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Peer Instruction Workshop



McGill University
Montreal, QC, 4 May 2015

Peer Instruction Workshop



@eric_mazur

McGill University
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1. Go to learningcatalytics.com/demo
2. Enter info, click "Start"
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Think of something you are really good at

EDUCACION

Now think how you became good at it









1 lecture

2 PI



1 lecture

2 PI

3 PI 2.0




**EXCITING
stuff!**

1 lecture

2 PI

3 PI 2.0

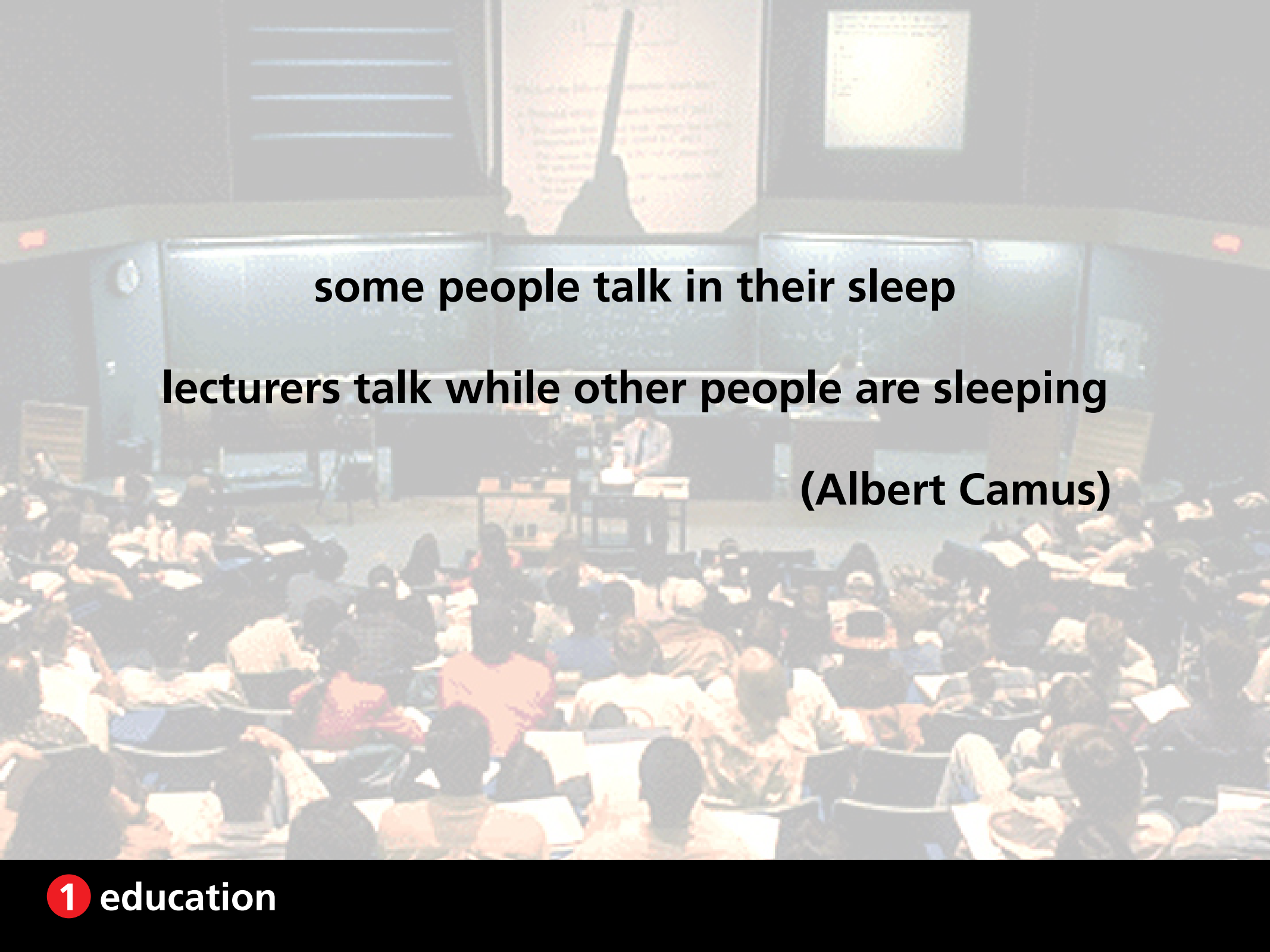


**What happens
in a lecture?**



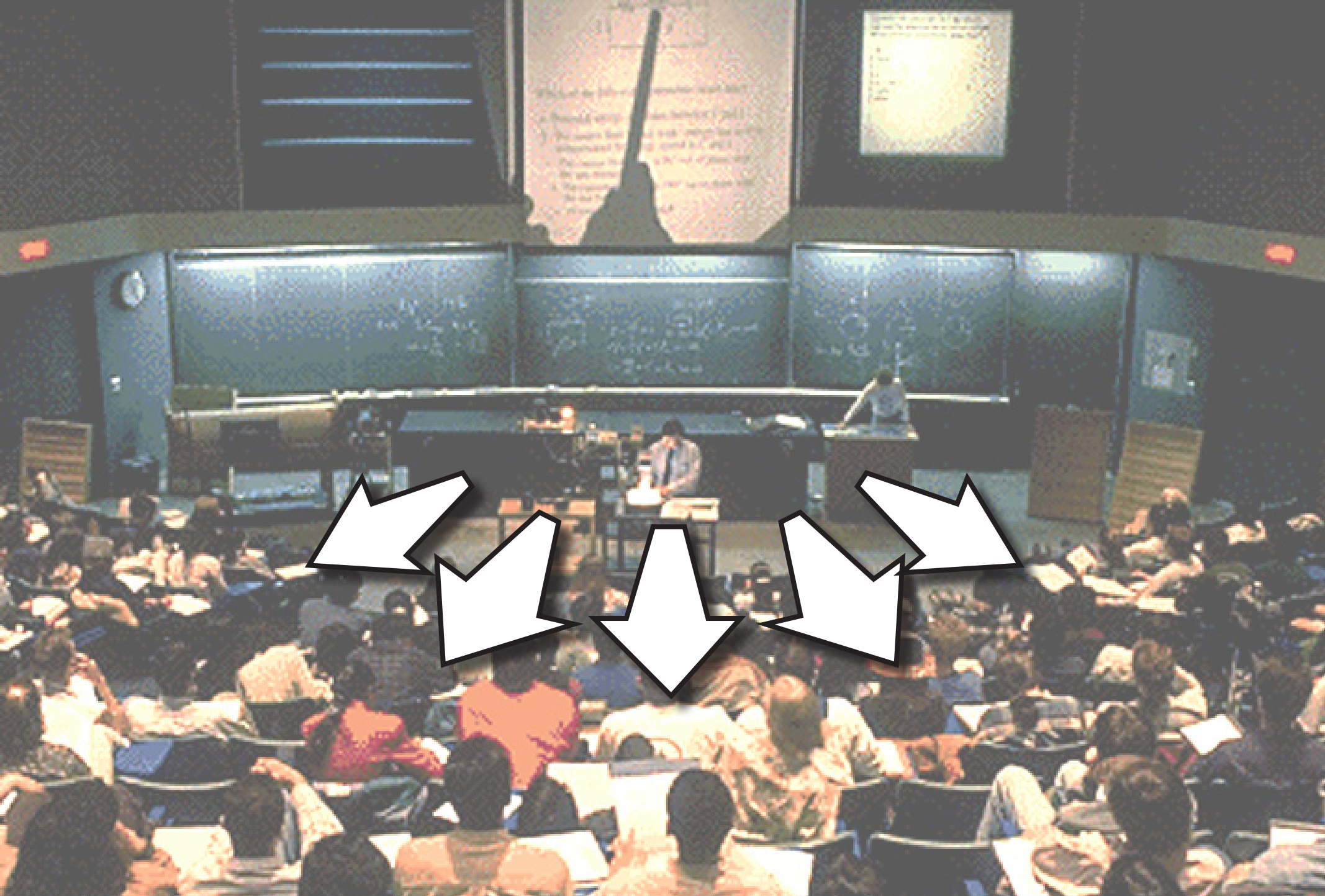
A wide-angle photograph of a large lecture hall. The room is filled with students seated in rows of chairs. Many students appear to be asleep, with their heads resting on their desks or hands. At the front of the room, a lecturer is standing near a podium, facing the audience. Behind the lecturer are several large projection screens displaying text and diagrams. The room has a curved ceiling and walls, and the overall atmosphere is one of a lecture where many students are disengaged or tired.

some people talk in their sleep

A large lecture hall filled with students. Many students are sleeping, with their heads resting on their desks or hands. The room has a curved front wall with a large screen and a lecturer standing at a podium. The text is overlaid on the image.

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



1 lecture

2 PI



1. transfer of information



1. transfer of information

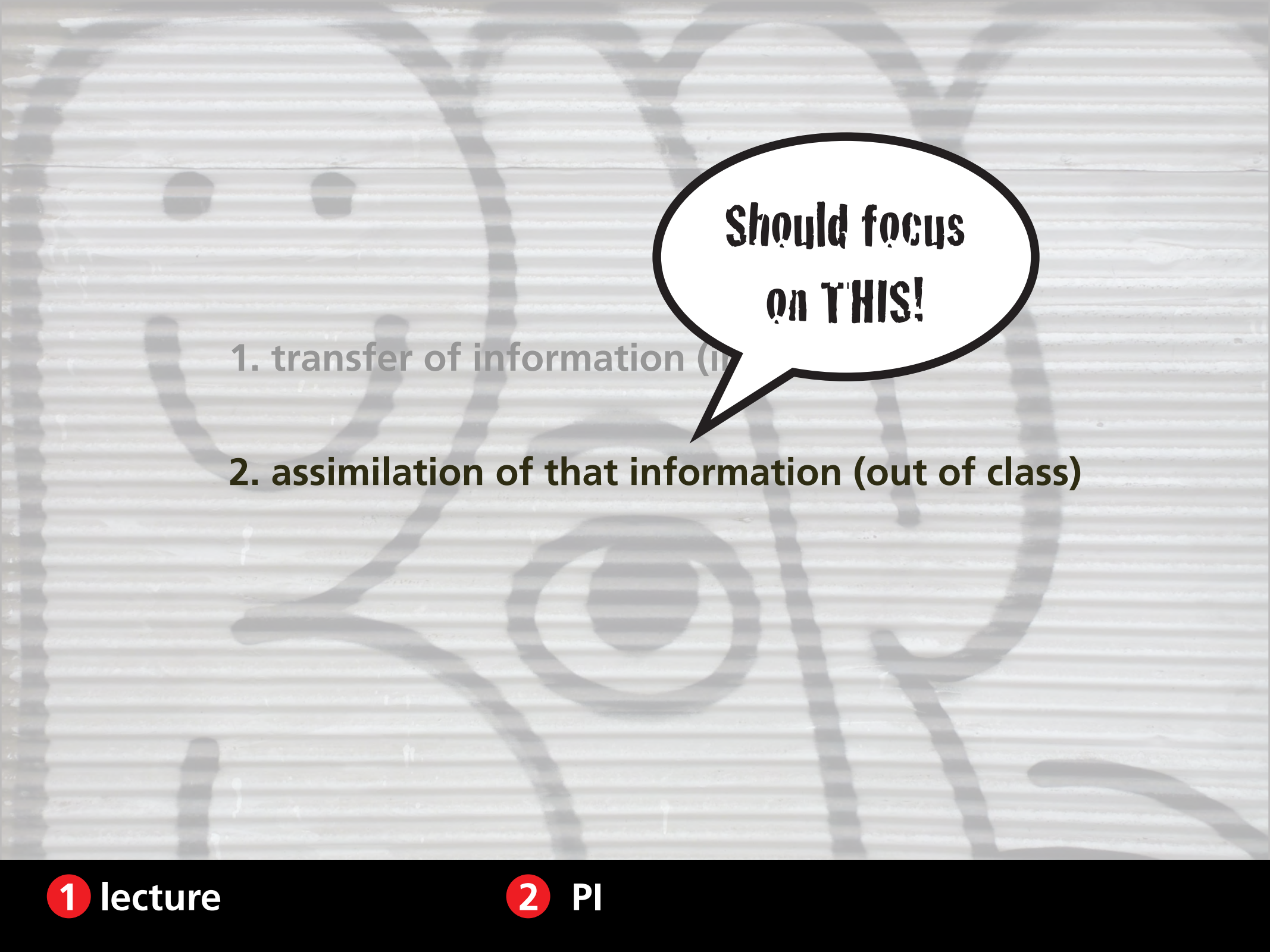
2. assimilation of that information



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)**

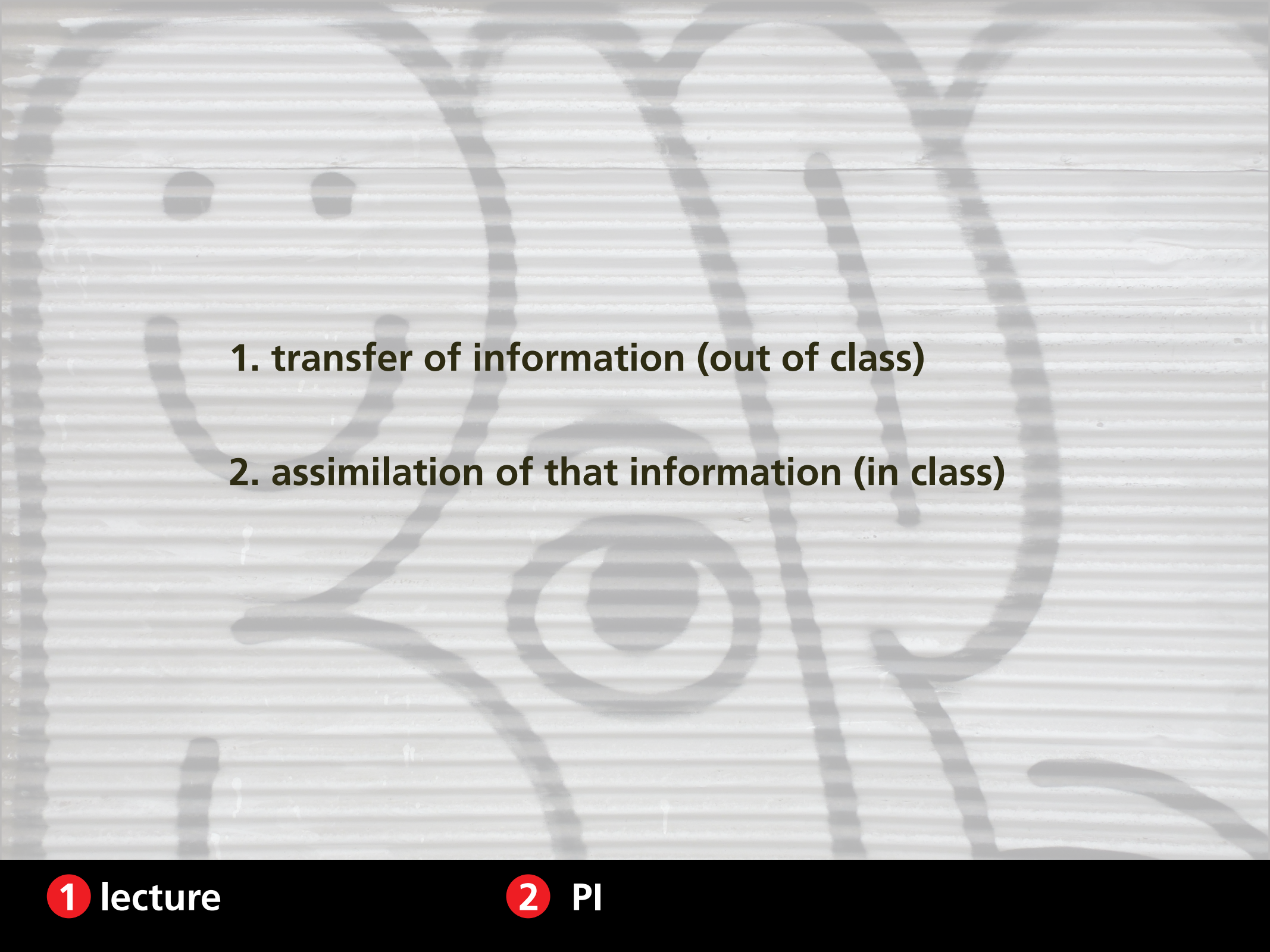


**Should focus
on THIS!**

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 lecture hall with green tiered seating. A man in a grey checkered suit and red tie is leaning over a group of students, interacting with them. The students are seated and some are looking at papers. The background shows other students and the curved wooden walls of the lecture hall.

1. transfer of information (out of class)

2. assimilation of that information (in class)



question



question



think



question



think



poll



question



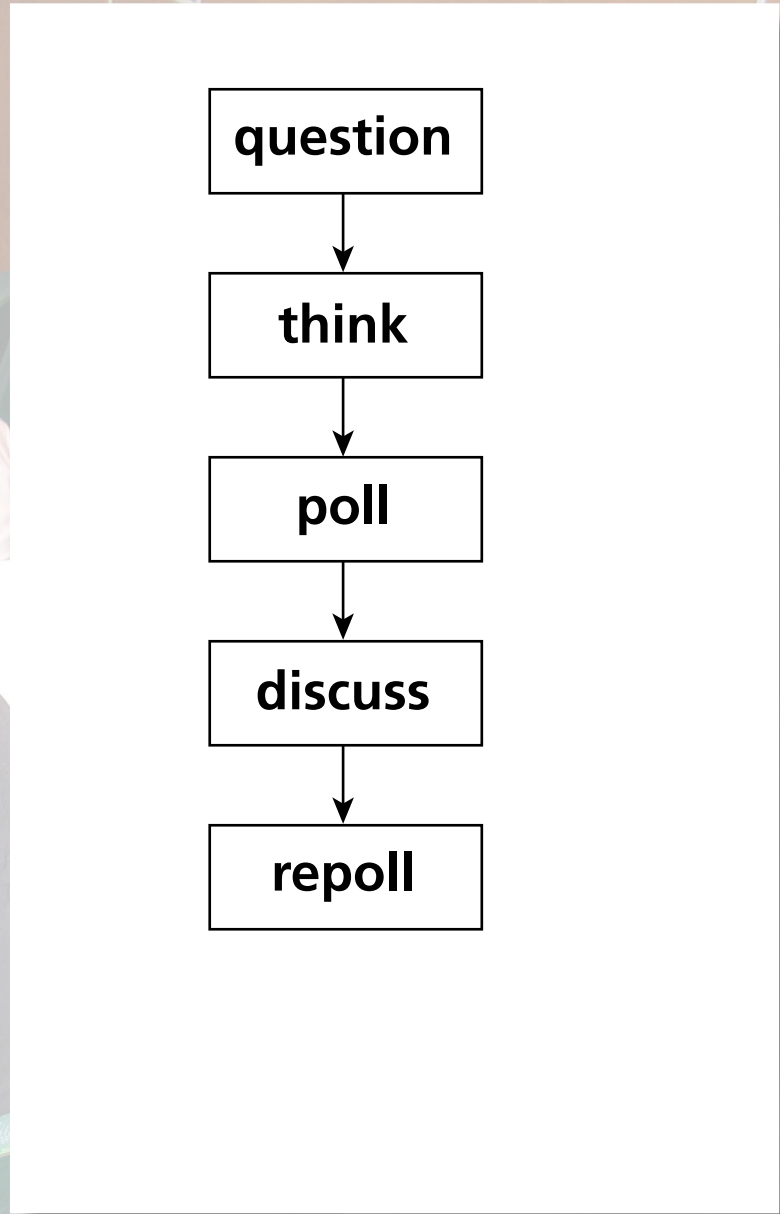
think

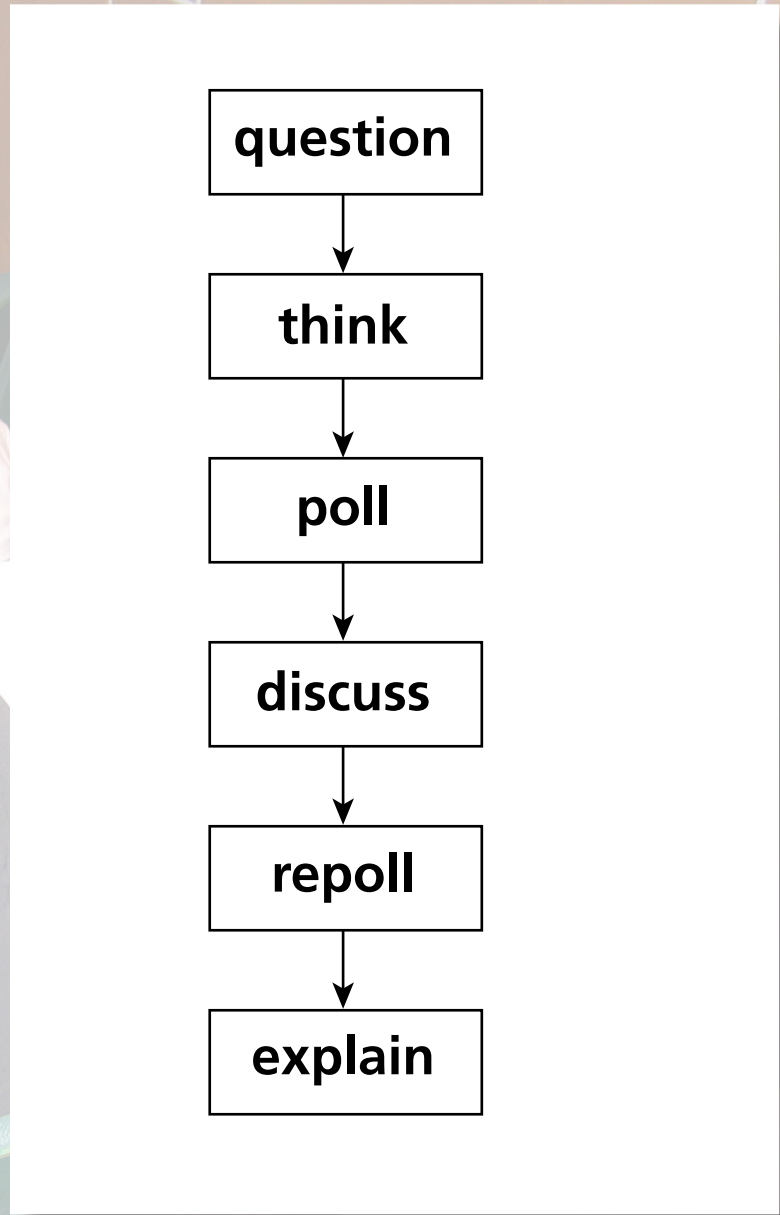


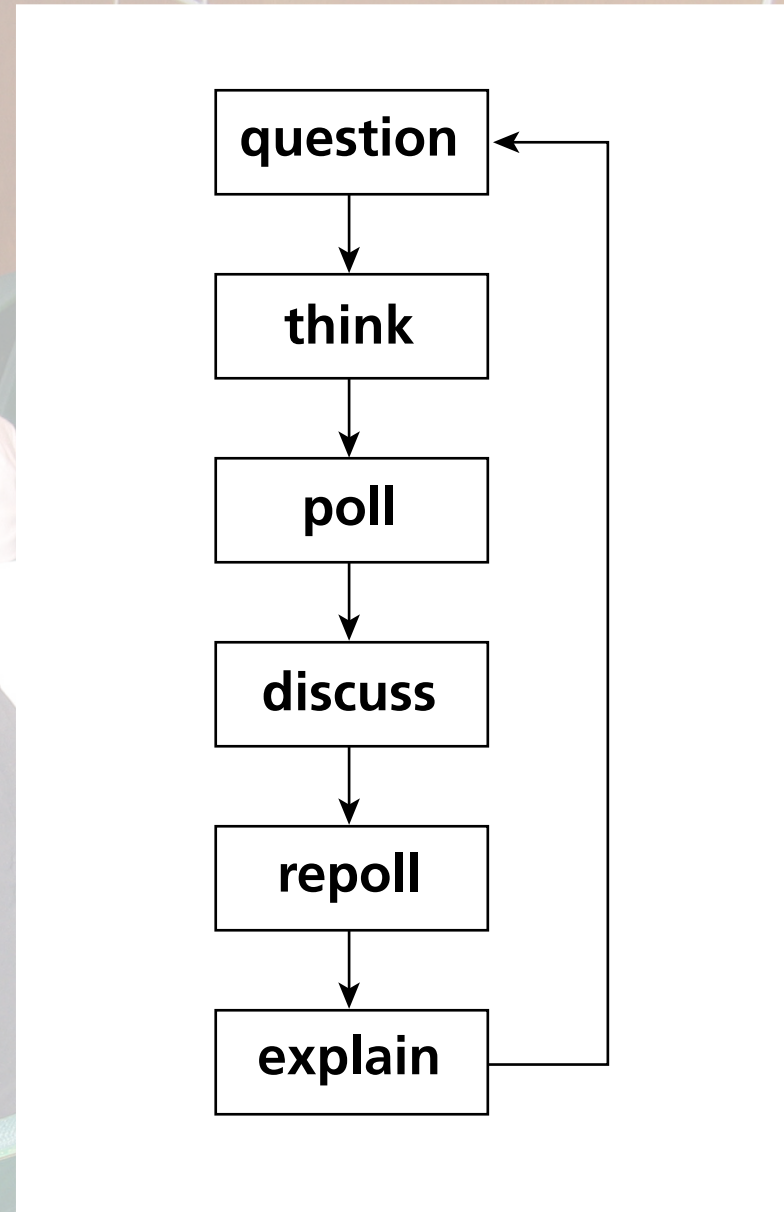
poll

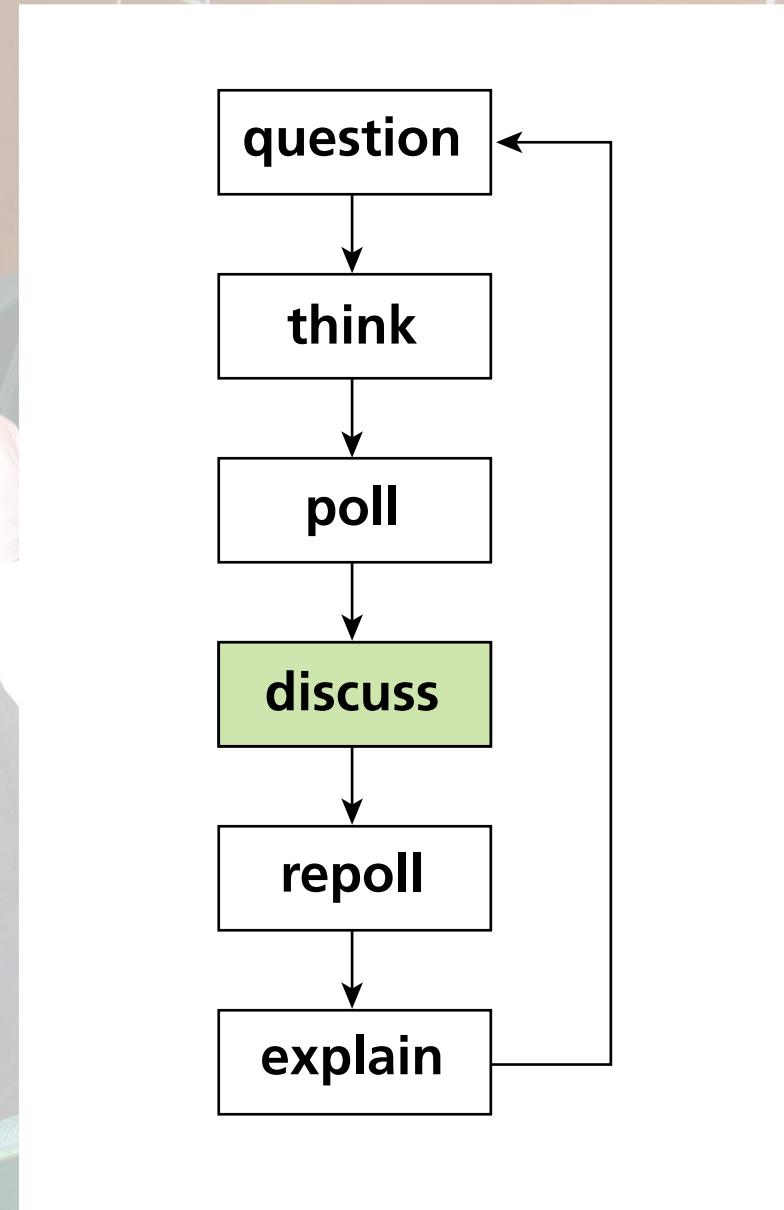


discuss













Peer

INSTRUCTION

1 lecture

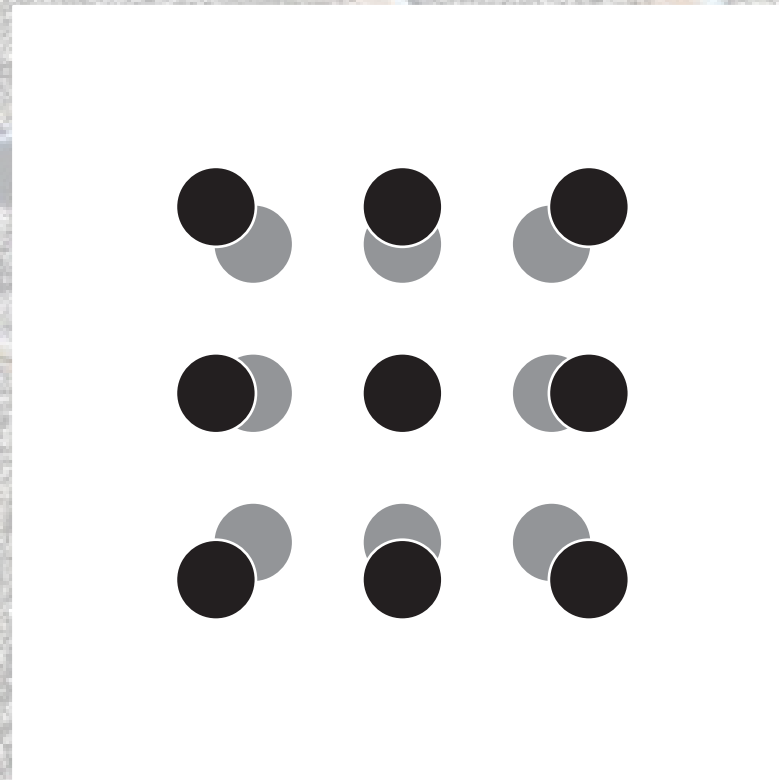
2 PI



An aerial photograph of a railway track. The track is composed of two parallel steel rails on a bed of dark gravel. The track is not straight but follows a wavy, S-shaped path across the landscape. The surrounding area is covered in green grass. The text "thermal expansion" is written in a bold, black, sans-serif font, centered over the middle of the track.

thermal expansion





all of them



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



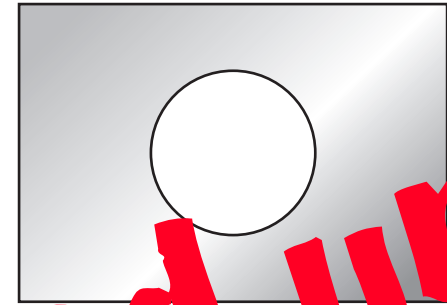
Consider a rectangular metal plate with a circular hole in it.



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, let's analyze what happened.

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.**

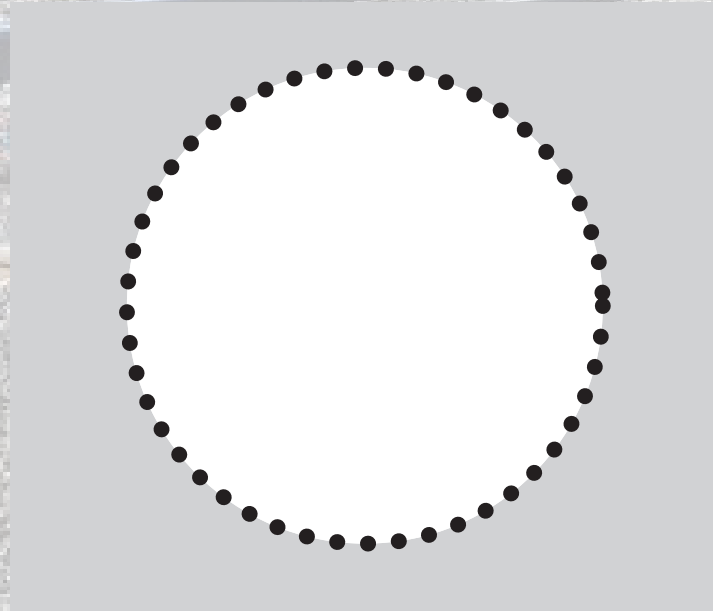
Consider a rectangular metal plate with a circular hole in it.



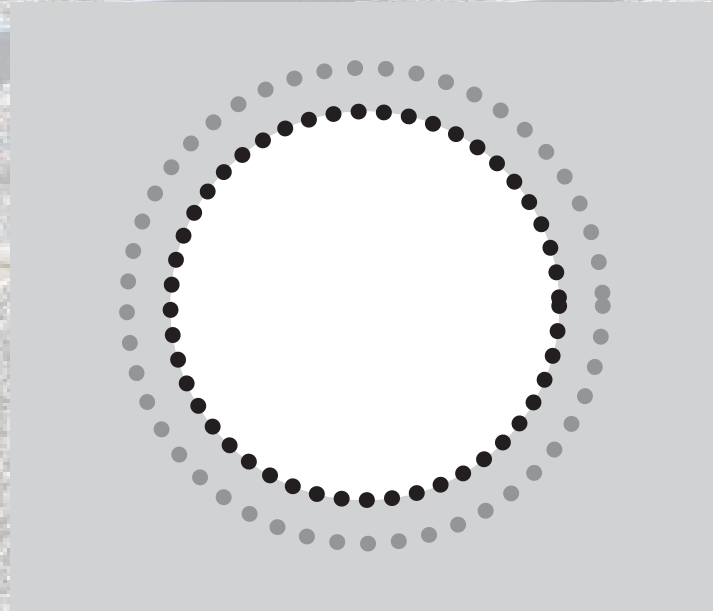
When the plate is uniformly heated, the diameter of the hole

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

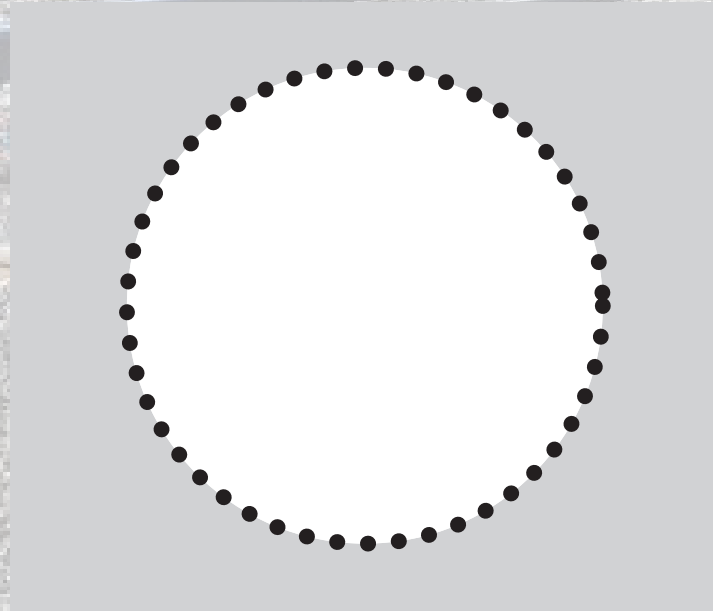
consider atoms at rim of hole



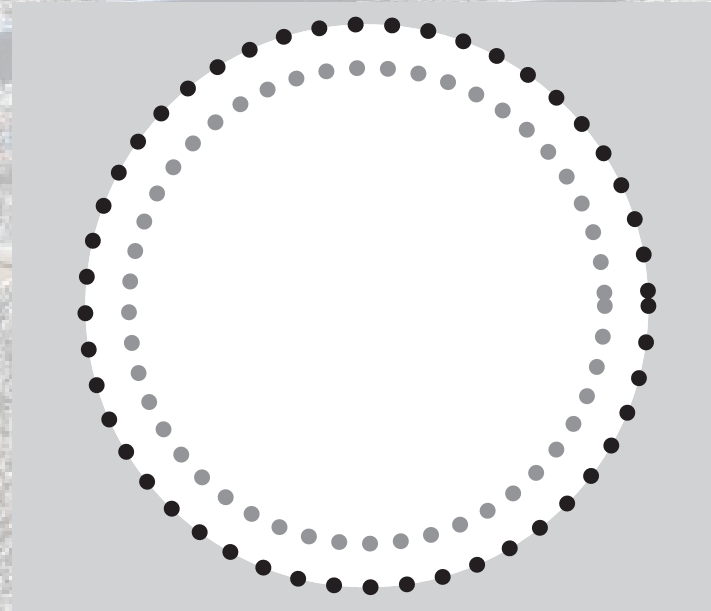
consider atoms at rim of hole



consider atoms at rim of hole



consider atoms at rim of hole



consider atoms at rim of hole

you won't forget this





Peer

back to pi

INSTRUCTION



Peer

Higher learning gains

INSTRUCTION

1 lecture

2 PI

The background features a large, light blue 'P' and 'eer' with a dashed yellow line forming a circle around the 'eer' part. A yellow arrow points from the 'P' towards the 'eer'. Below this, the words 'Higher learning gains' and 'Better retention' are written in a bold, red, sans-serif font, slanted upwards from left to right. A dotted blue line with a yellow arrow at the end points from the bottom left towards the word 'INSTRUCTION'.

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



1998





1 lecture

2 PI

3 PI 2.0



How do I...

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

learning | catalytics

1 lecture

2 PI

3 PI 2.0

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 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

Sample question types:

- direction
- mathematical expression
- long answer, short answer, word cloud
- numerical, data collection
- ranking, priority
- region (select point on image)
- sketch, composite sketch
- highlight passage

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4. direction
prevailing

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

 [Deliver](#)

 [Show all results](#)



1 lecture

3 PI 2.0

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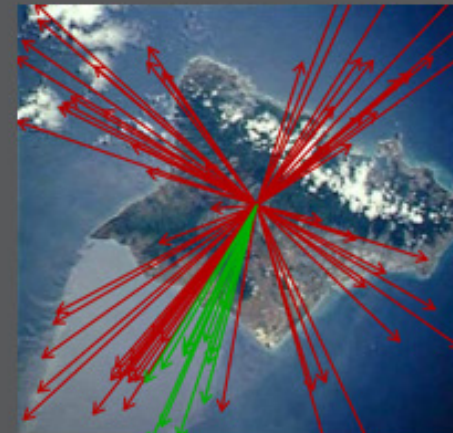
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4. direction
prevailing

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

[Deliver](#)[Show all results](#)**Round 1**

77 responses, 16% correct



✓ 17 get it now

✗ 3 still don't get it

1 lecture

3 PI 2.0

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optics i

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Jump to ▼

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

**4.** direction Light enters horizontally into the combination of two perpendicular mirrors as shown below.[Deliver](#) [Show all results](#)

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



feedback & support

1 lecture**2** PI**3** PI 2.0

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optics i

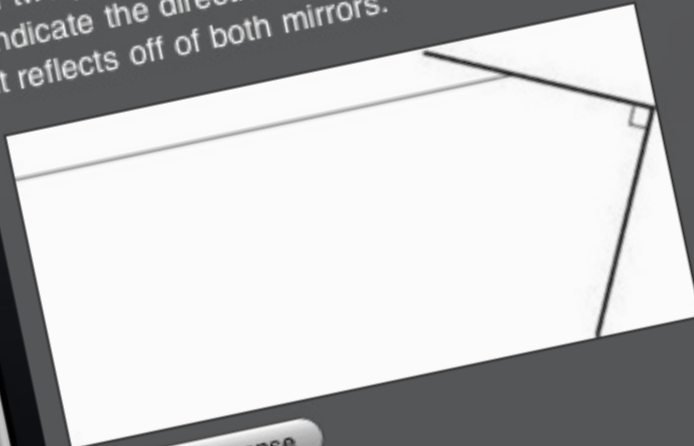
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6 7 8 9 10 11 12 13 14 15

perpendicular mirrors as shown below.

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Light enters horizontally into the combination of two perpendicular mirrors as shown below. Indicate the direction of the incident light after it reflects off of both mirrors.



Submit response

[Switch to text response](#)[feedback & support](#)

1 lecture

3 PI 2.0

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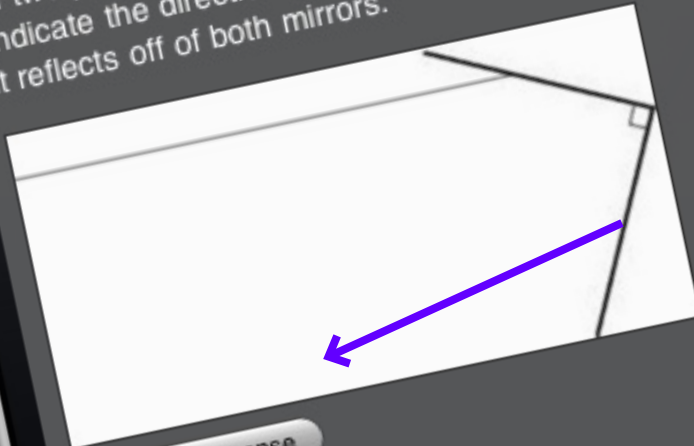
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6 7 8 9 10 11 12 13 14 15

pendicular mirrors as shown below.

[Deliver](#) [Show all results](#)

Light enters horizontally into the combination of two perpendicular mirrors as shown below. Indicate the direction of the incident light after it reflects off of both mirrors.

[Submit response](#)[Switch to text response](#)[feedback & support](#)**1** lecture**3** PI 2.0

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6 7 8 9 10 11 12 13 14 15

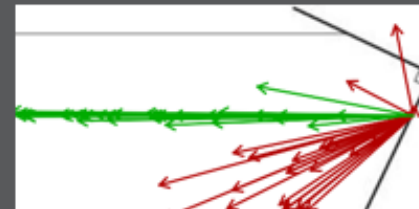


perpendicular mirrors as shown below.

[Deliver](#) [Show all results](#)

Round 1

57 responses, 58% correct



feedback & support

1 lecture

3 PI 2.0

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optics i

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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Round 1

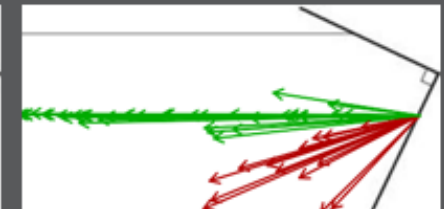
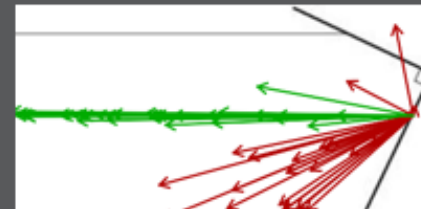


57 responses, 58% correct

Round 2



51 responses, 73% correct



✓ 8 get it now

✗ 0 still don't get it



feedback & support

1 lecture

3 PI 2.0

Sample question types:

- direction
- mathematical expression
- long answer, short answer, word cloud
- numerical, data collection
- ranking, priority
- region (select point on image)
- sketch, composite sketch
- highlight passage

If $2x - y = 4$, then $x =$

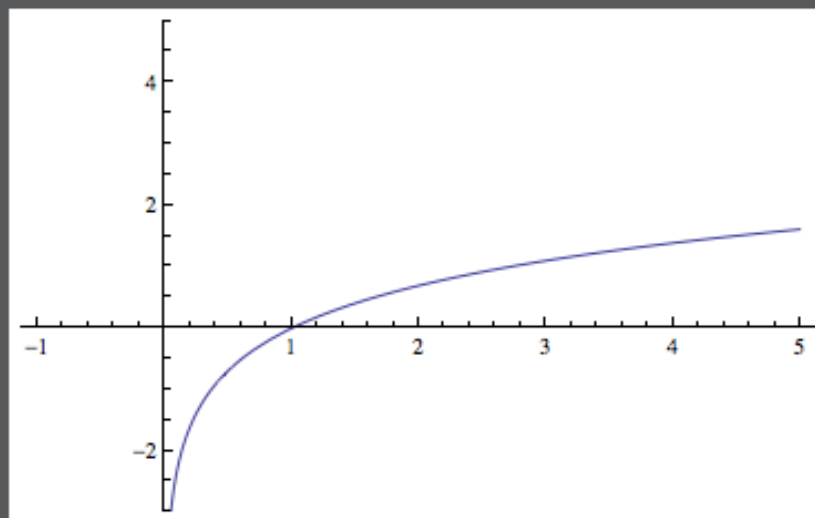
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This is a graph of $f(x) = \ln x$. Sketch a graph of the derivative $f'(x)$.

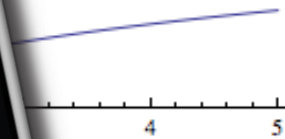
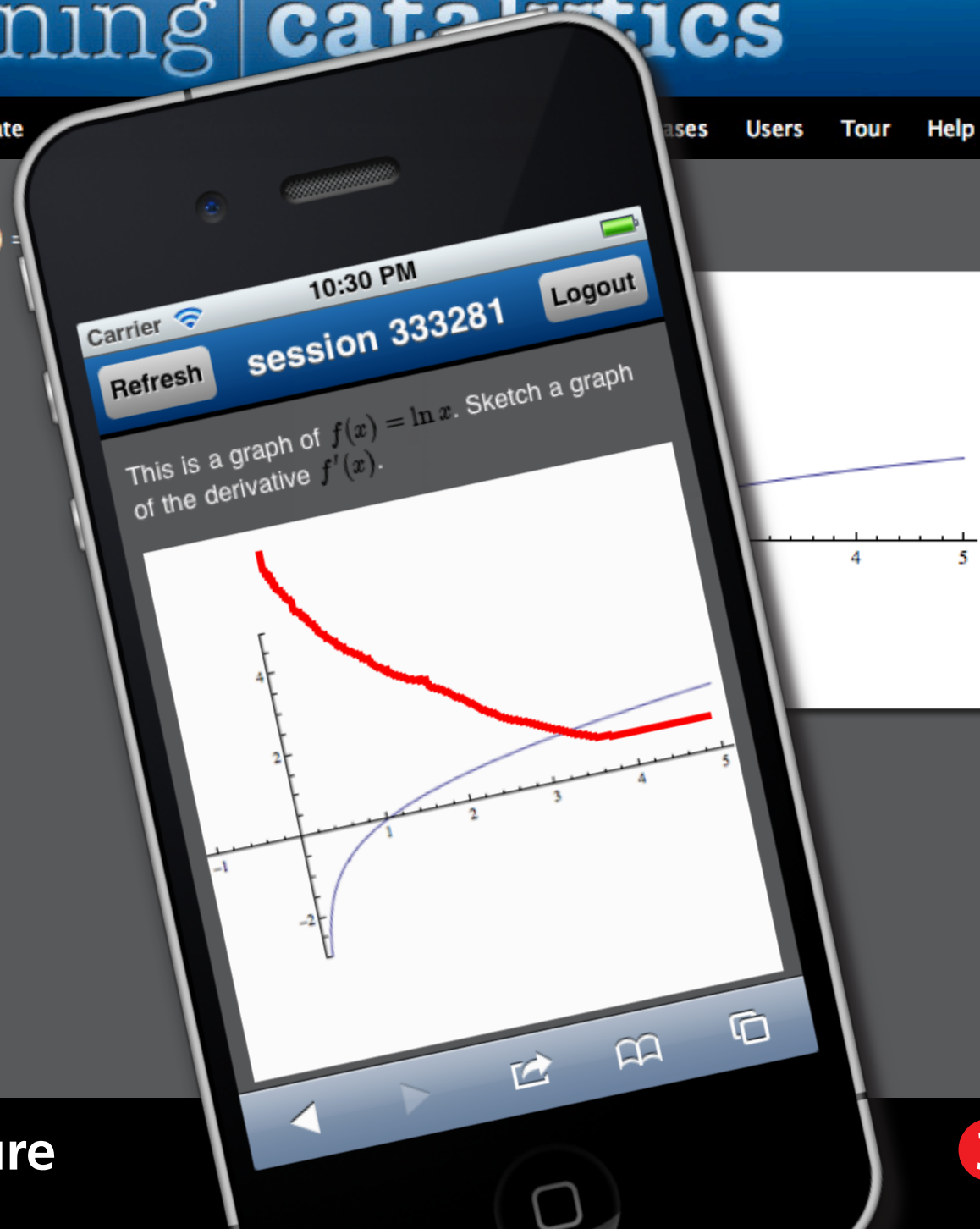


1 lecture

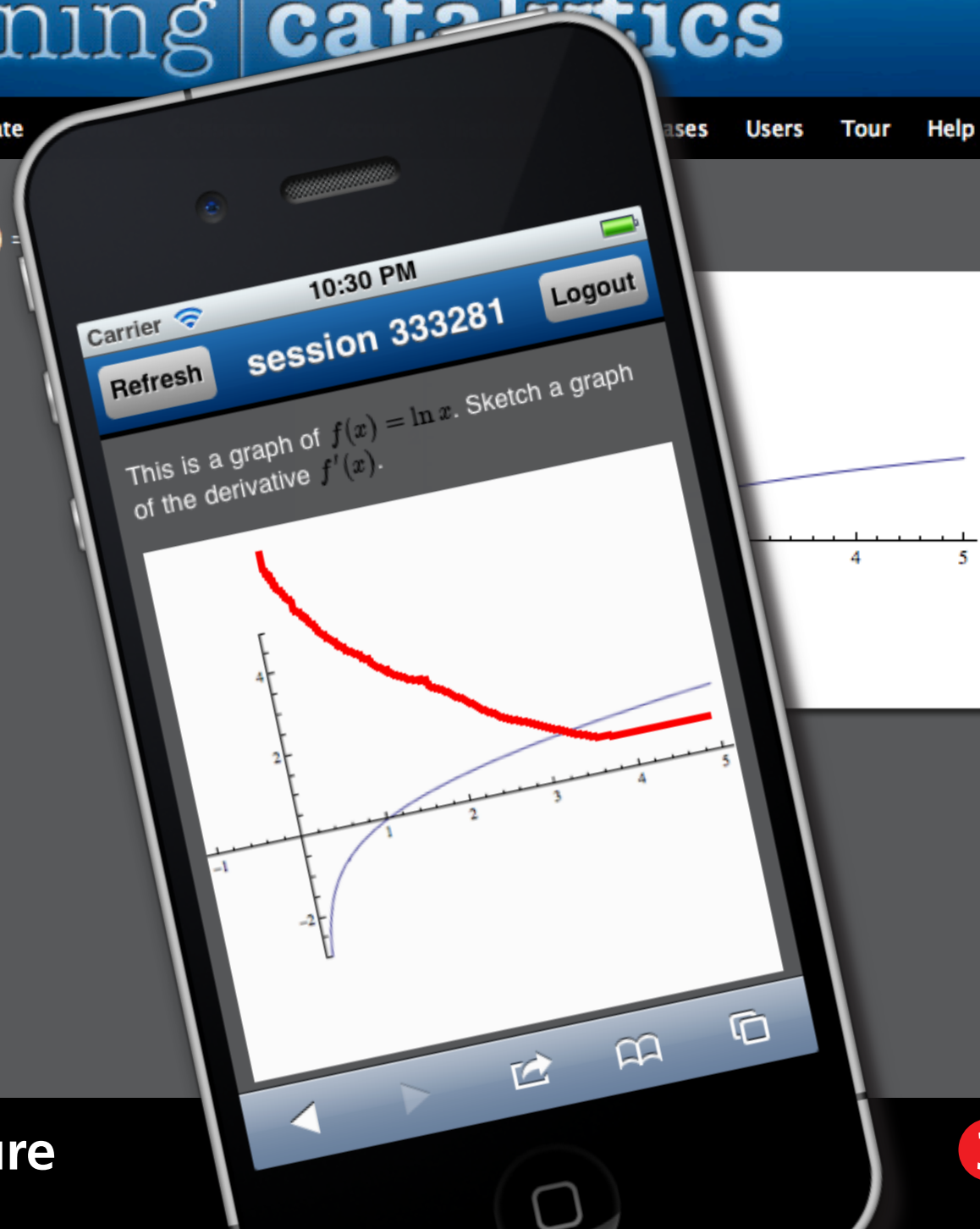
2 PI

3 PI 2.0

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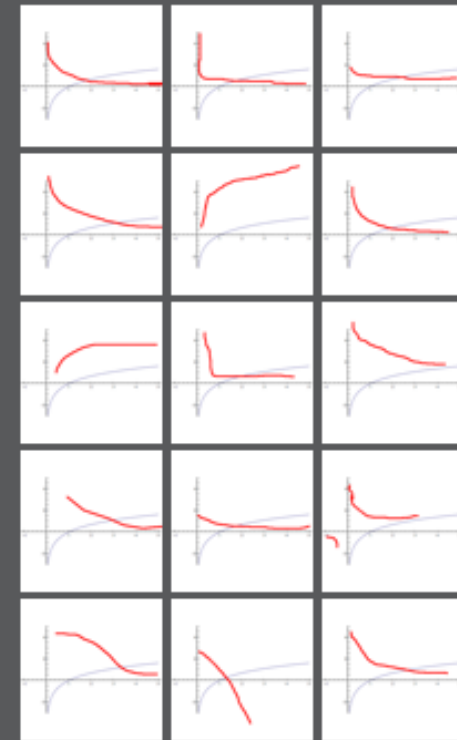
[Courses](#) [Participate](#)[ases](#) [Users](#) [Tour](#) [Help](#)This is a graph of $f(x) =$ **1** lecture**3** PI 2.0

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[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 lecture

3 PI 2.0

Sample question types:

- direction
- mathematical expression
- long answer, short answer, word cloud
- numerical data collection
- ranking priority
- region (select point on image)
- sketch, composite sketch
- highlight passage



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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review results for session 399757 in electrostatic work and energy ii

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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



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

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 at constant speed. 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: _____

Carrier 9:31 PM 100%

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1 lecture

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learning catalytics

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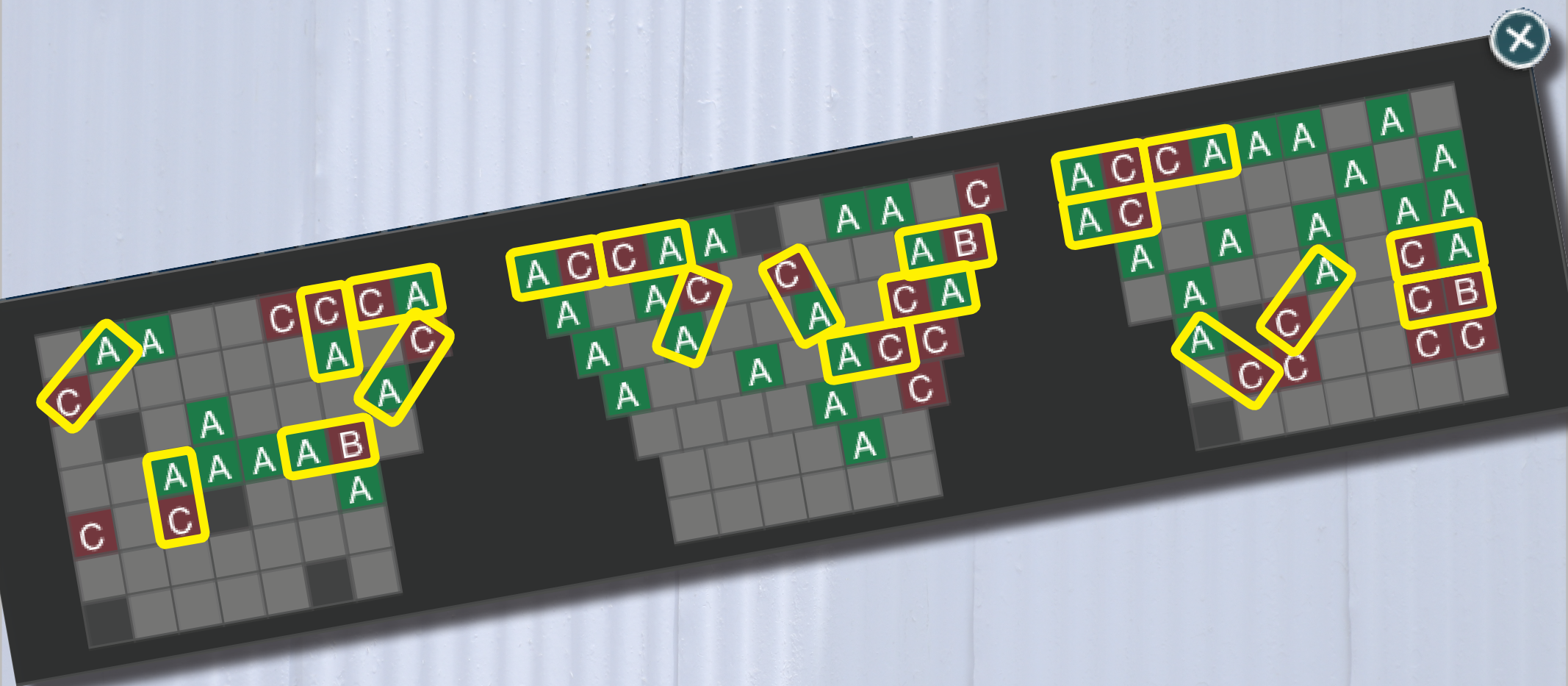
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B. 4%
C. 35%
D. 0%
E. 0%

Round 2
75 responses, 83% correct

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

Search: _____

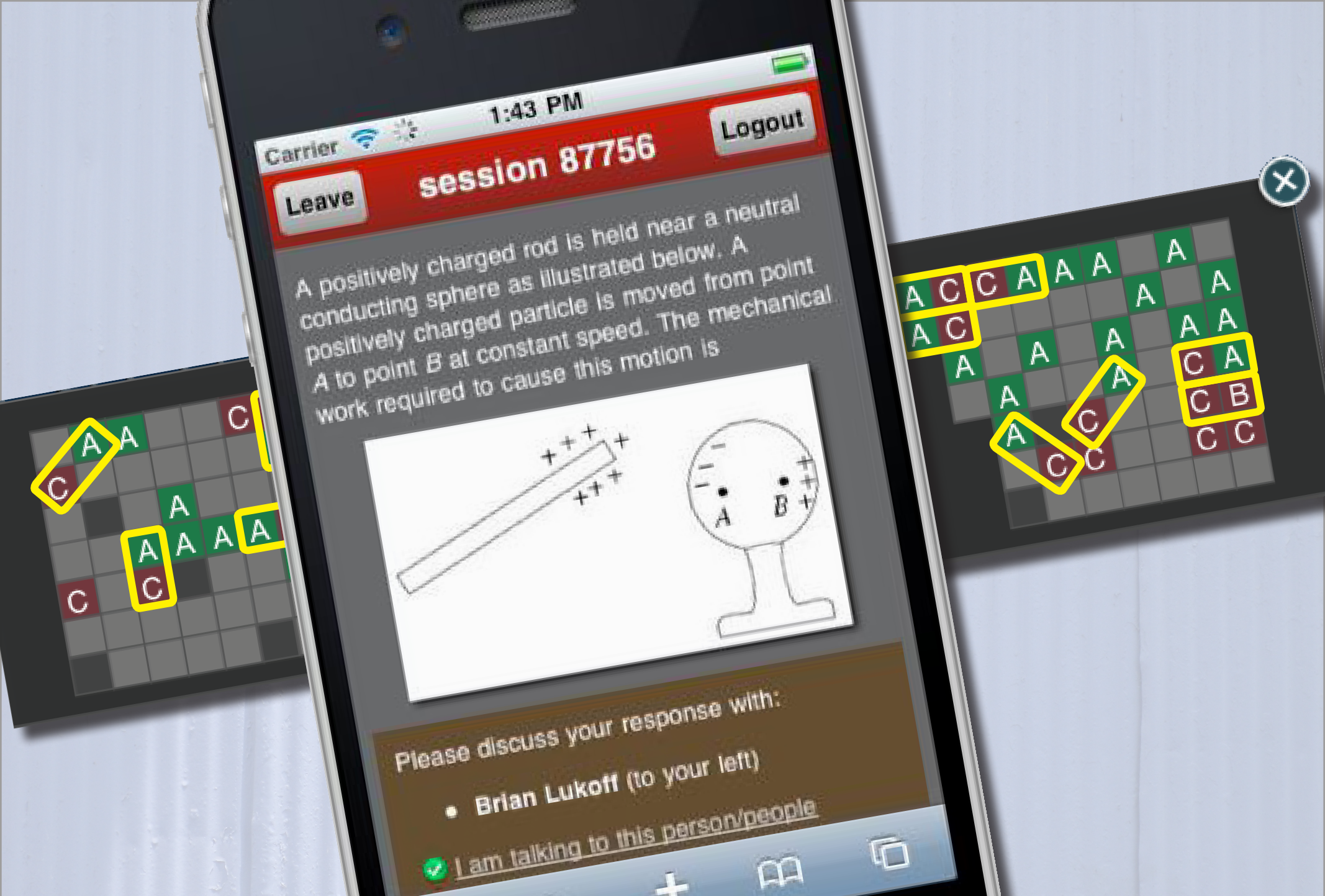
let system manage pairing



1 lecture

2 PI

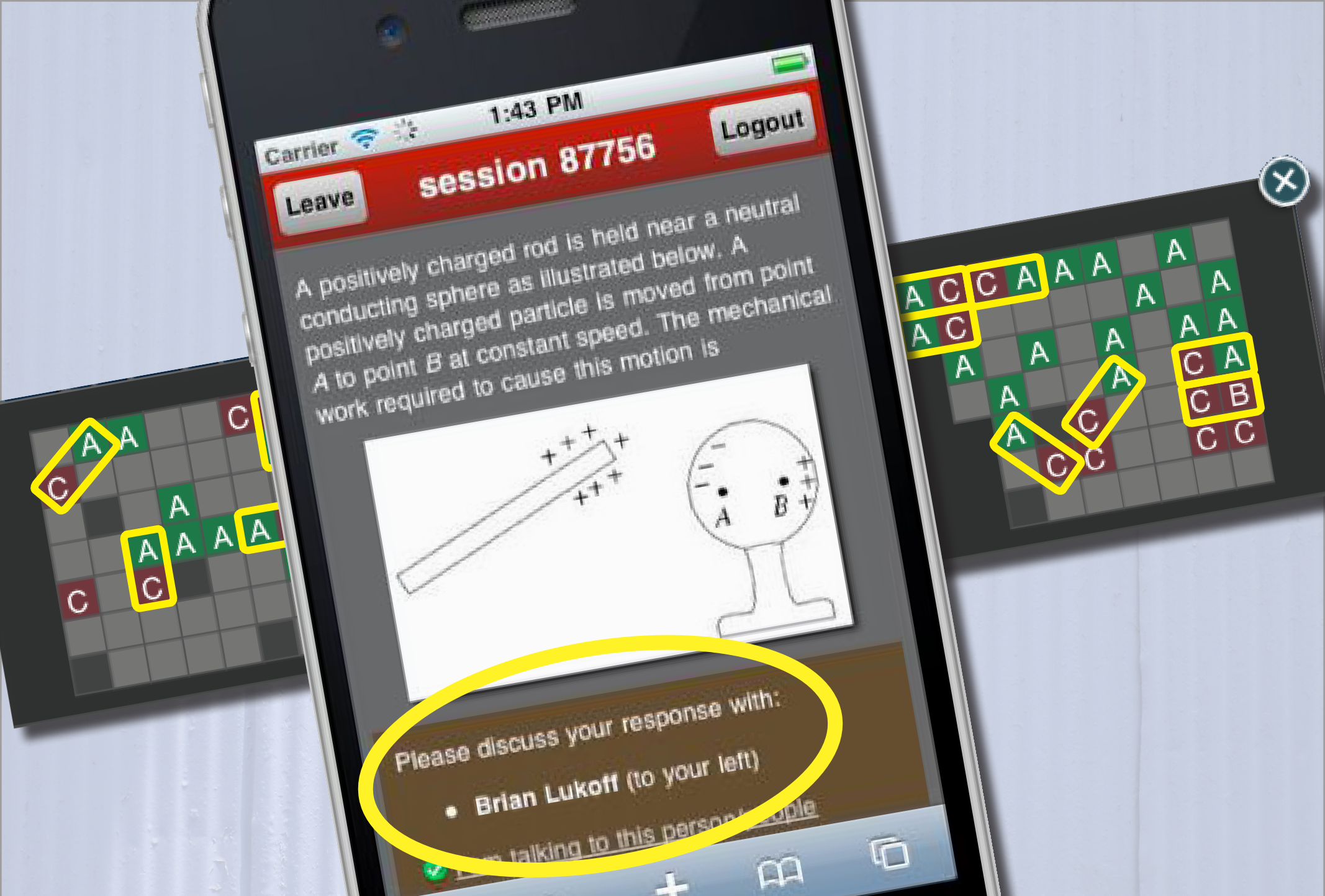
3 PI 2.0



1 lecture

2 PI

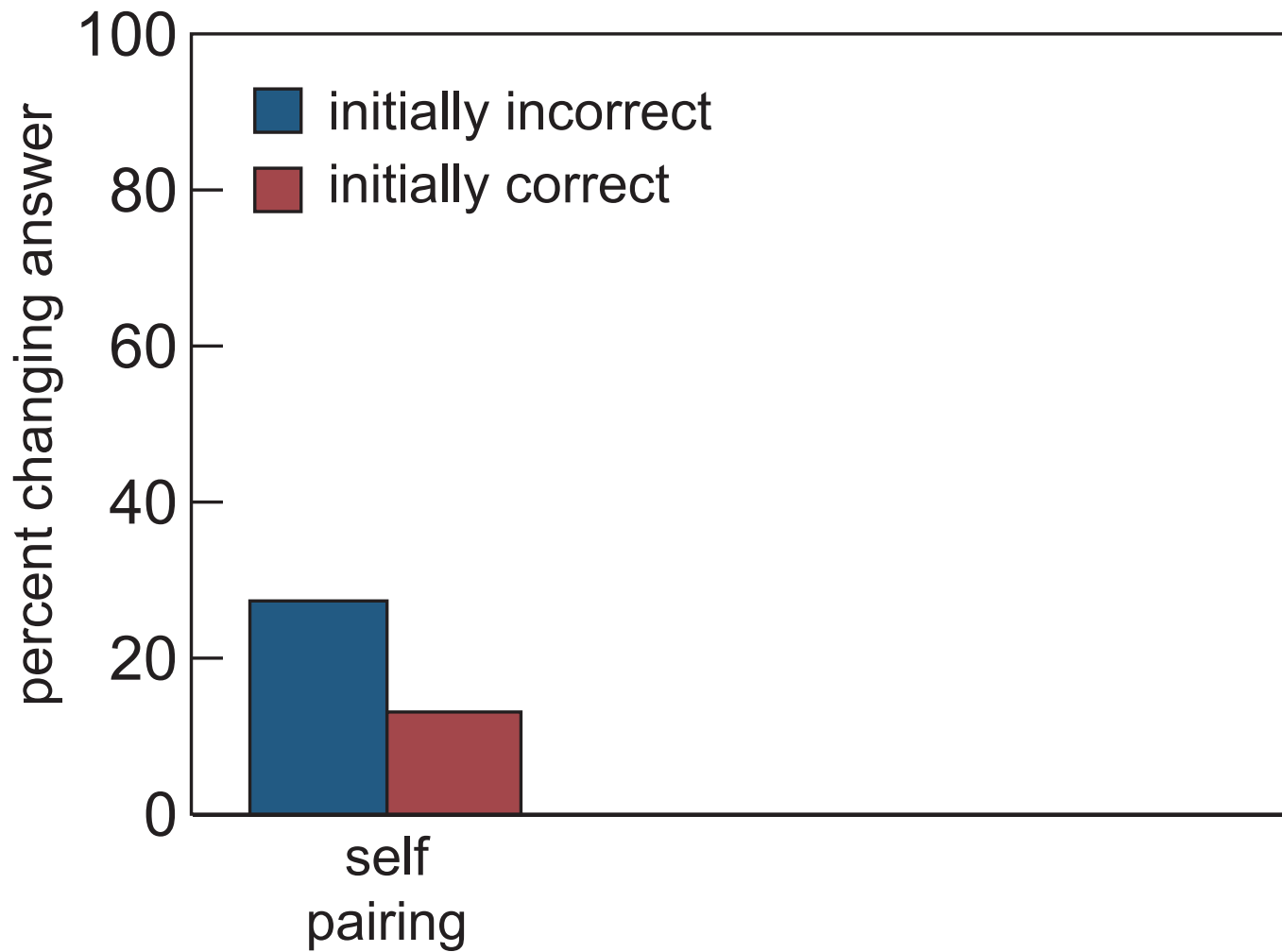
3 PI 2.0

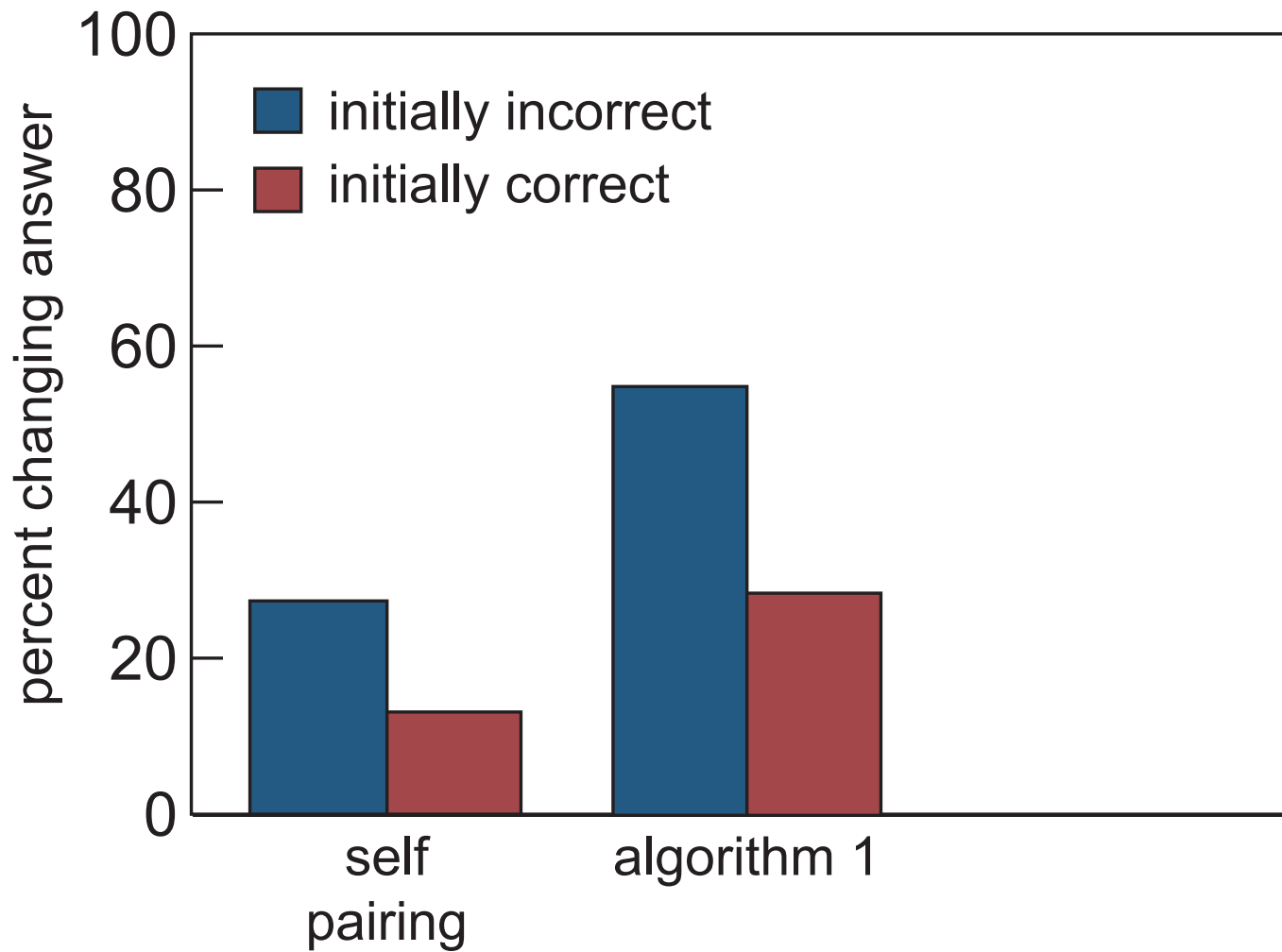


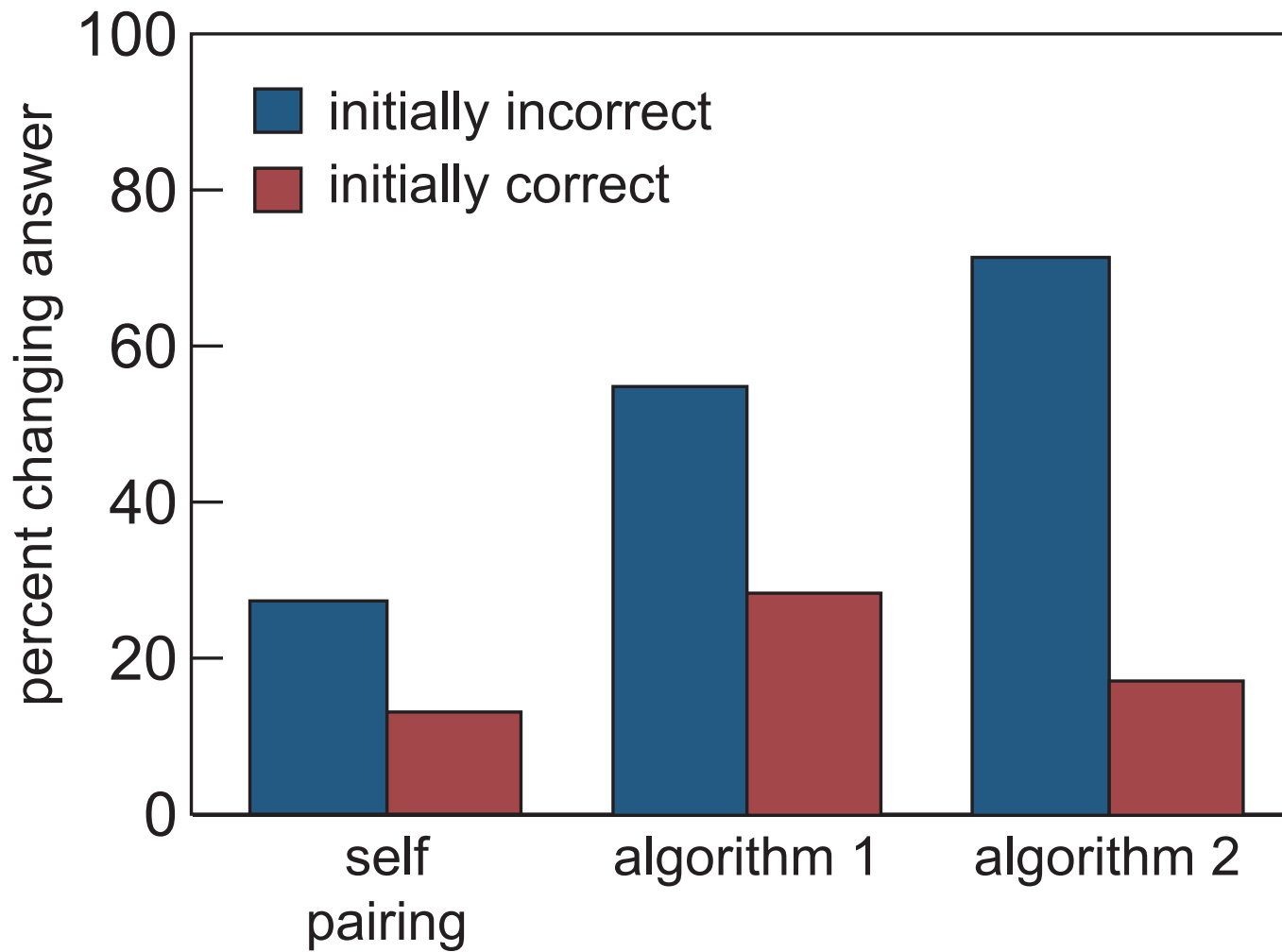
1 lecture

2 PI

3 PI 2.0









1 lecture

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!



Learning Catalytics:

- **implement proven, researched pedagogy**



Learning Catalytics:

- implement proven, researched pedagogy
- use consumer devices



Learning Catalytics:

- implement proven, researched pedagogy
- use consumer devices
- avoid pitfalls of MC assessment

Learning Catalytics:

- implement proven, researched pedagogy
- use consumer devices
- avoid pitfalls of MC assessment
- create a smart classroom *anywhere*



not technology, but pedagogy matters

1 education

2 PI

3 PI 2.0

Funding:

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