

**1. Go to <http://LCatalytics.com>**

**2a. If you have instructor account: Log in, click "Student view"**

**2b. Otherwise: Create *student* account with signup code DEMO**

**3. Join session 1234567**

# Confessions of a converted lecturer



Franklin McKinley School District  
San Jose, CA, 13 August 2013



# Confessions of a converted lecturer



@eric\_mazur

EDUCATION

Franklin McKinley School District  
San Jose, CA, 13 August 2013



Think of something you are good at

EDUCACION

1 [lcatalytics.com](https://lcatalytics.com) 2 create student account 3 ID 1234567

Now think how you became good at it



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- 2 create student account
- 3 ID 1234567





**1** lecture



1 lecture

2 PI





1 lecture

2 PI

3 PI 2.0




**EXCITING  
stuff!**

**1** lecture

**2** PI

**3** PI 2.0



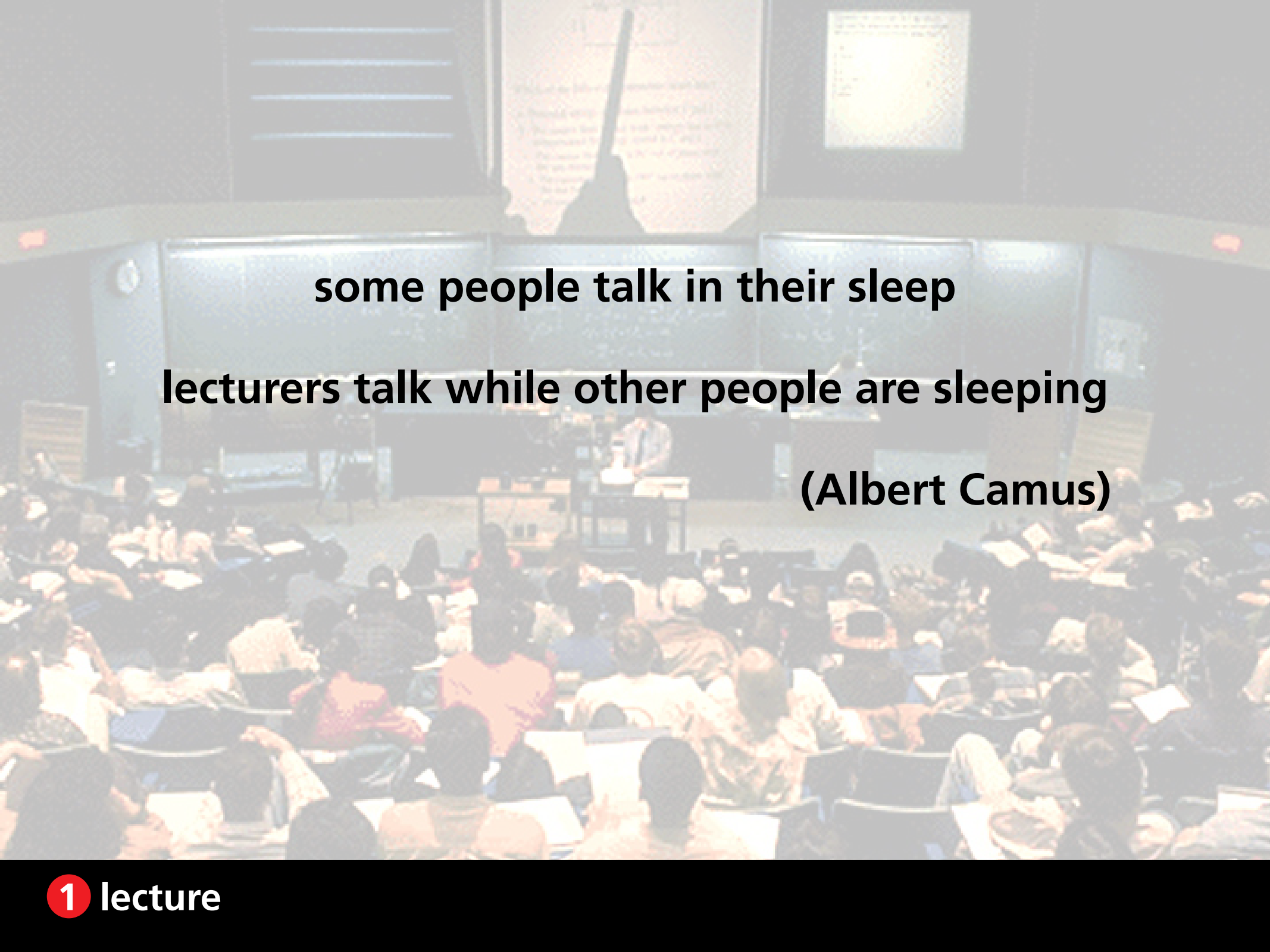
**What happens  
in a lecture?**



**1** lecture

A large lecture hall with a professor at a podium and students in the audience. The professor is standing at a podium on a 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 table. The overall scene is a typical university lecture hall.

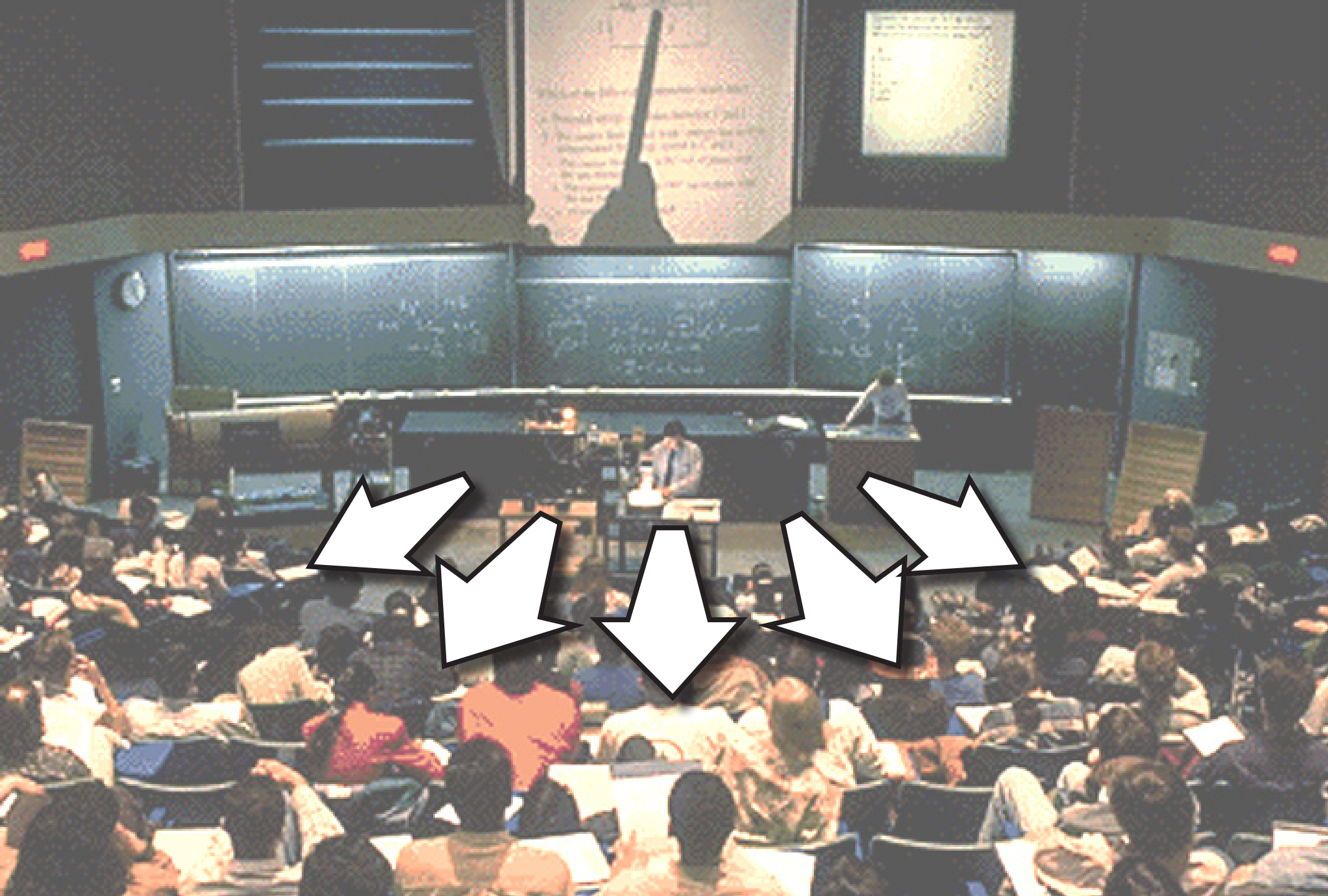
**some people talk in their sleep**

A large lecture hall with a lecturer at a podium and a large audience. The room is filled with people sitting at desks, facing the front. A lecturer is standing at a podium in the center, addressing the audience. The room has a curved wall and a large screen at the front. The text is overlaid on the image.

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



**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)

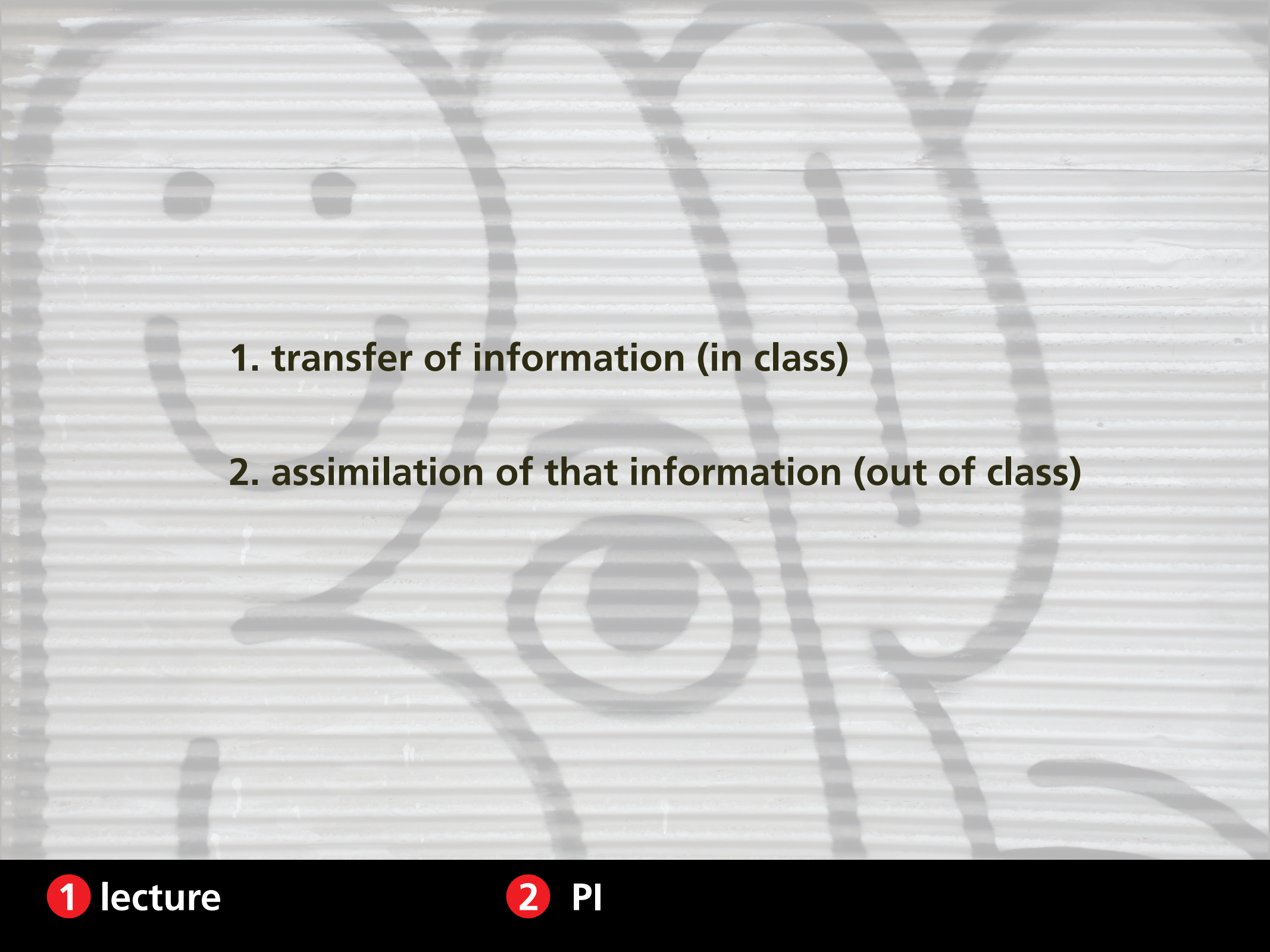


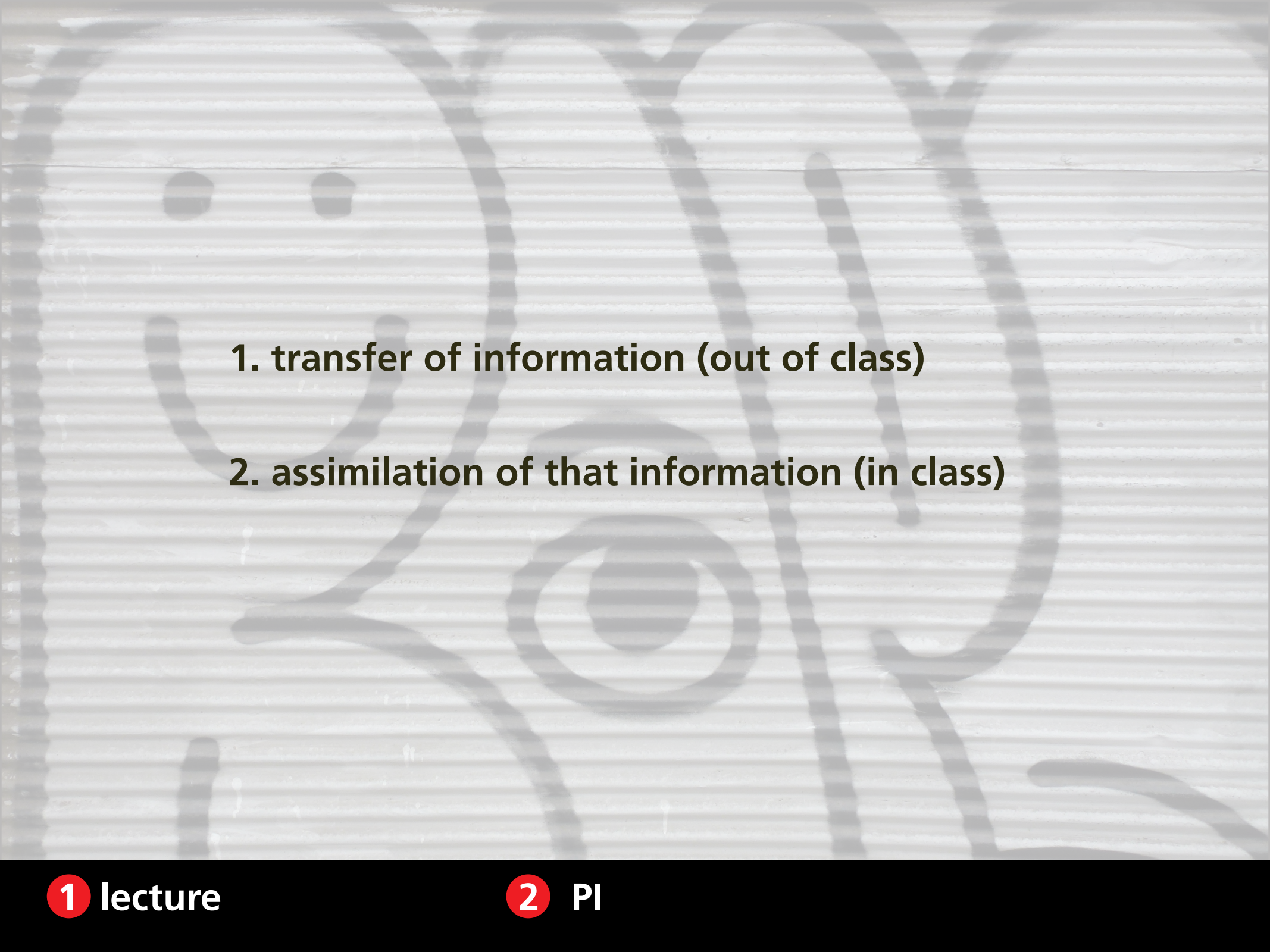


**Should focus  
on THIS!**

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)

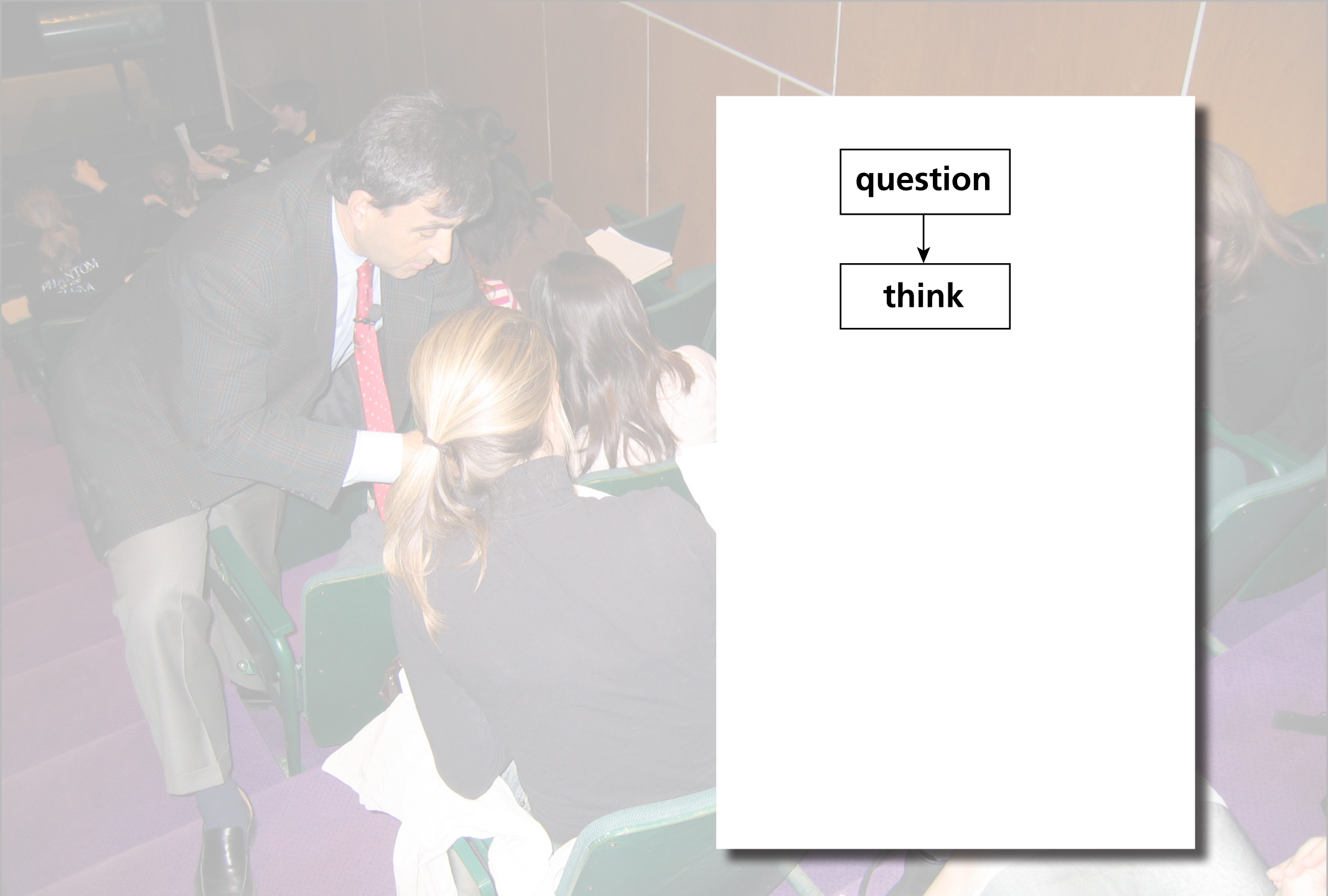
2. assimilation of that information (in class)

A photograph of a man in a dark plaid suit and red tie leaning over a woman with blonde hair in a lecture hall. The woman is seated in a green chair, and the man is looking at something in her hands. Other people are visible in the background, some seated and some standing. The floor is purple carpeted.

question

1 lecture

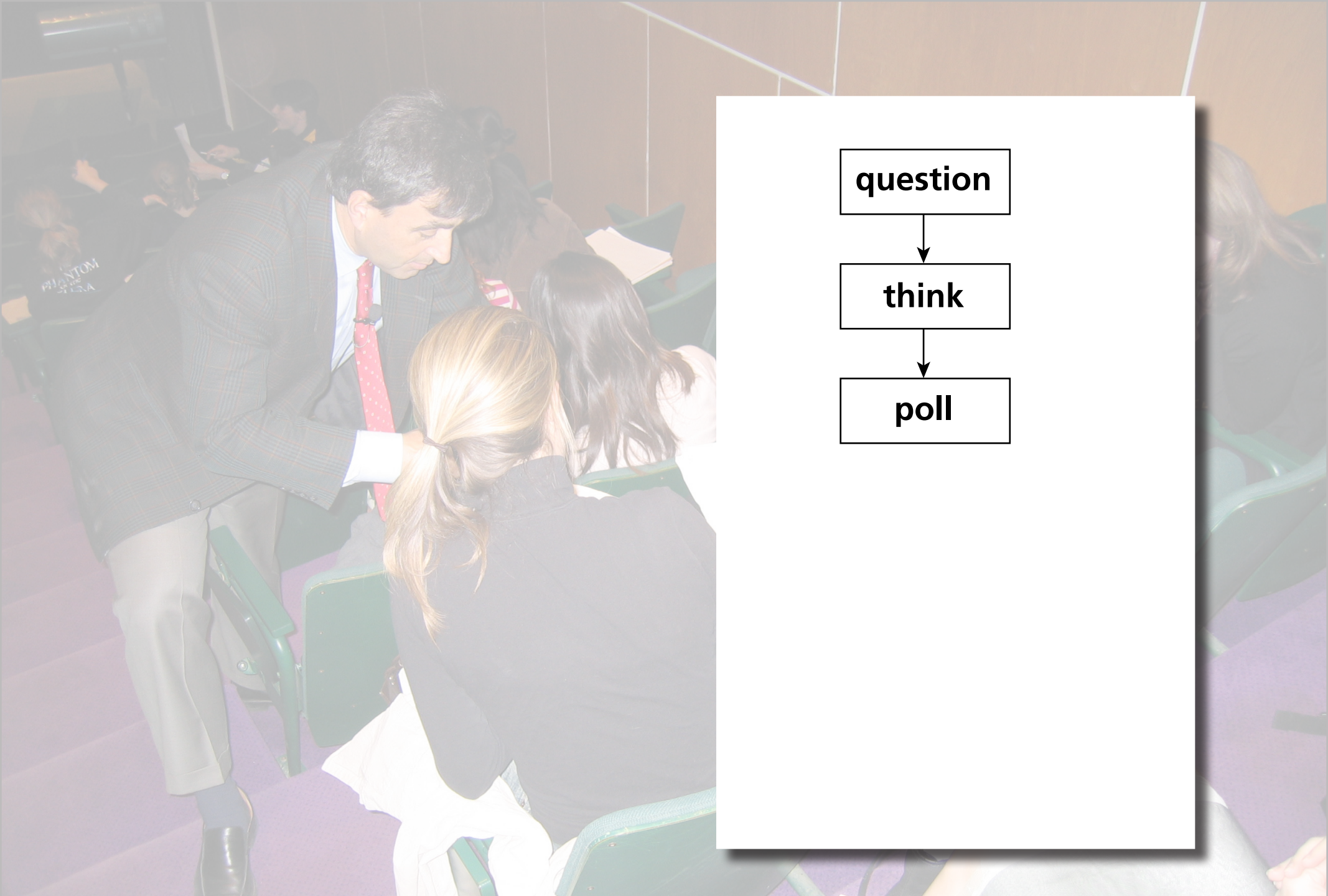
2 PI



question



think



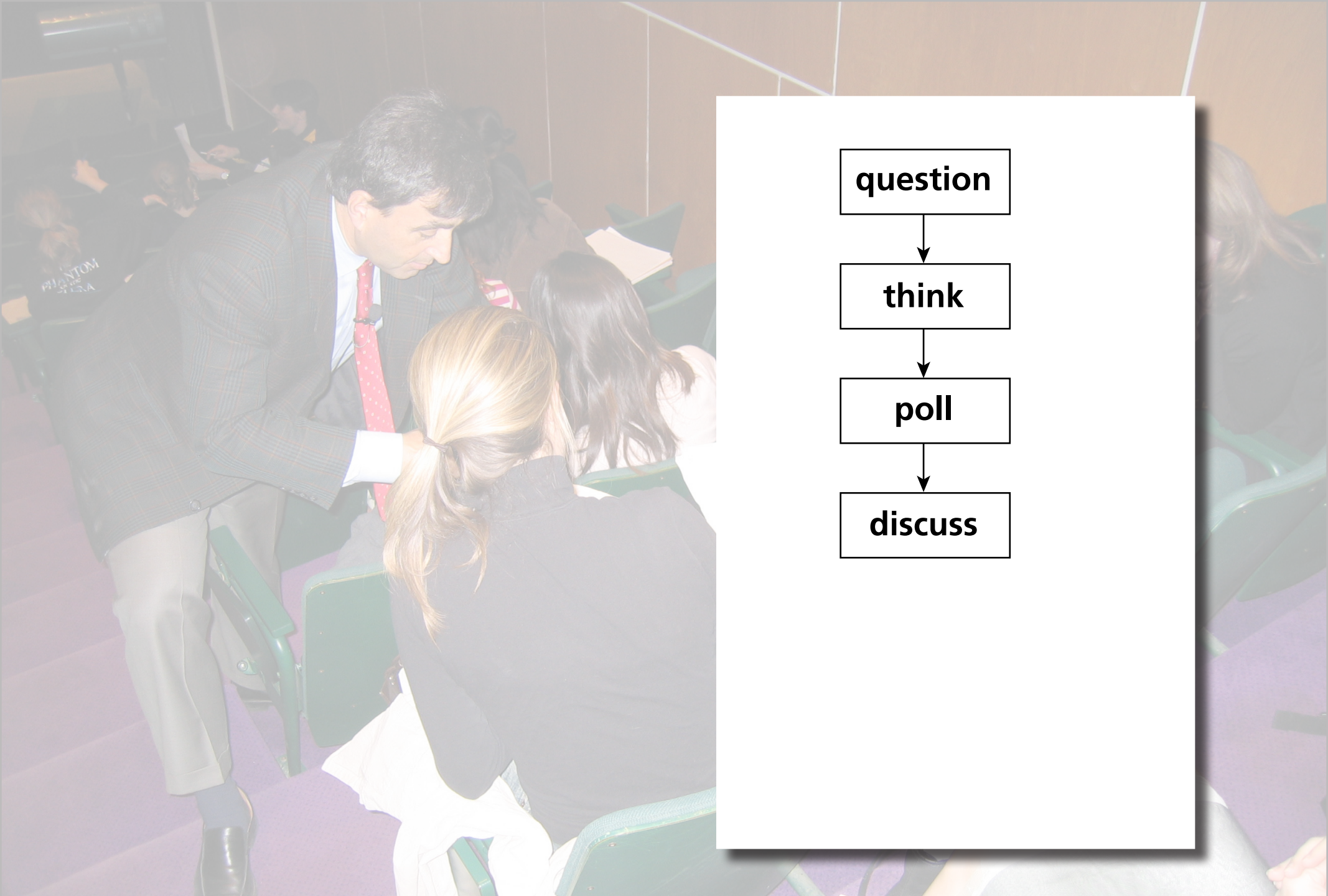
question



think



poll



**question**



**think**

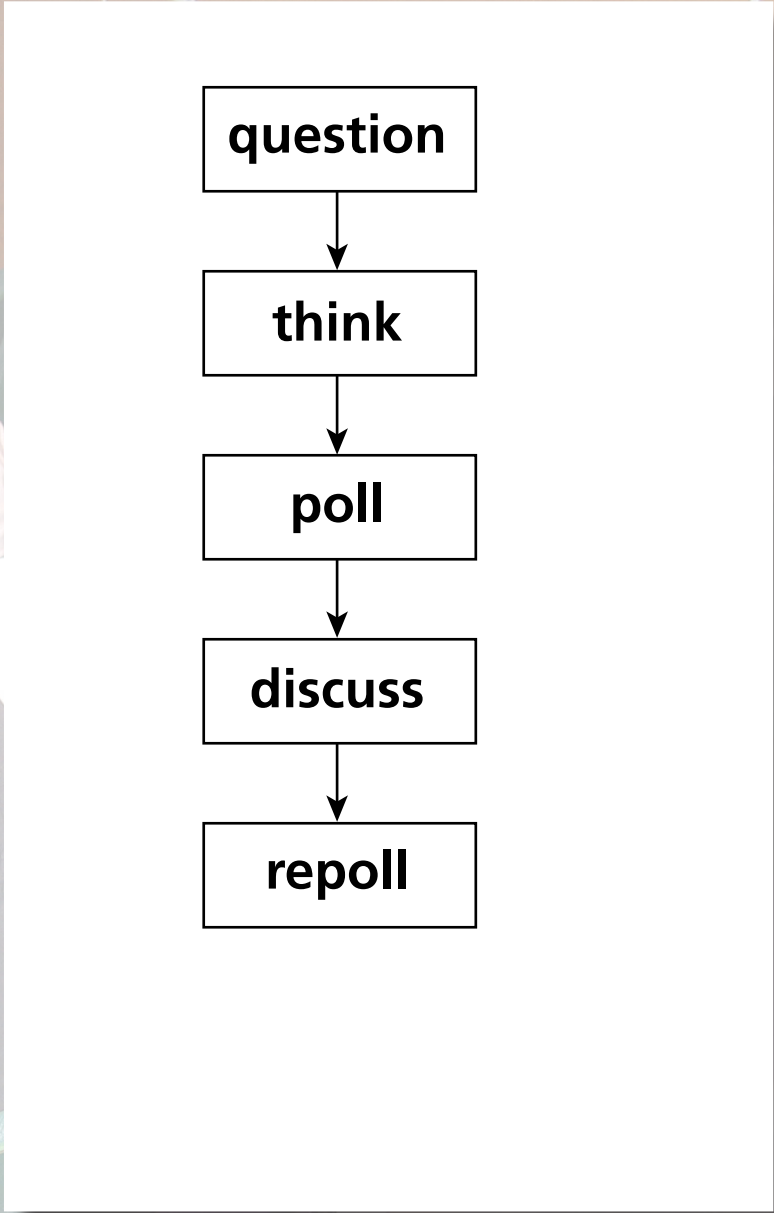
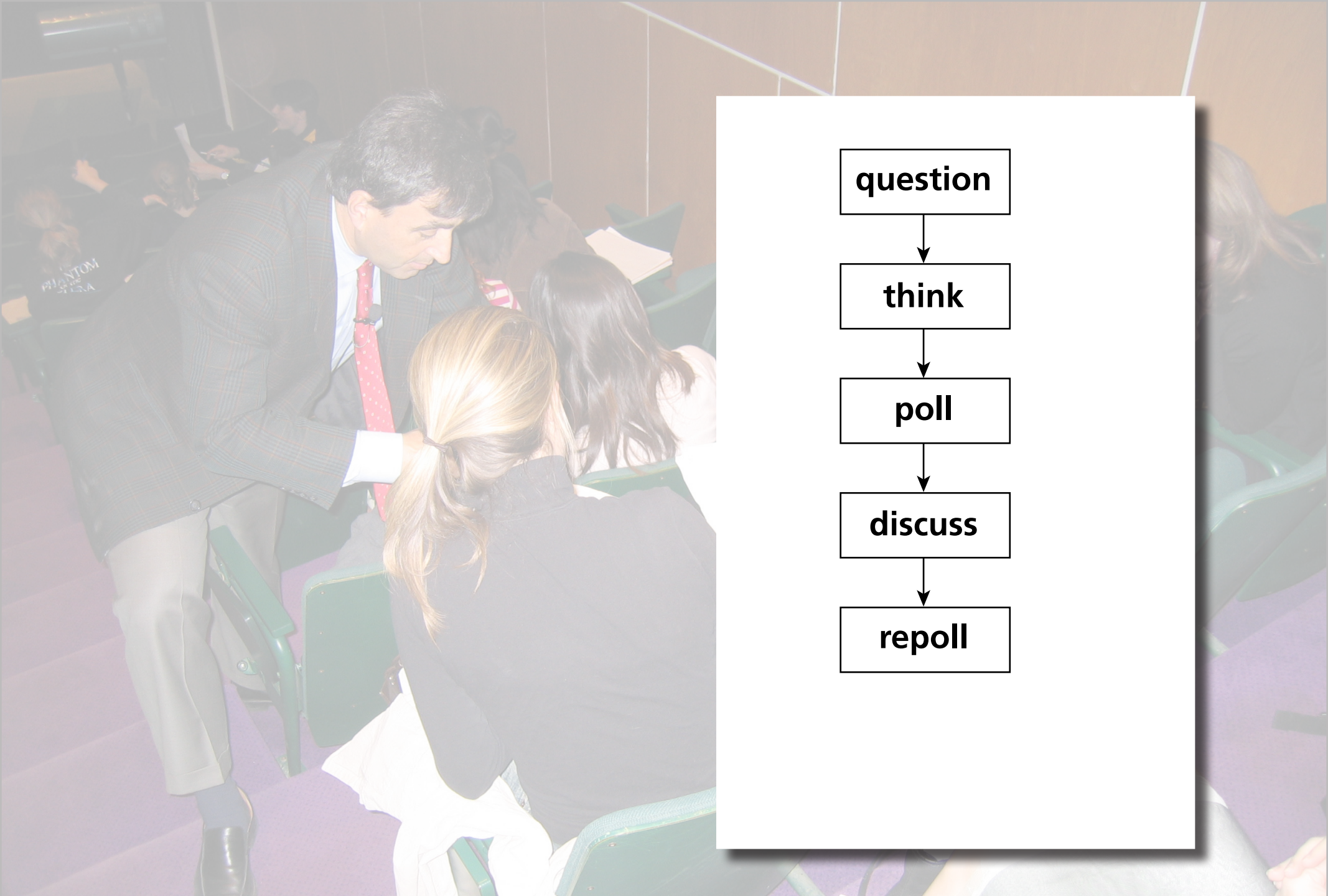


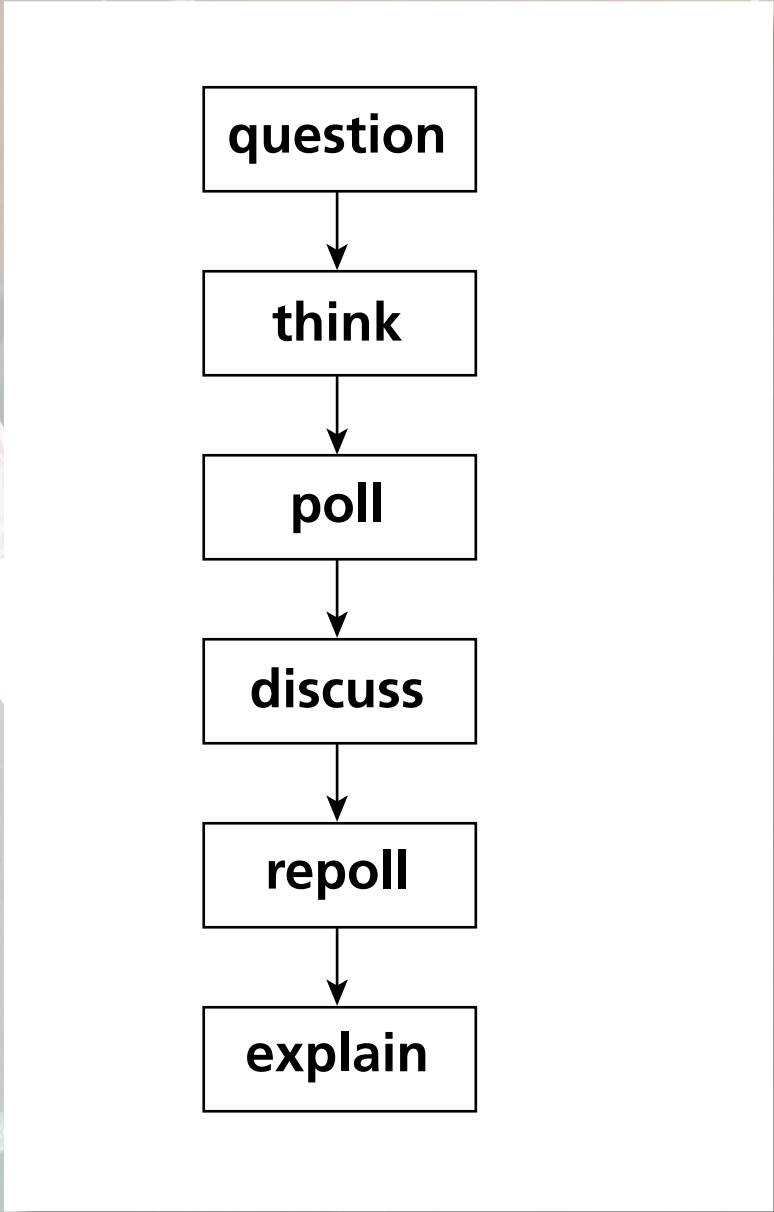
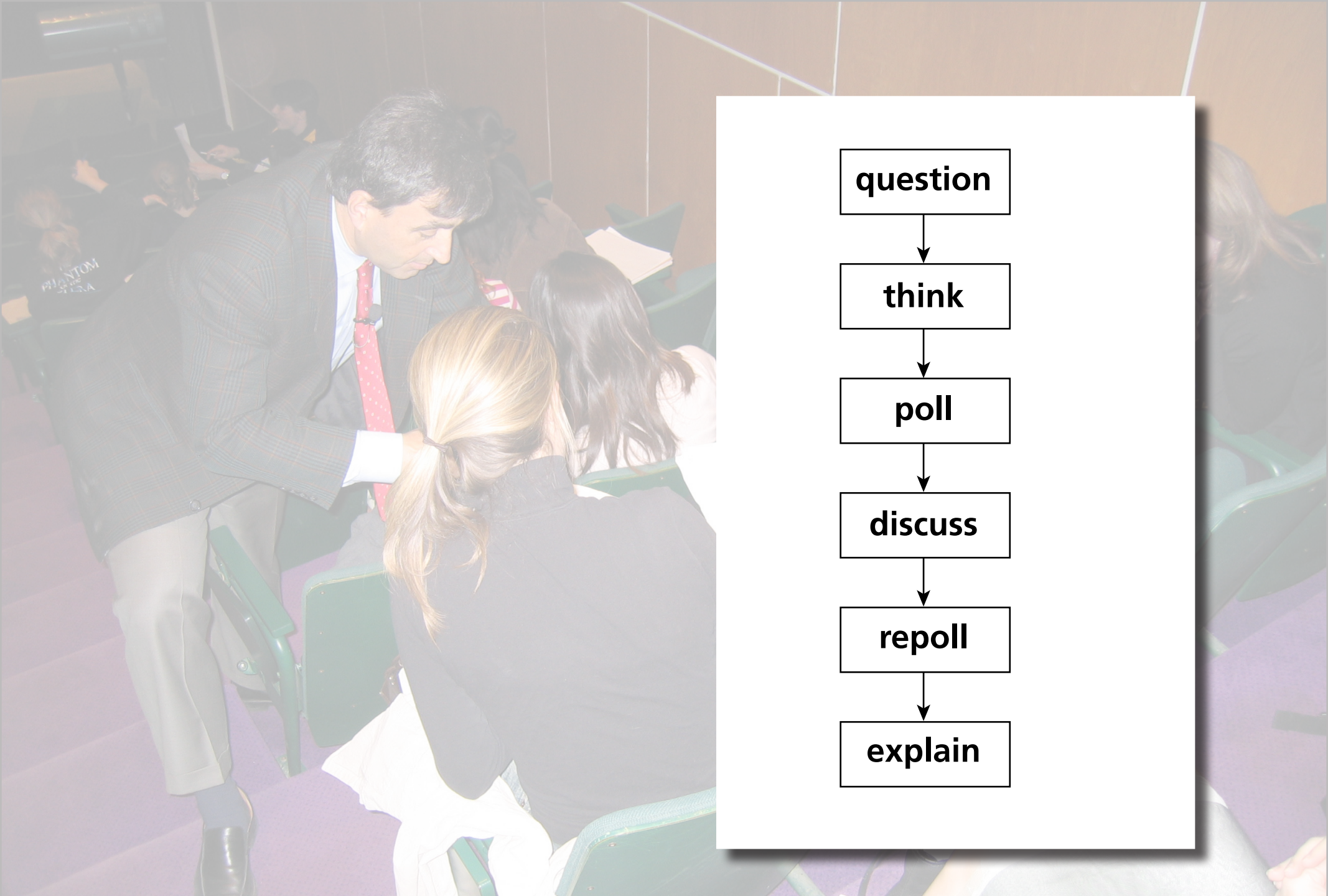
**poll**

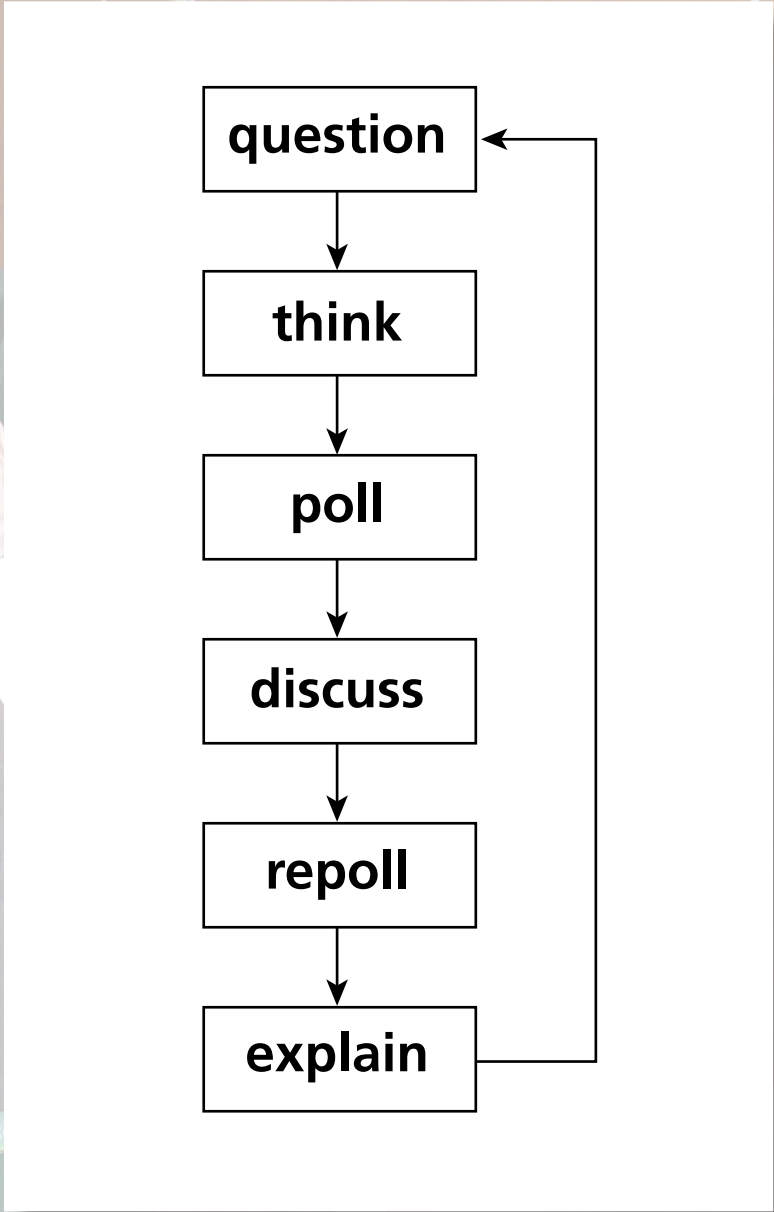
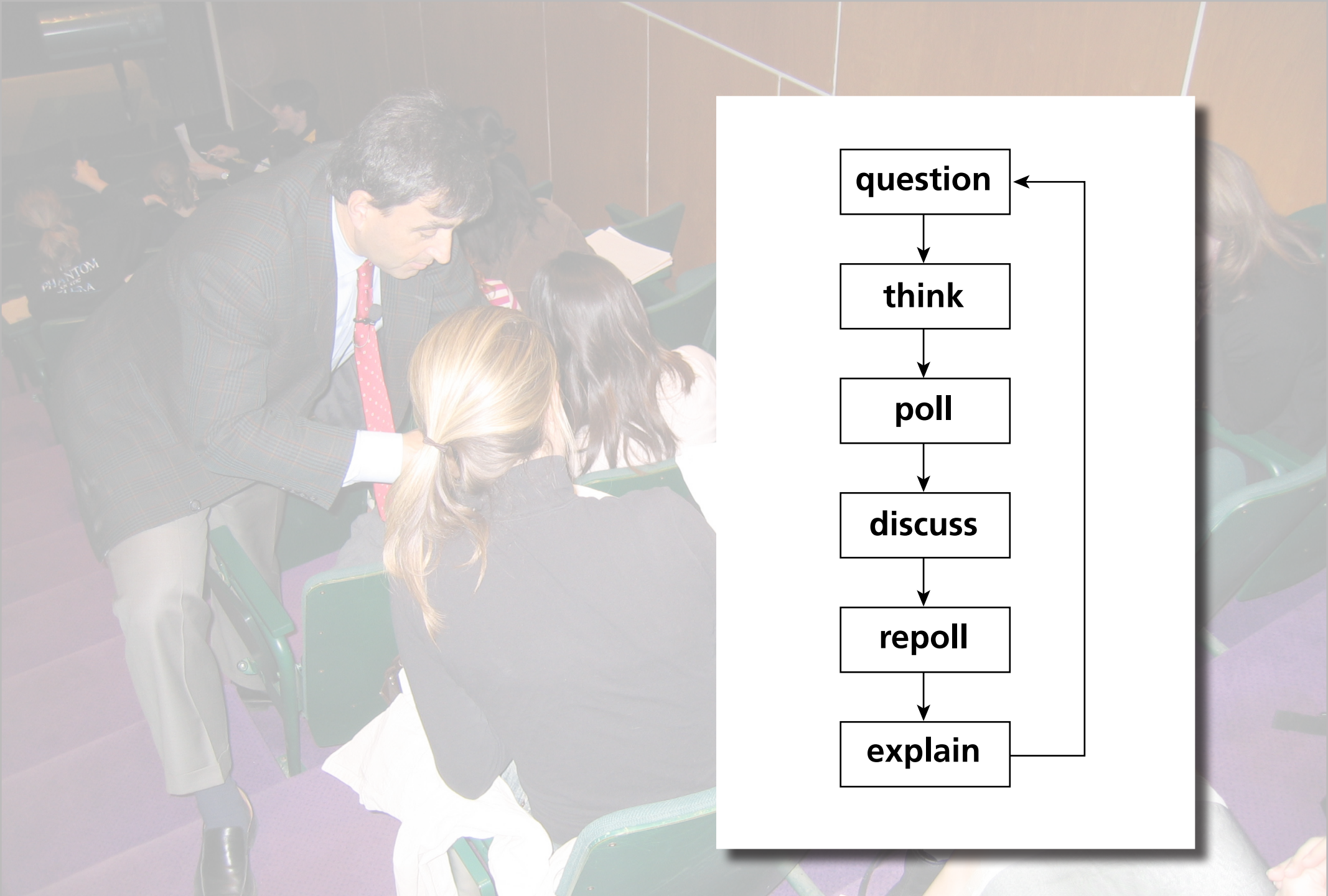


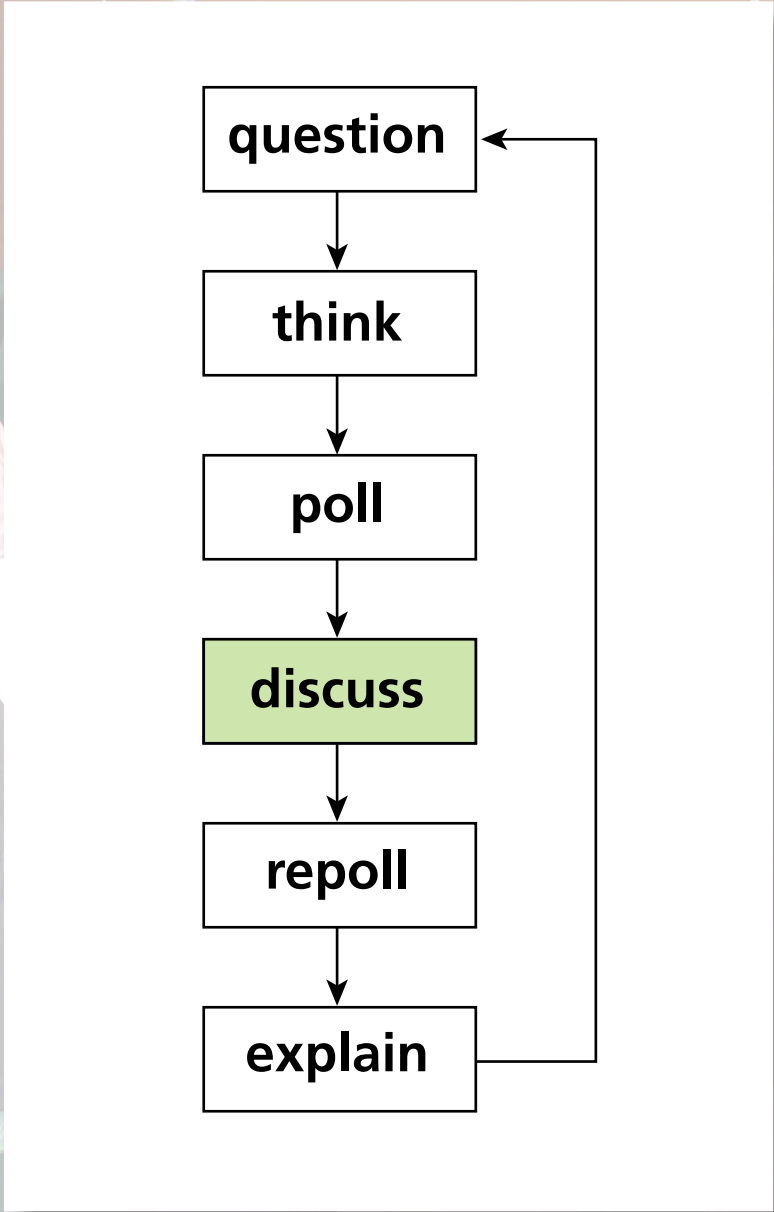
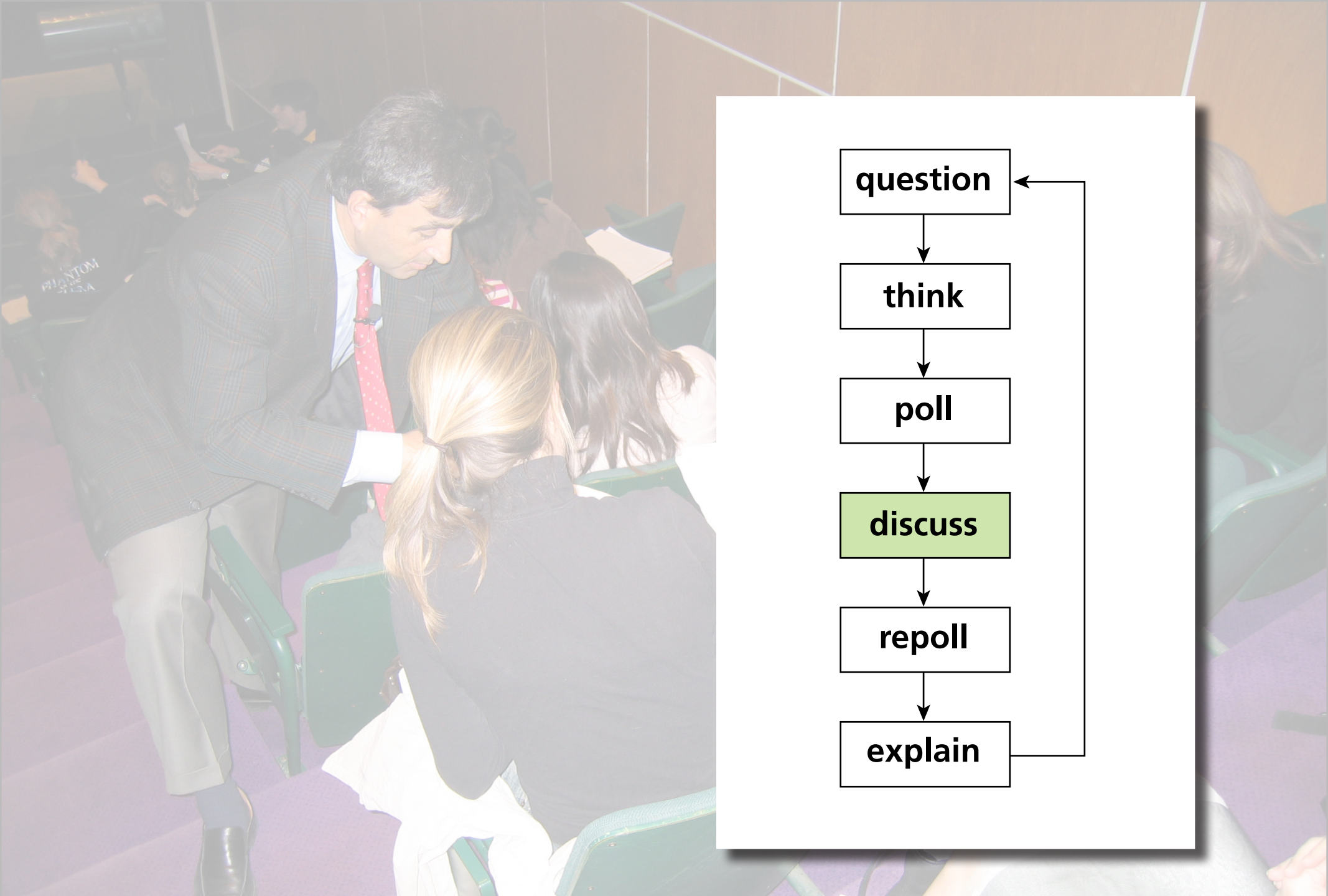
**discuss**











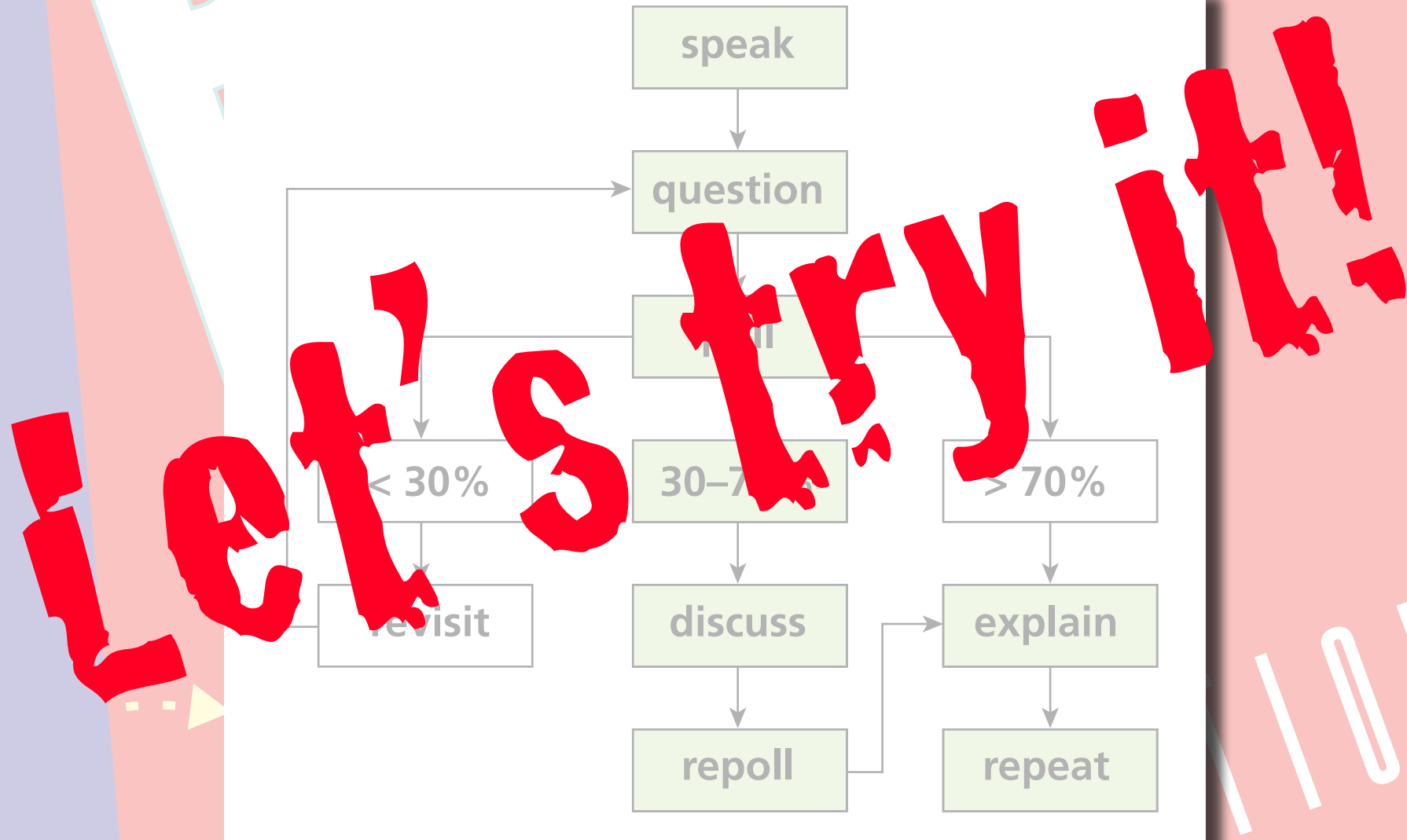


Peer

INSTRUCTION

1 lecture

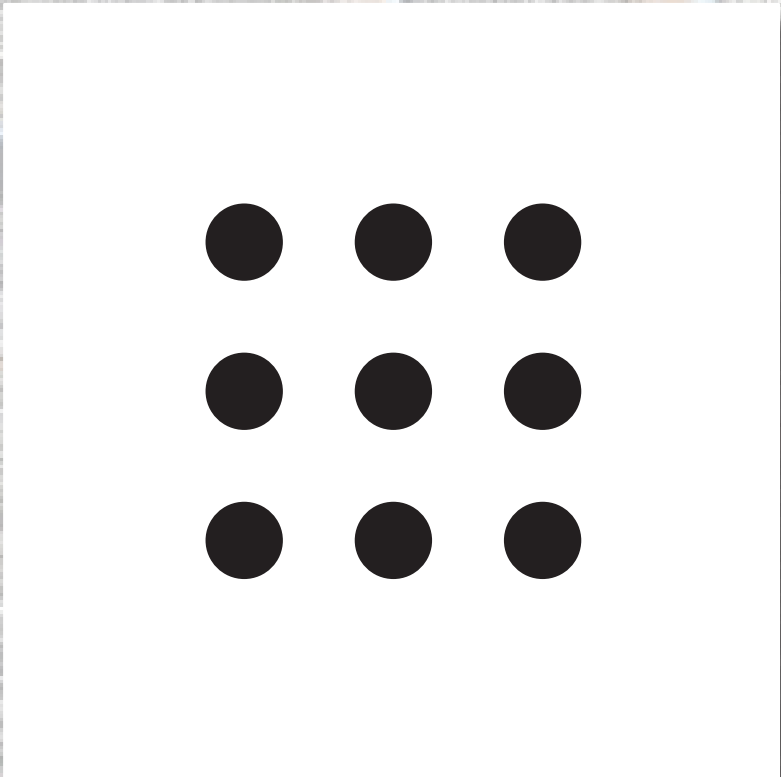
2 PI

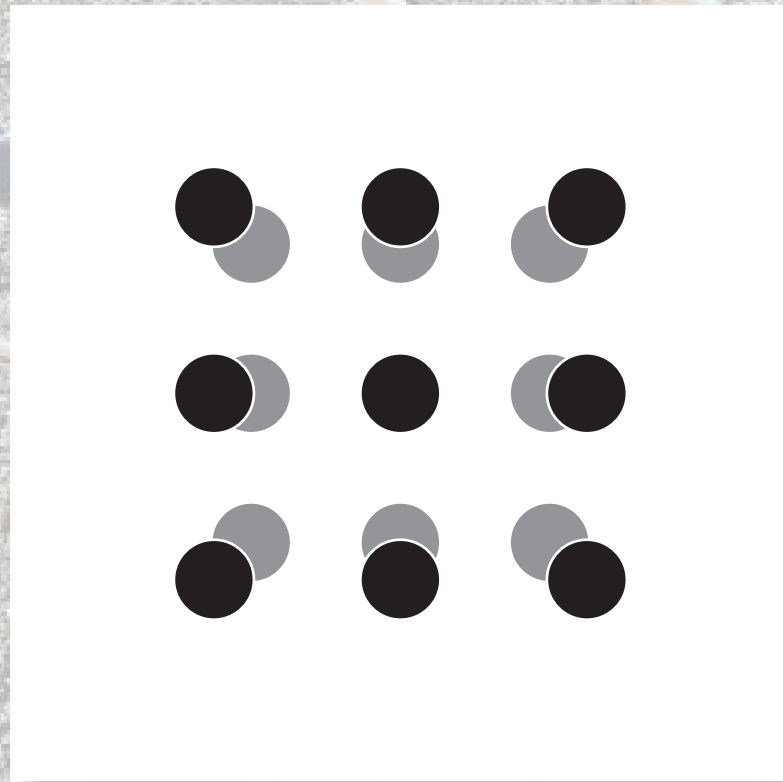




**thermal expansion**



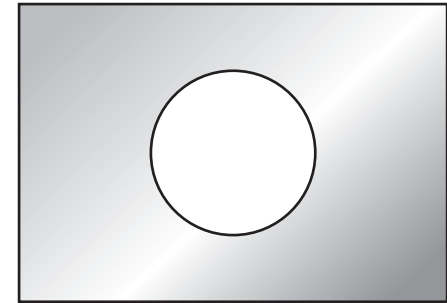




all of them

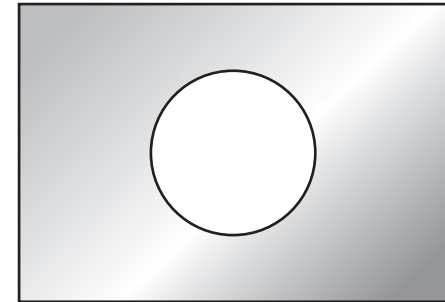
A white square is centered on the page, containing a 3x3 grid of black dots. Overlaid on this square and extending to the left and right is the text "all of them" in a large, red, stylized, handwritten-style font. The background of the entire slide is a photograph of a gravel path with several circular pits dug into it, set against a grassy area.

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



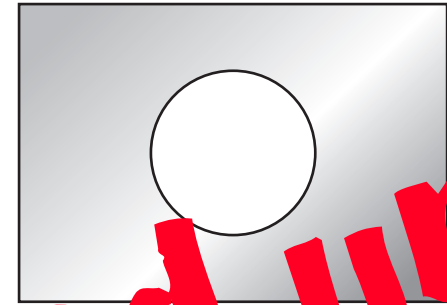
**Consider a rectangular metal plate with a circular hole in it.**

**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.



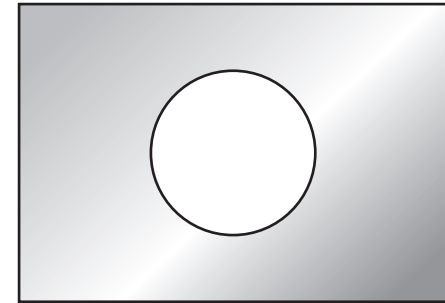
When the plate is uniformly heated, the diameter of the hole

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**

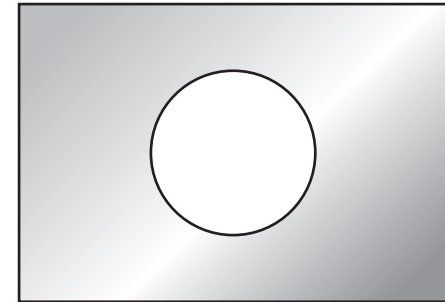
**Before I tell you the answer, let's analyze what happened.**

**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**

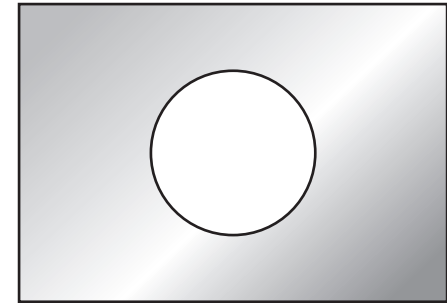
**Consider a rectangular metal plate with a circular hole in it.**

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



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

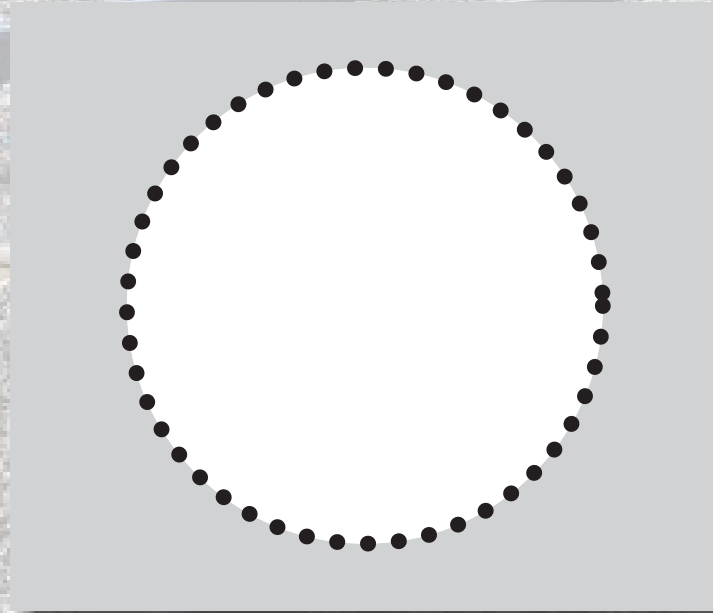
**Consider a rectangular metal plate with a circular hole in it.**



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

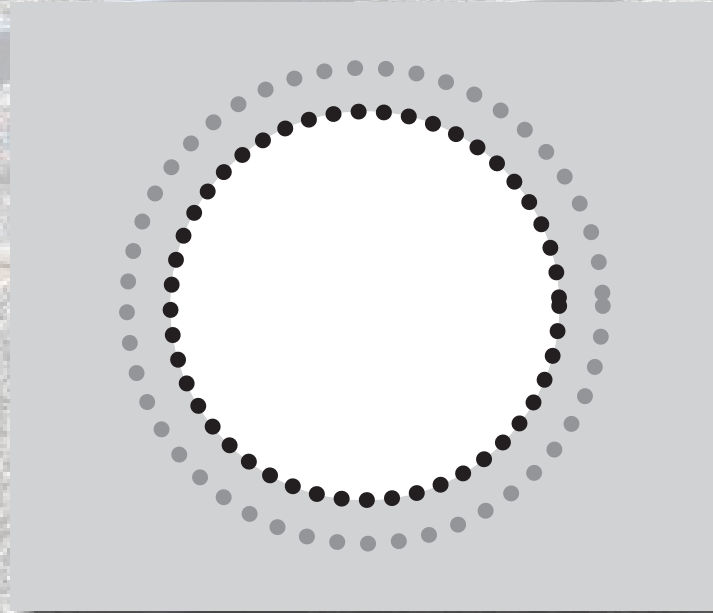
- 1. increases. ✓**
2. stays the same.
3. decreases.

consider atoms at rim of hole

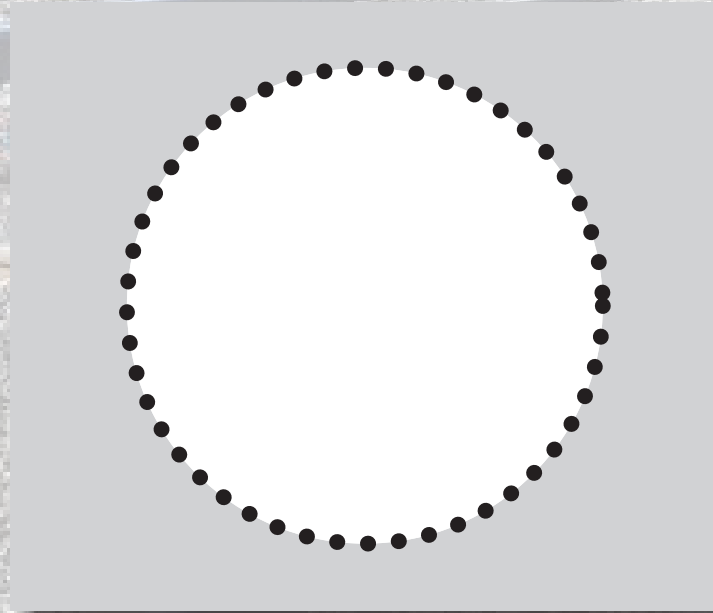




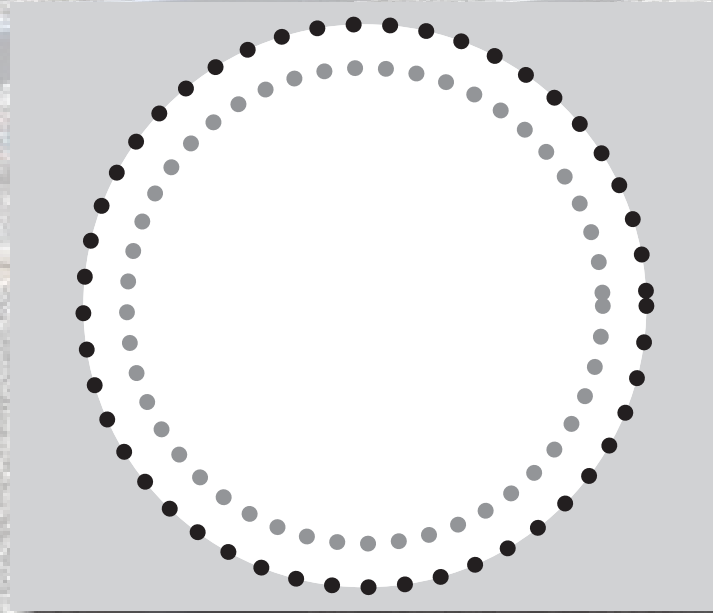
consider atoms at rim of hole



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

# Peer

**Higher learning gains**

**Better retention**

INSTRUCTION



**Join now!**

**PeerInstruction.net**





**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



# technology

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...

learning | catalytics

- improve questioning
- manage discussions

- facilitate time management/flow

- 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. capital
  - c. market research
  - d. depreciation?

## extensible plug-in architecture for question types

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

## 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

## Sample question types:

- direction

- mathematical expression

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- highlight passage



1 [lccatalytics.com](https://lccatalytics.com)

2 create student account

3 ID 1234567

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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  
prevailing

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

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



**1** educa

**3** PI 2.0

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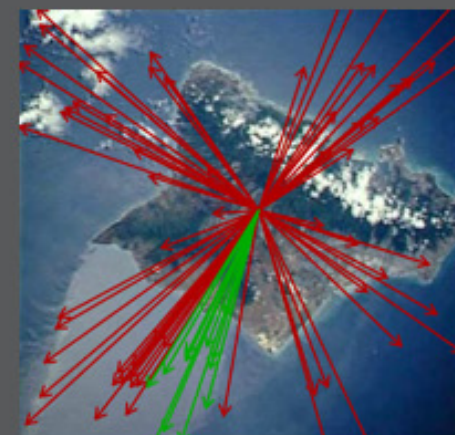
4. direction  
prevailing

...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



**1** educa

**3** PI 2.0

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optics i

current session: **766079** | 69 students

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Jump to ▾

1

2

3

4

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7

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9

10

11

12

13

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 lecture

2 PI

3 PI 2.0

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current session: **766079** | 69 students

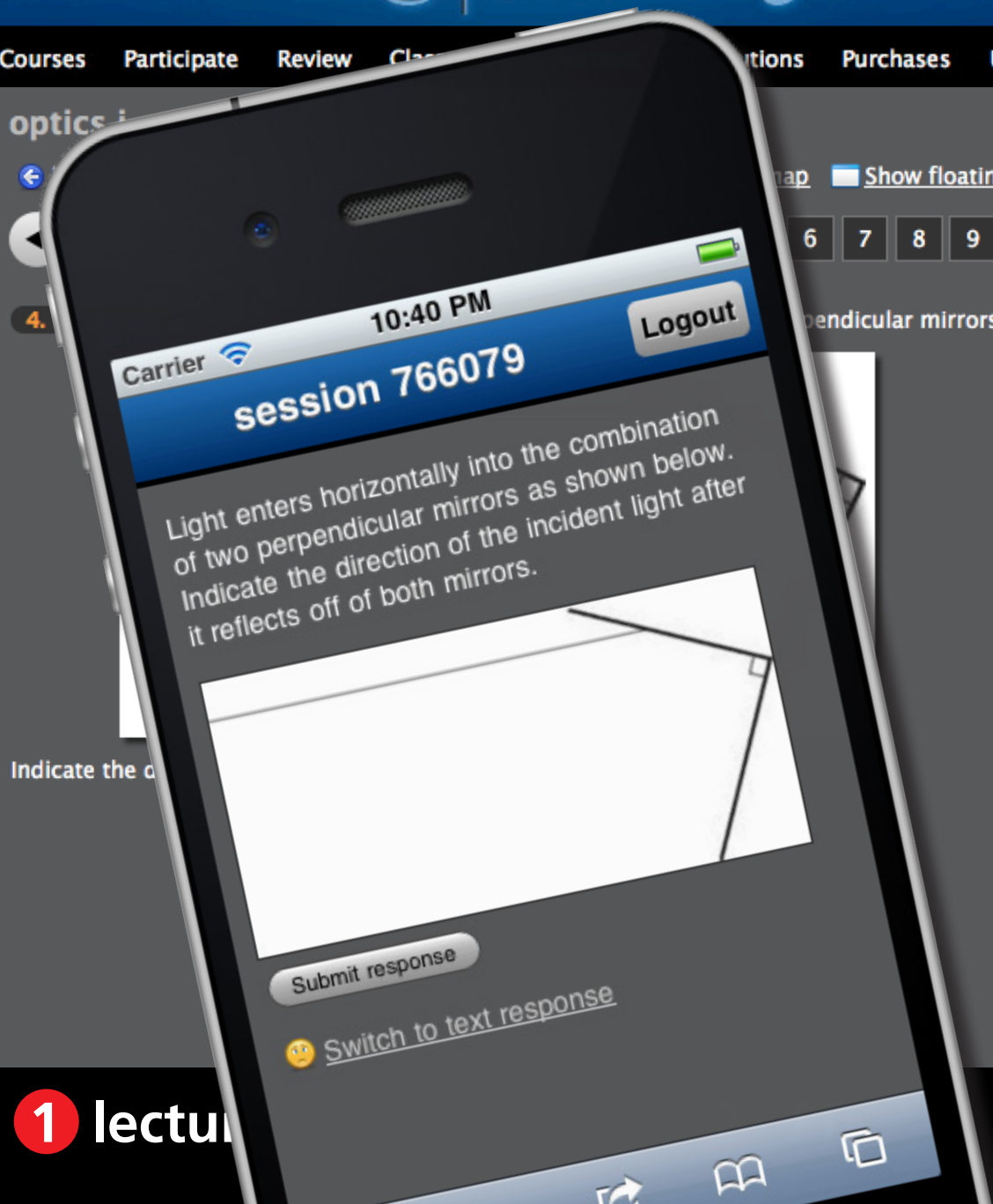
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6 7 8 9 10 11 12 13 14 15

perpendicular mirrors as shown below.

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

[feedback & support](#)



1 lecture

3 PI 2.0

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current session: **766079** | 69 students

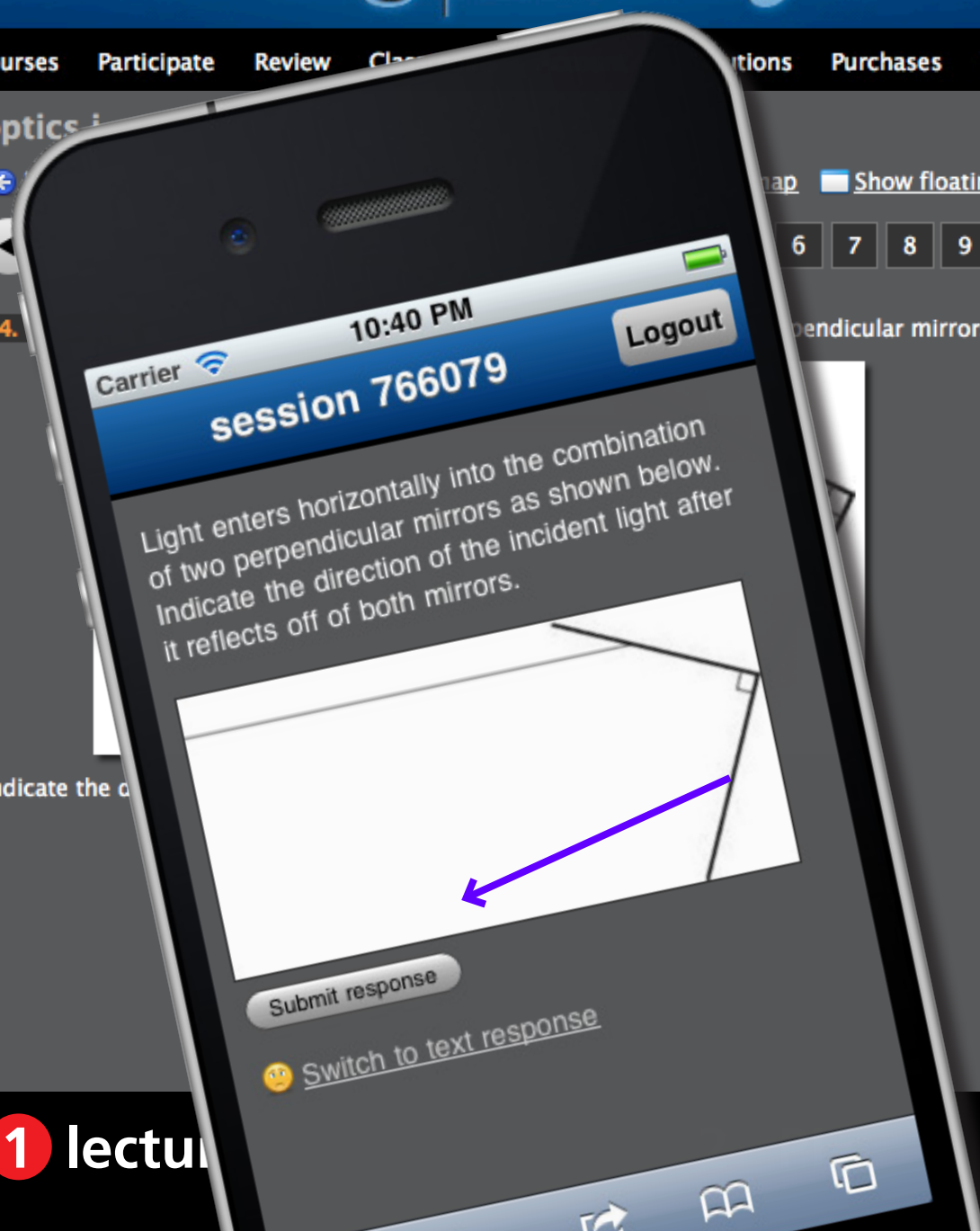
[Map](#) [Show floating session ID](#) [Edit](#) [Delete](#)

6 7 8 9 10 11 12 13 14 15

perpendicular mirrors as shown below.

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

[feedback & support](#)



1 lecture

3 PI 2.0

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current session: **766079** | 69 students

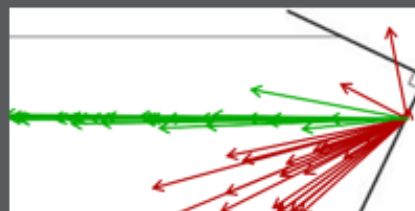
[Map](#) [Show floating session ID](#) [Edit](#) [Delete](#)

6 7 8 9 10 11 12 13 14 15

perpendicular mirrors as shown below.

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

Round 1     
● 57 responses, 58% correct



 [feedback & support](#)



1 lecture

3 PI 2.0

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current session: **766079** | 69 students

Map  Show floating session ID  Edit  Delete

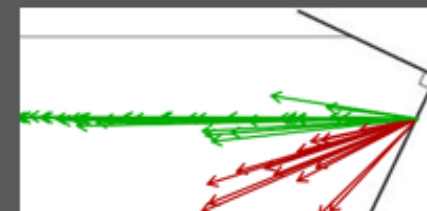
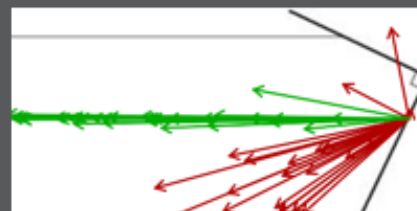
6 7 8 9 10 11 12 13 14 15

perpendicular mirrors as shown below.

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



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  $x =$**

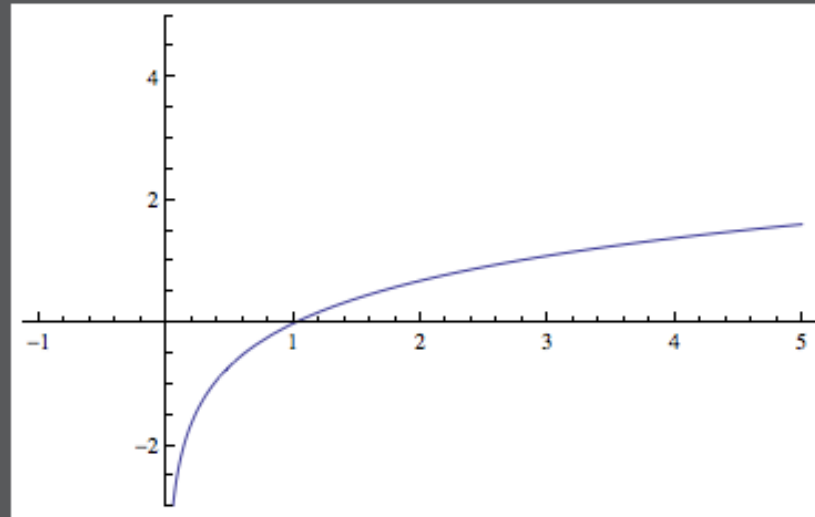
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- mathematical expression
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- highlight passage

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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

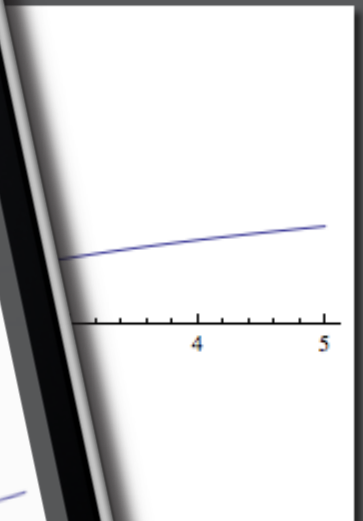
**3** PI 2.0

# learning | catalytics

Courses Participate

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



**1** lecture

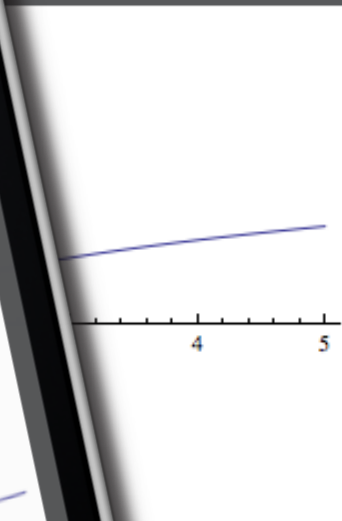
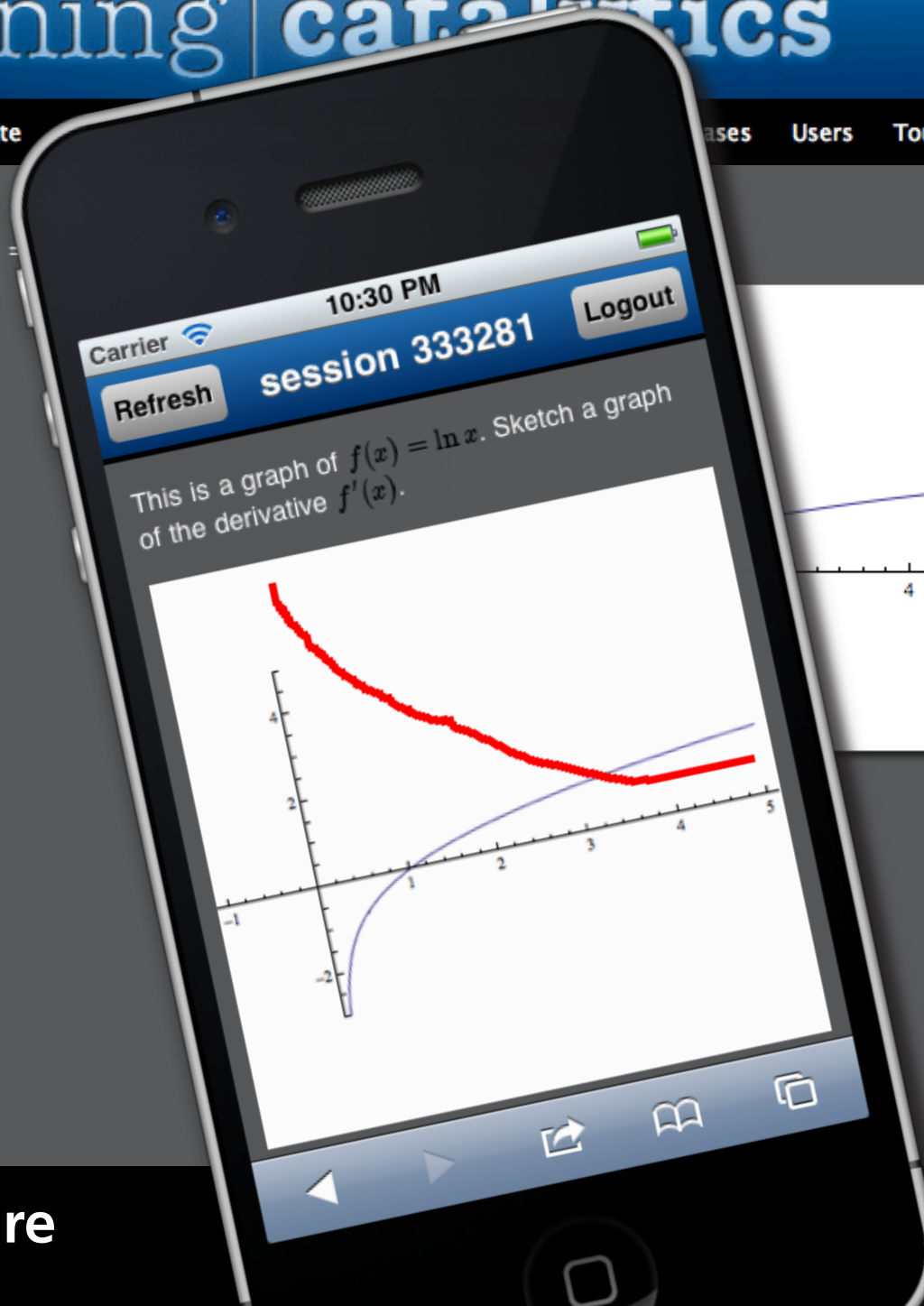
**3** PI 2.0

# learning | catalytics

Courses Participate

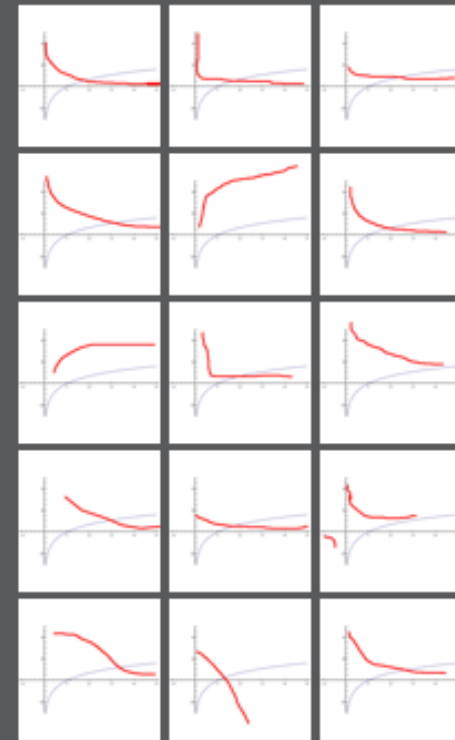
ases Users Tour Help

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



Round 1

15 responses



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

1 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

**data analytics**



1 lecture

2 PI

3 PI 2.0

A photograph of three people in a meeting, tilted and overlaid with the text 'human interaction'. The photo shows a woman on the left writing in a notebook, a woman in the middle looking up, and a man on the right with his hand to his chin. The text 'human interaction' is written in a large, red, stylized font across the center of the photo.

# 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  
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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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%

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1 lecture

2 PI

3 PI 2.0

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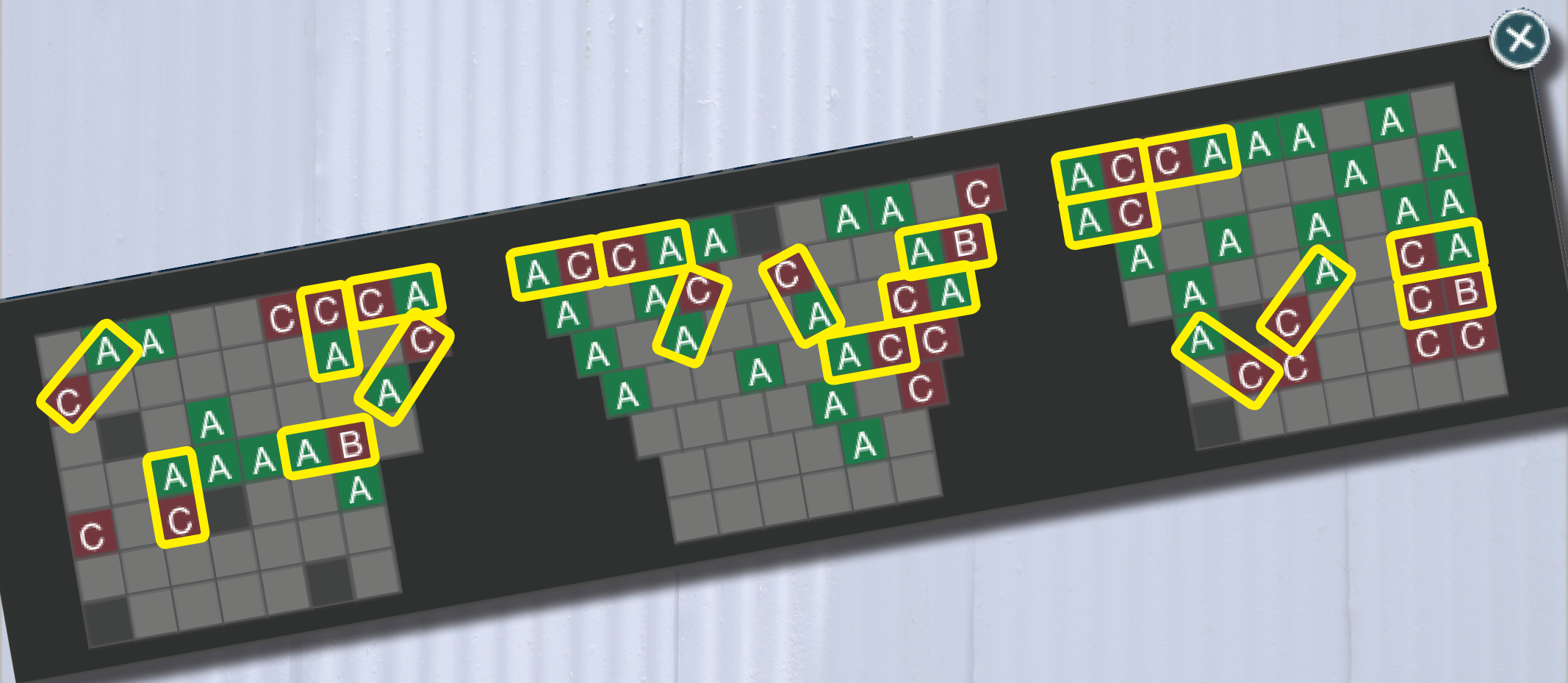
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1 lecture

2 PI

3 PI 2.0

let system manage pairing



1 lecture

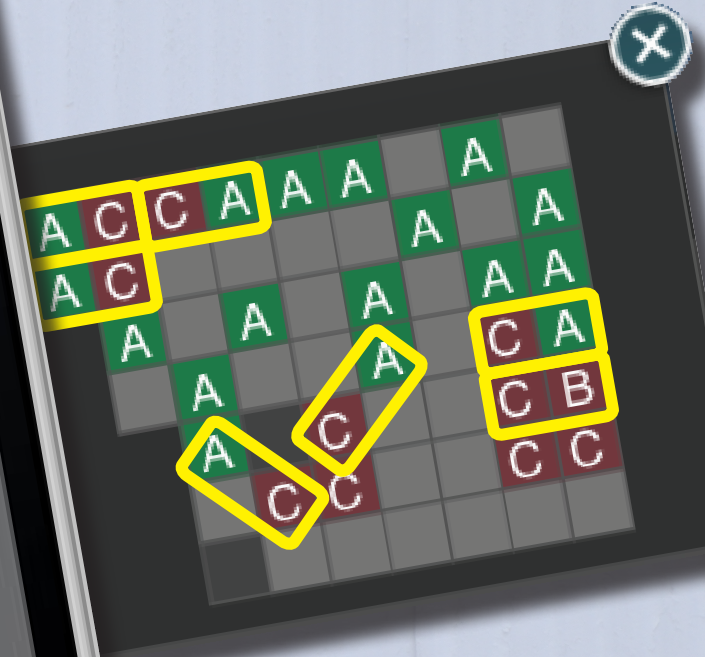
2 PI

3 PI 2.0

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 at constant speed. The mechanical work required to cause this motion is

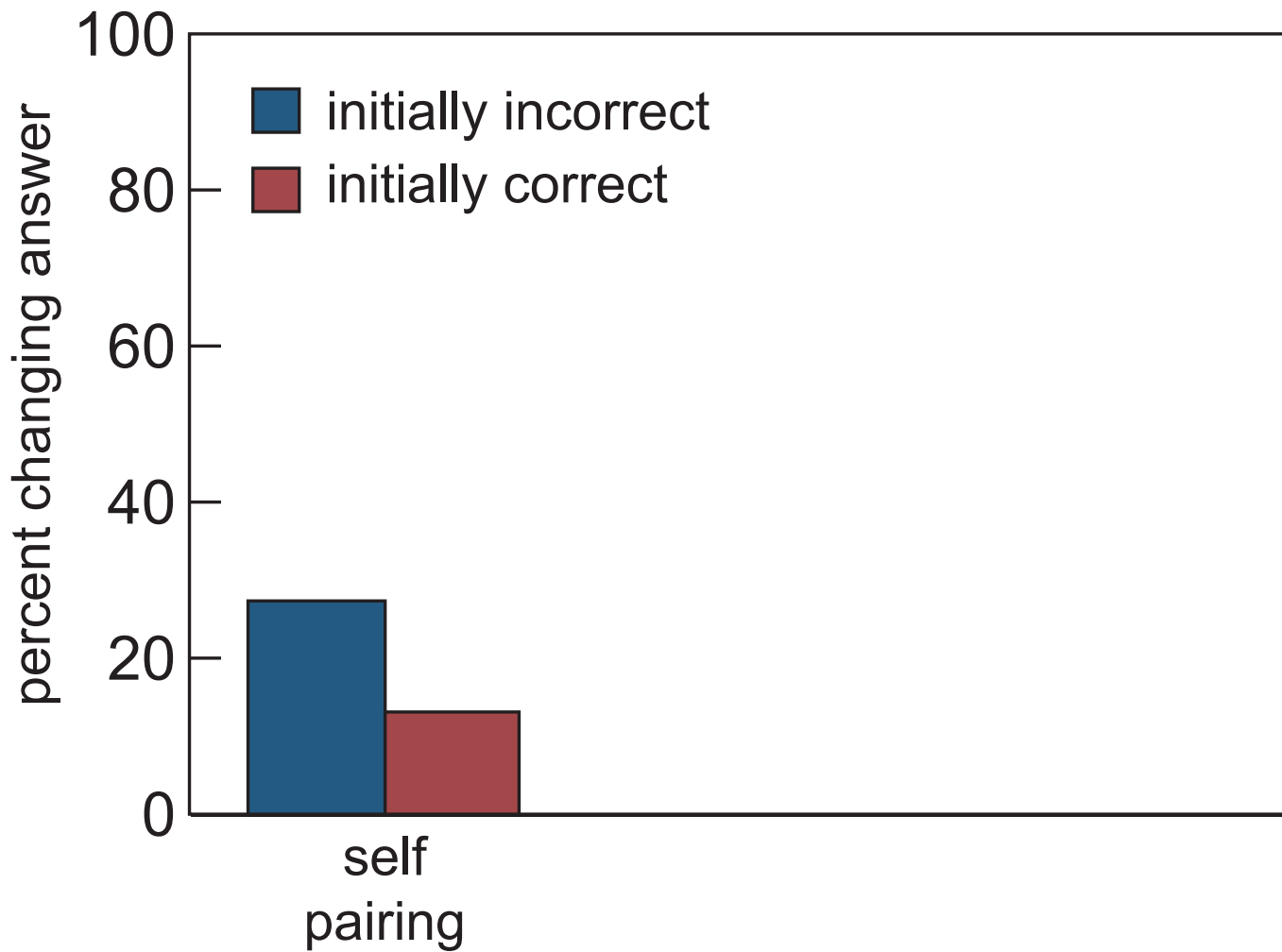


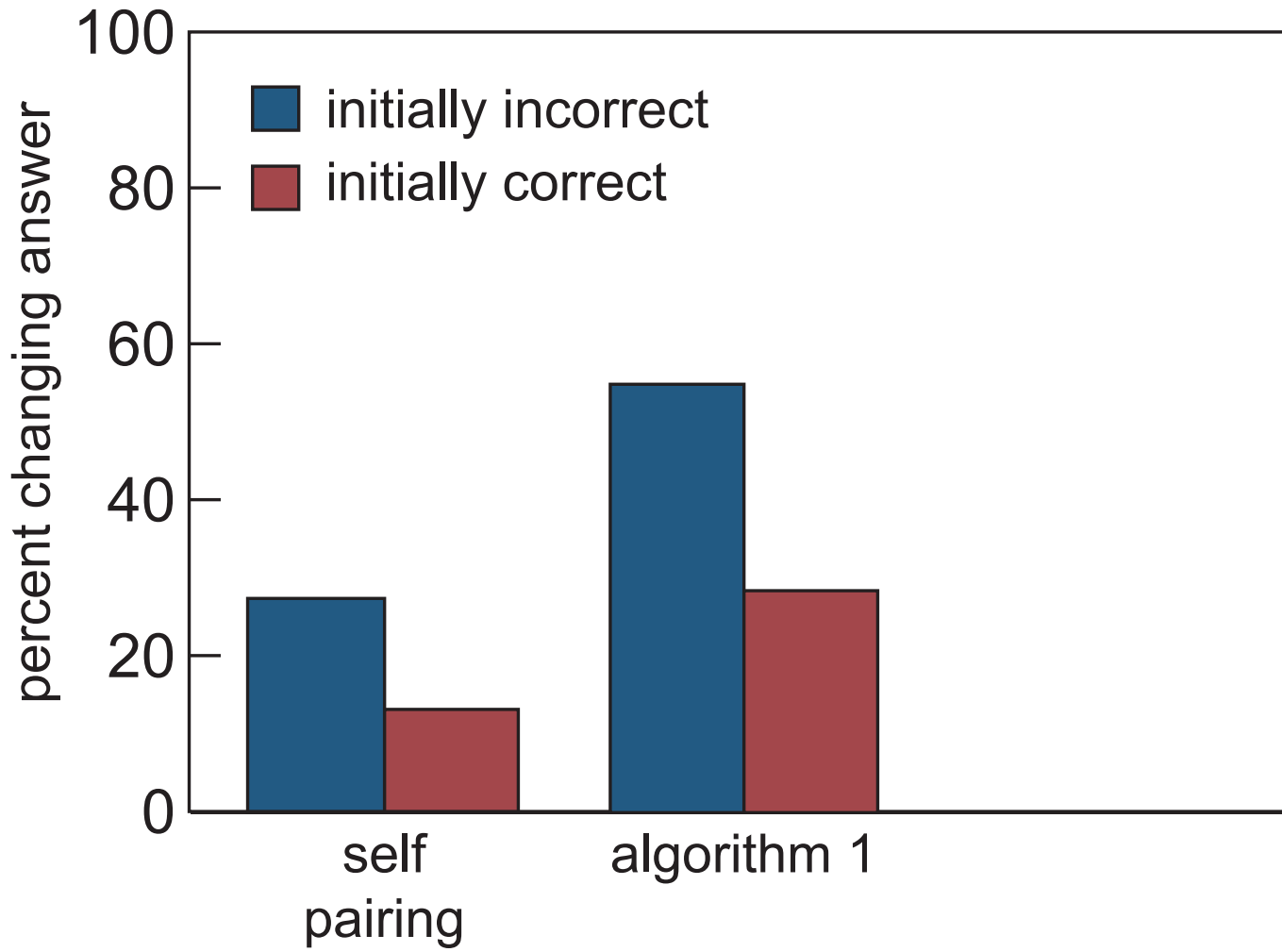
Please discuss your response with:  
• Brian Lukoff (to your left)  
✓ I am talking to this person/people

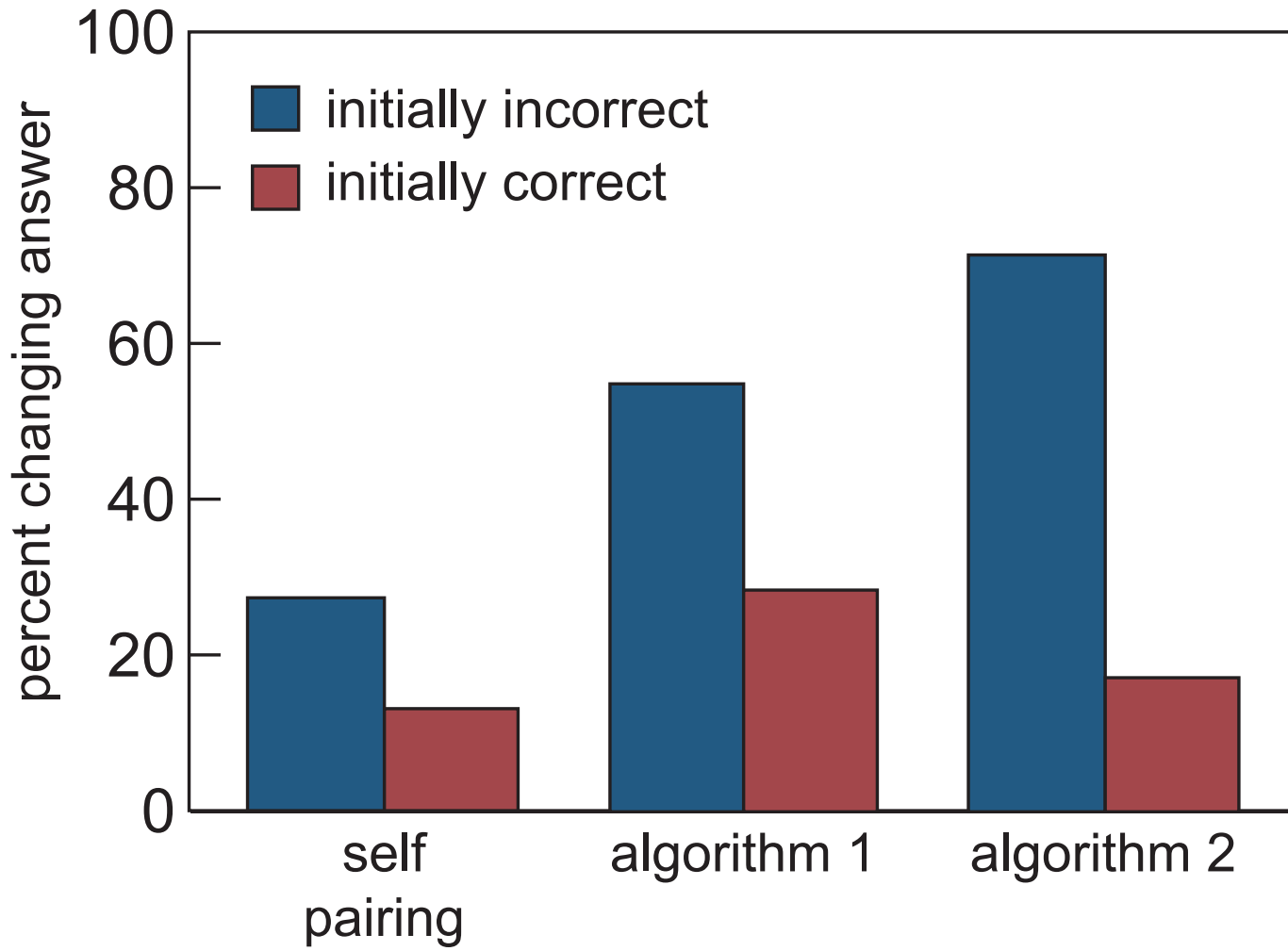














**1** lecture

**2** PI

**3** PI 2.0



**Education is not just about:**

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



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**discovery & exploration a must!**

The background of the slide features a painting of a window with horizontal blinds. A hand is visible on the right side, holding a pen and writing on the window pane. The scene is dimly lit, with light coming from the window. The text is overlaid on this background.

## Learning Catalytics:

- implement proven, researched pedagogy



## Learning Catalytics:

- implement proven, researched pedagogy
- use consumer devices



## **Learning Catalytics:**

- **implement proven, researched pedagogy**
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- **avoid pitfalls of MC assessment**

## Learning Catalytics:

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

**Funding:**

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