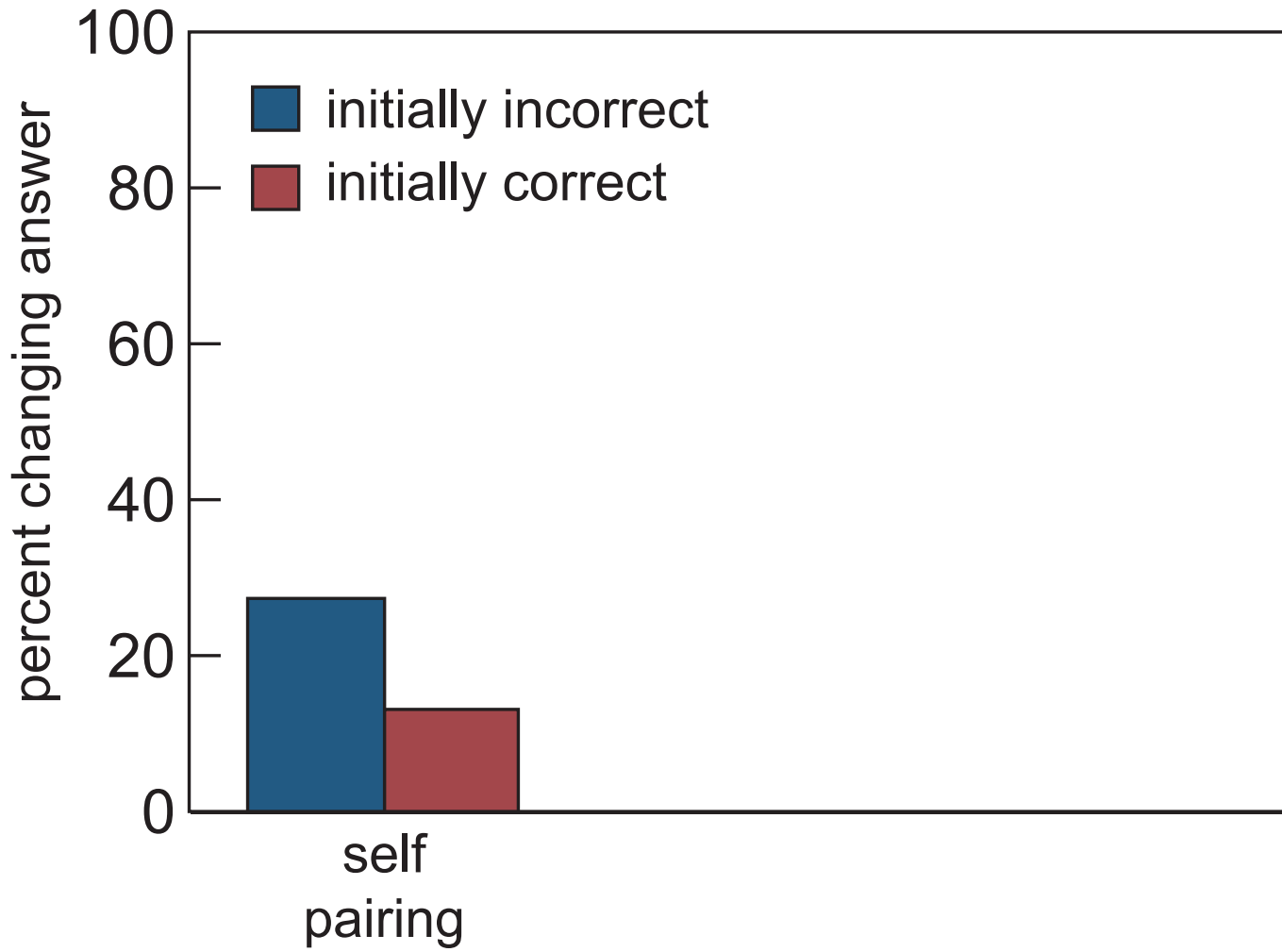
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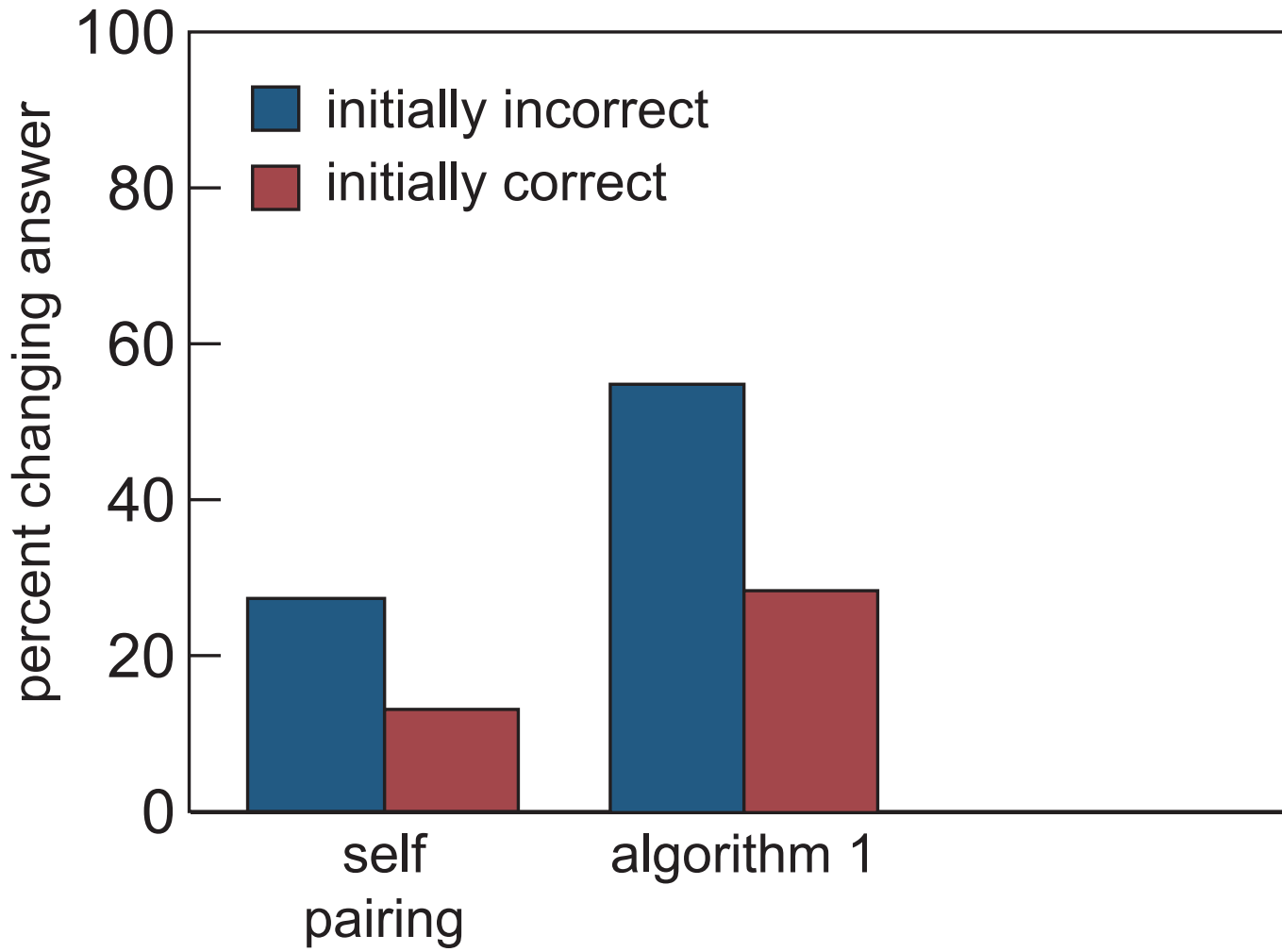


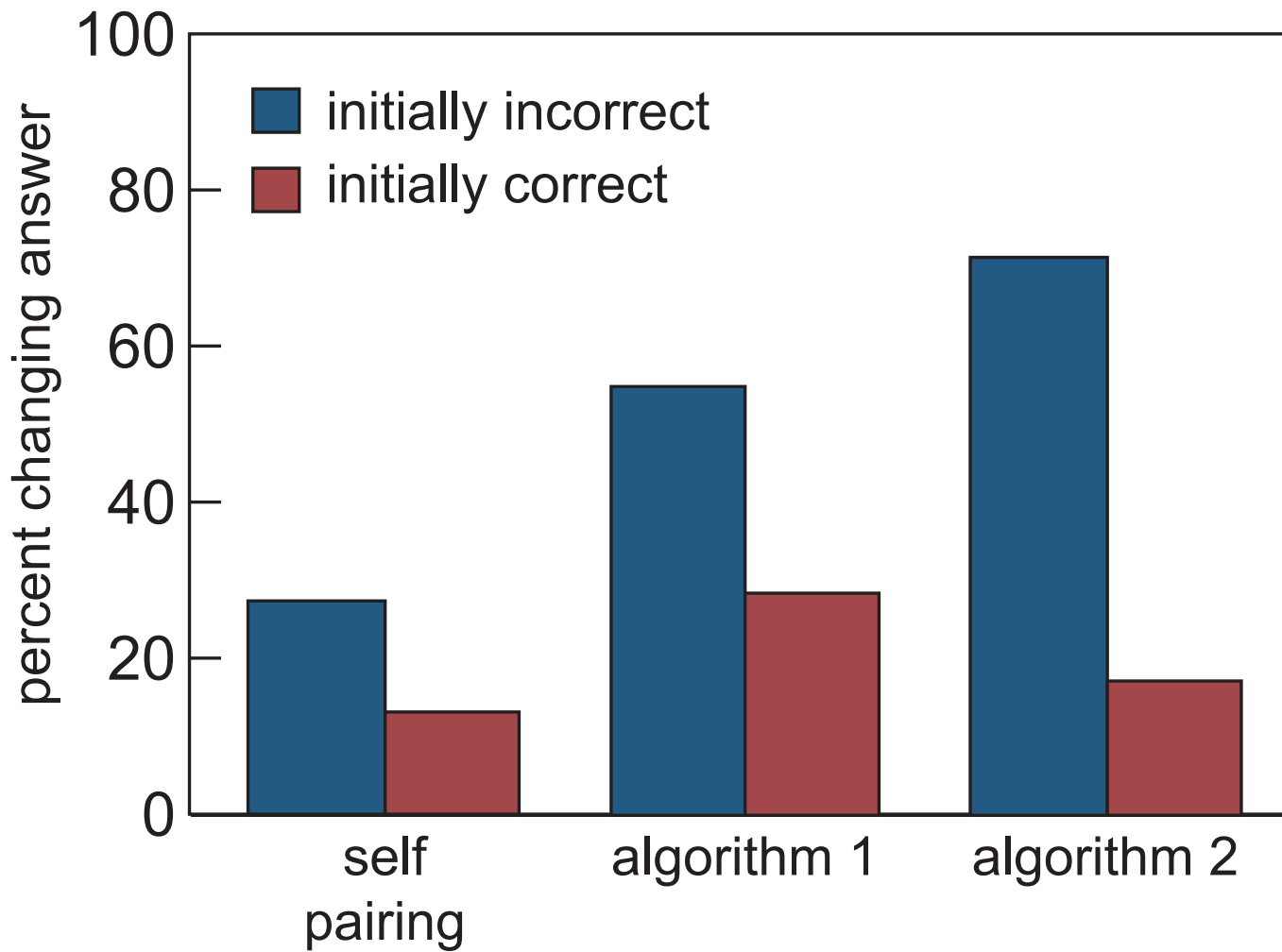
Please discuss your response with:

- Brian Lukoff (to your left)











**1** lecture

**2** PI

**3** PI 2.0

in a lecture, students...

**1** lecture

**2** PI

**3** PI 2.0

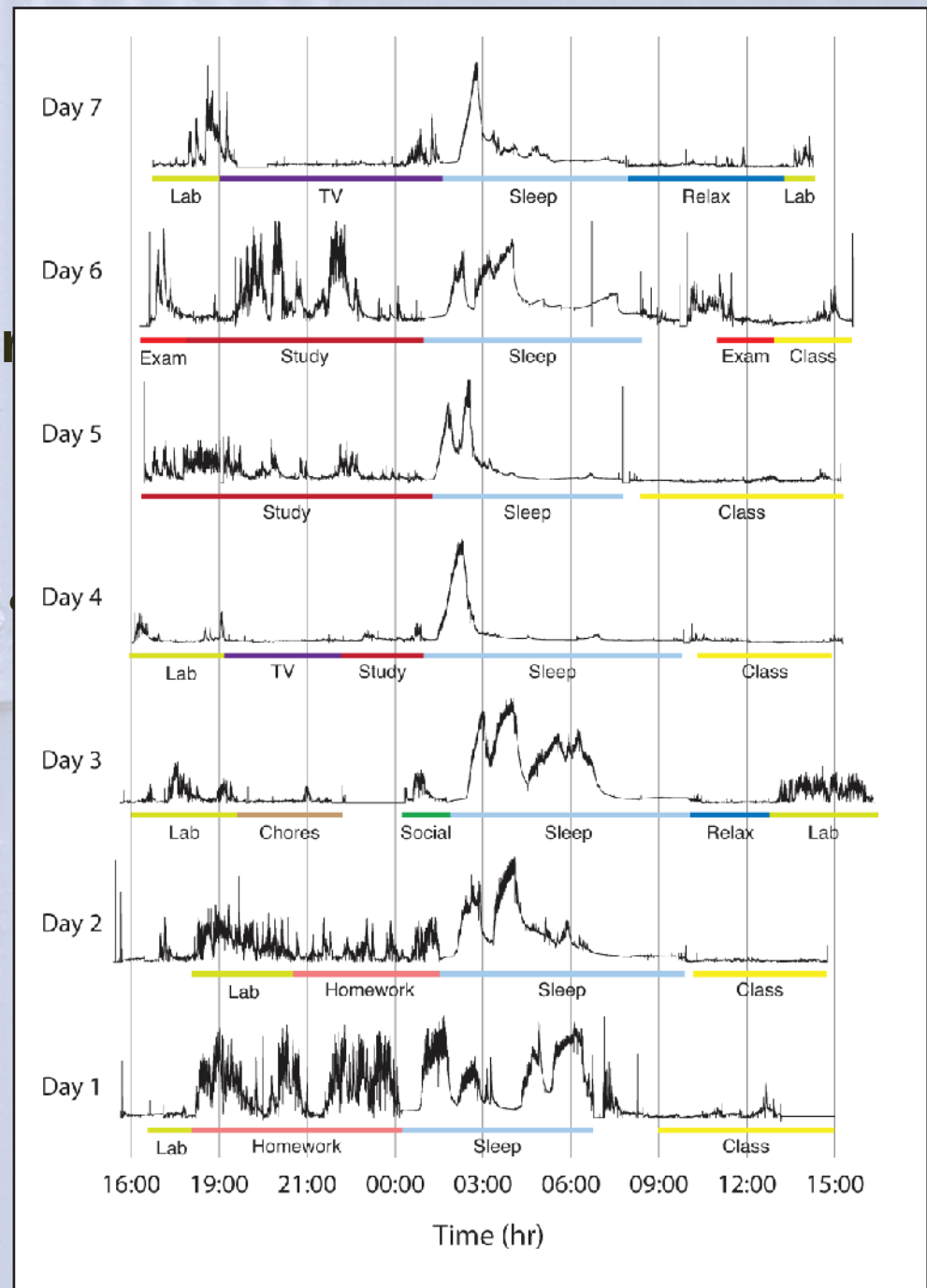


**in a lecture, students...**

**1. don't pay utmost attention**

in a lecture

1. don't pay utmost



doi: 10.1109/TBME.2009.2038487

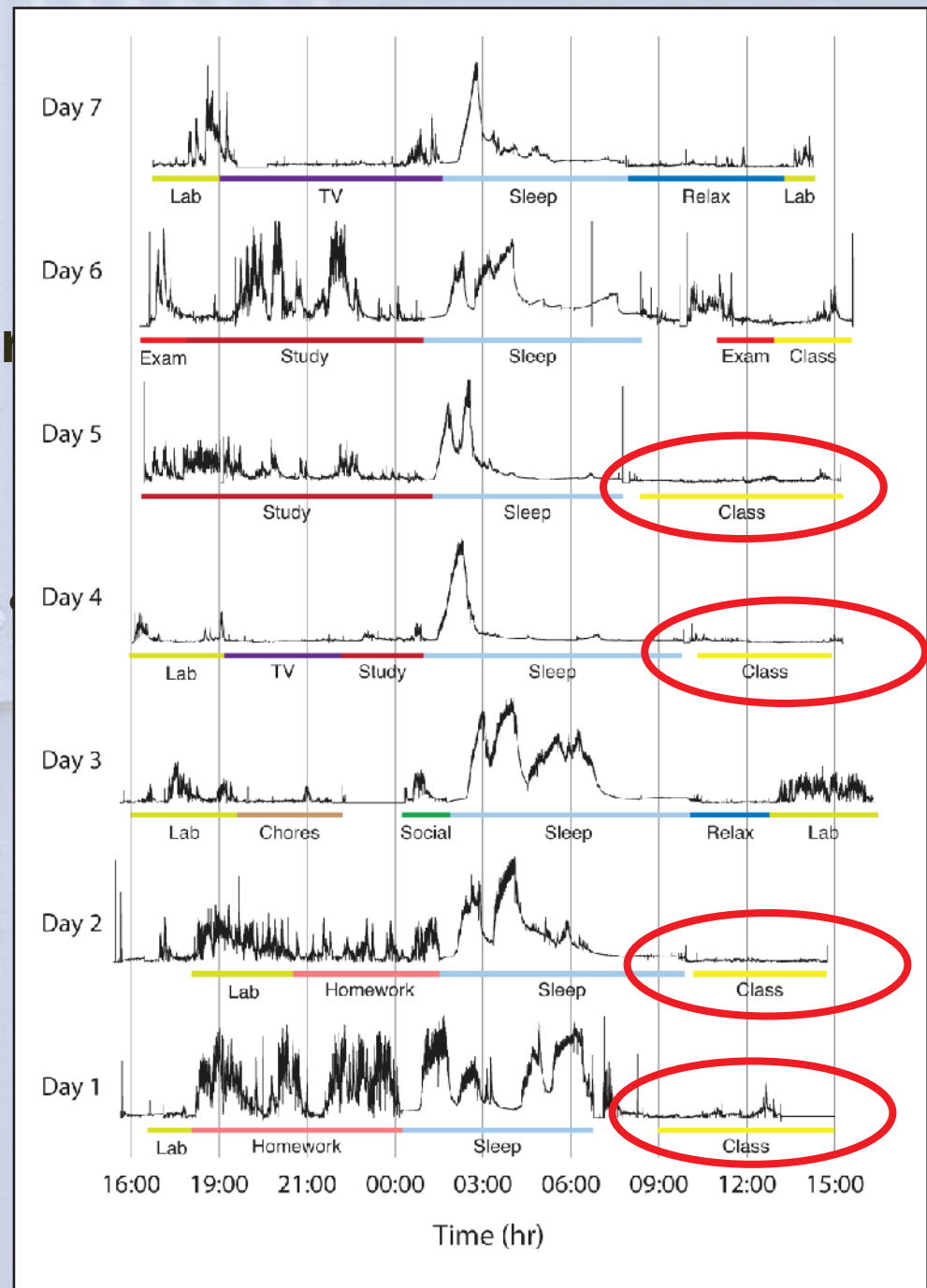
1 lecture

2 PI

3 PI 2.0

in a lecture

1. don't pay utmost



doi: 10.1109/TBME.2009.2038487

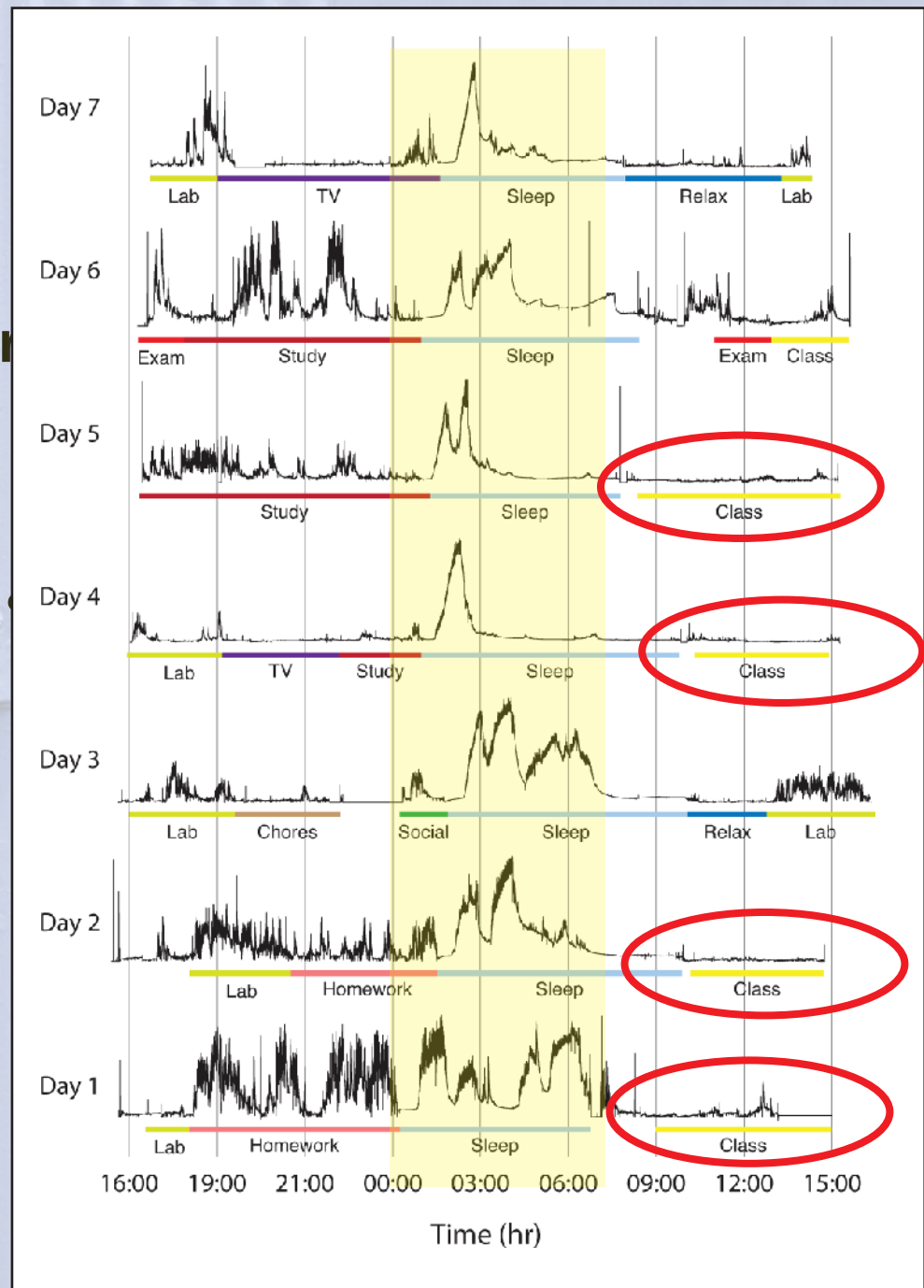
1 lecture

2 PI

3 PI 2.0

in a lecture

1. don't pay utmost



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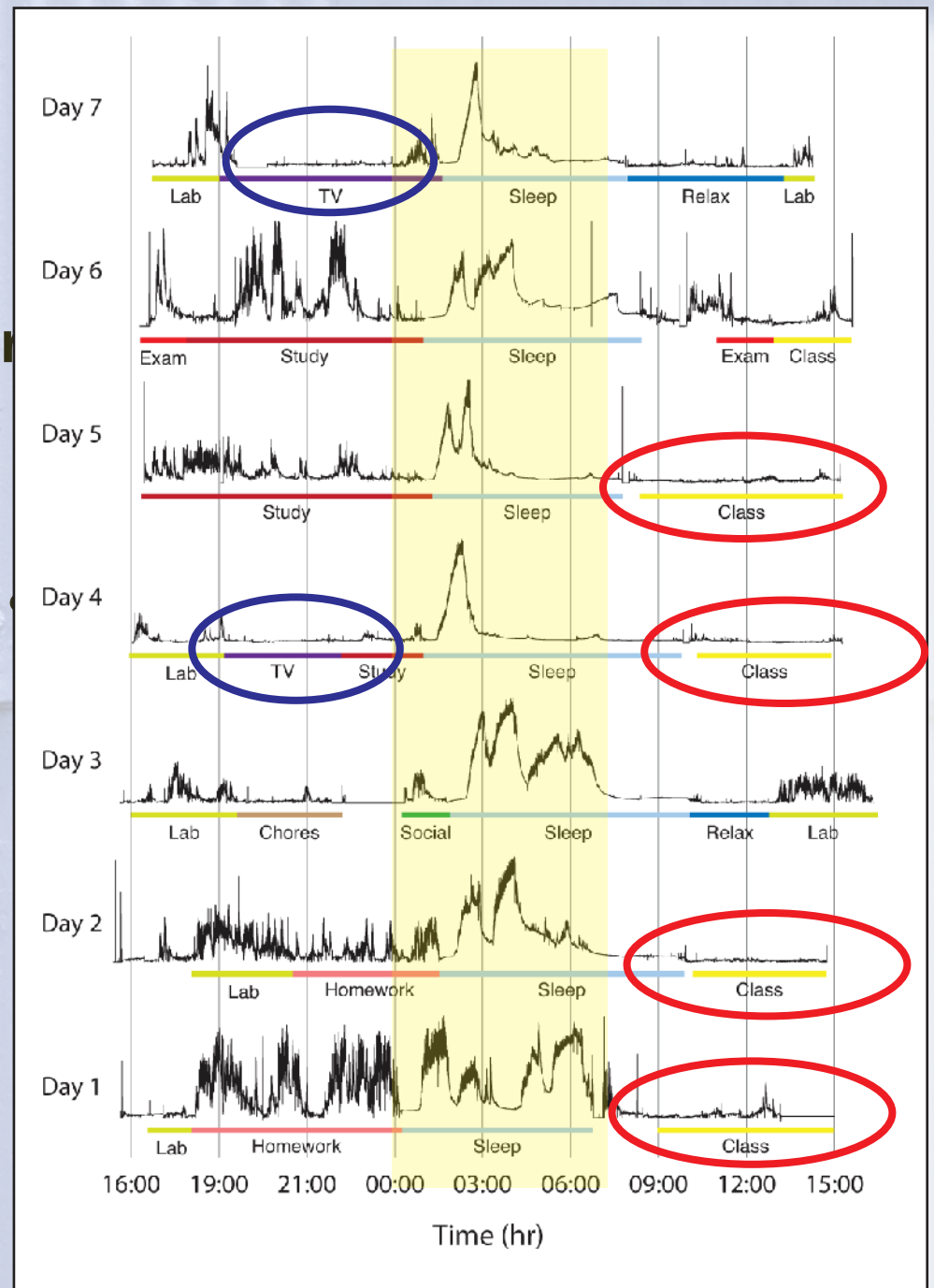
1 lecture

2 PI

3 PI 2.0

in a lecture

1. don't pay utmost



doi: 10.1109/TBME.2009.2038487

1 lecture

2 PI

3 PI 2.0

**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**





an illusion. . .

1 lecture

2 PI

3 PI 2.0



**1** education

**2** PI

**3** PI 2.0



**Education is not just about:**

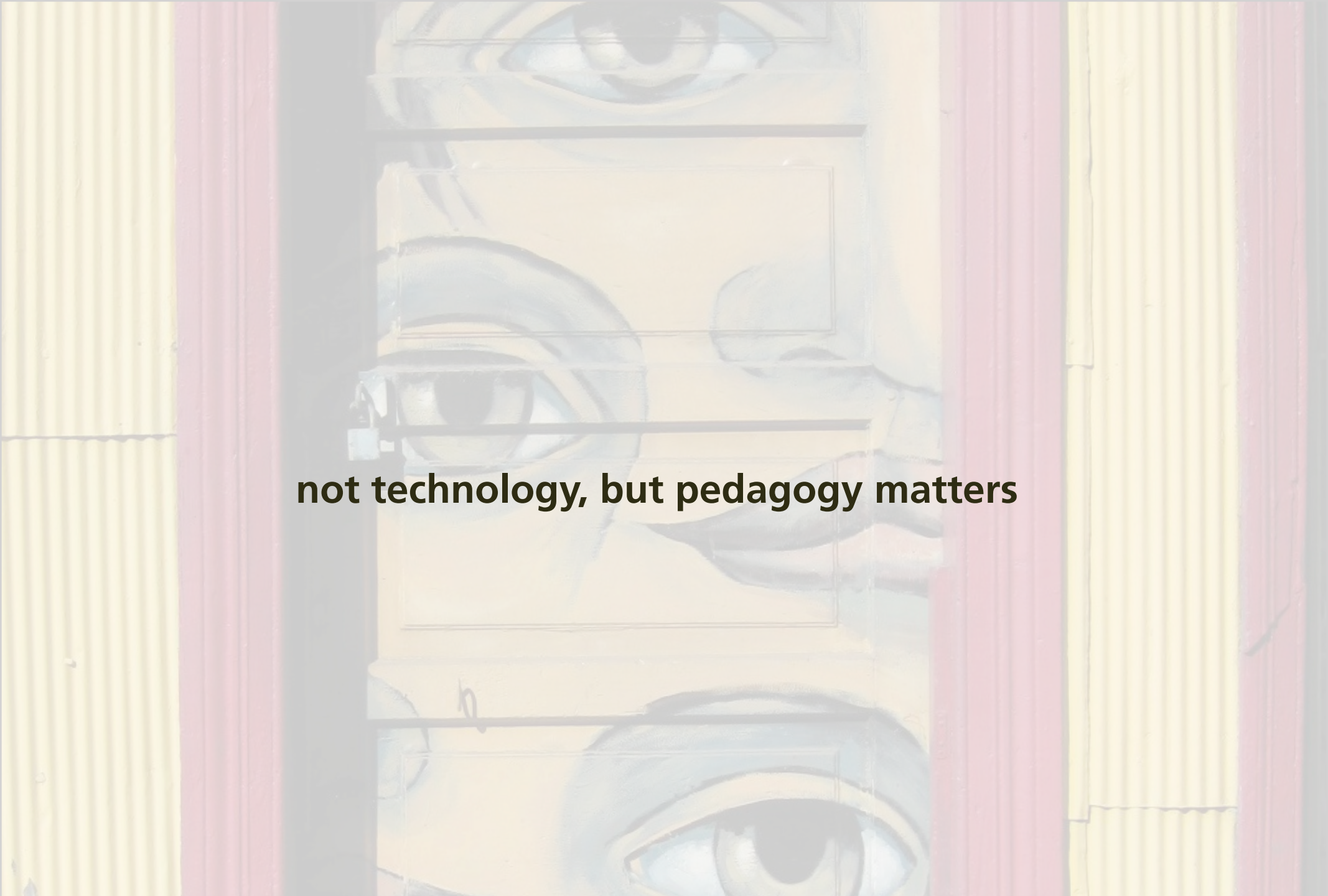
- **transferring information**
- **getting students to do what we do**



**Education is not just about:**

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

**discovery & exploration a must!**



**not technology, but pedagogy matters**

**1** education

**2** PI

**3** PI 2.0

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