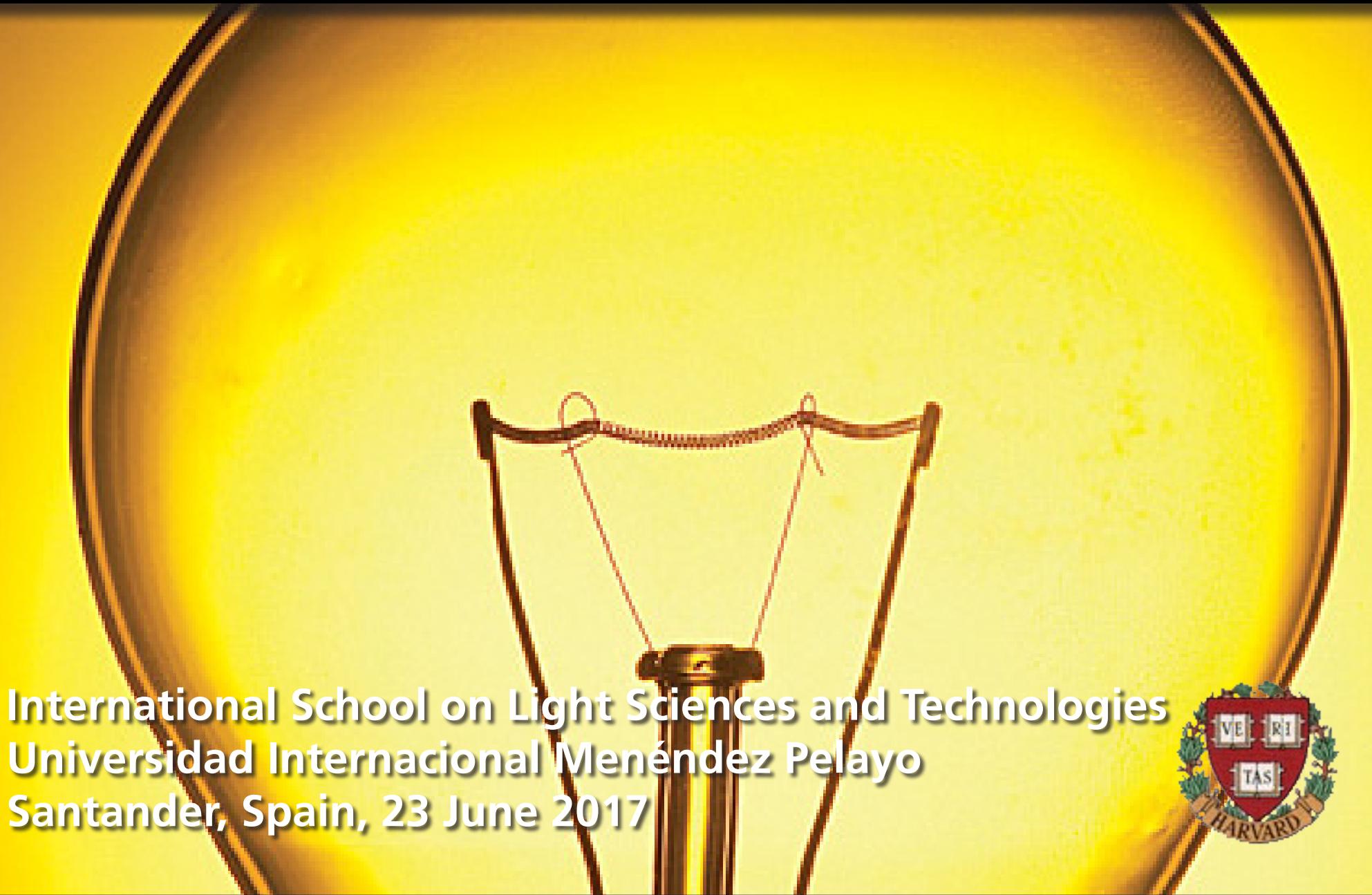
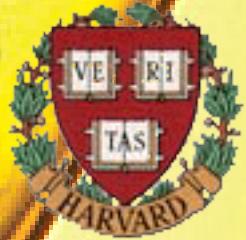


Innovating education to educate innovators



International School on Light Sciences and Technologies
Universidad Internacional Menéndez Pelayo
Santander, Spain, 23 June 2017



Innovating education to educate innovators



@eric_mazur

International School on Light Sciences and Technologies
Universidad Internacional Menéndez Pelayo
Santander, Spain, 23 June 2017

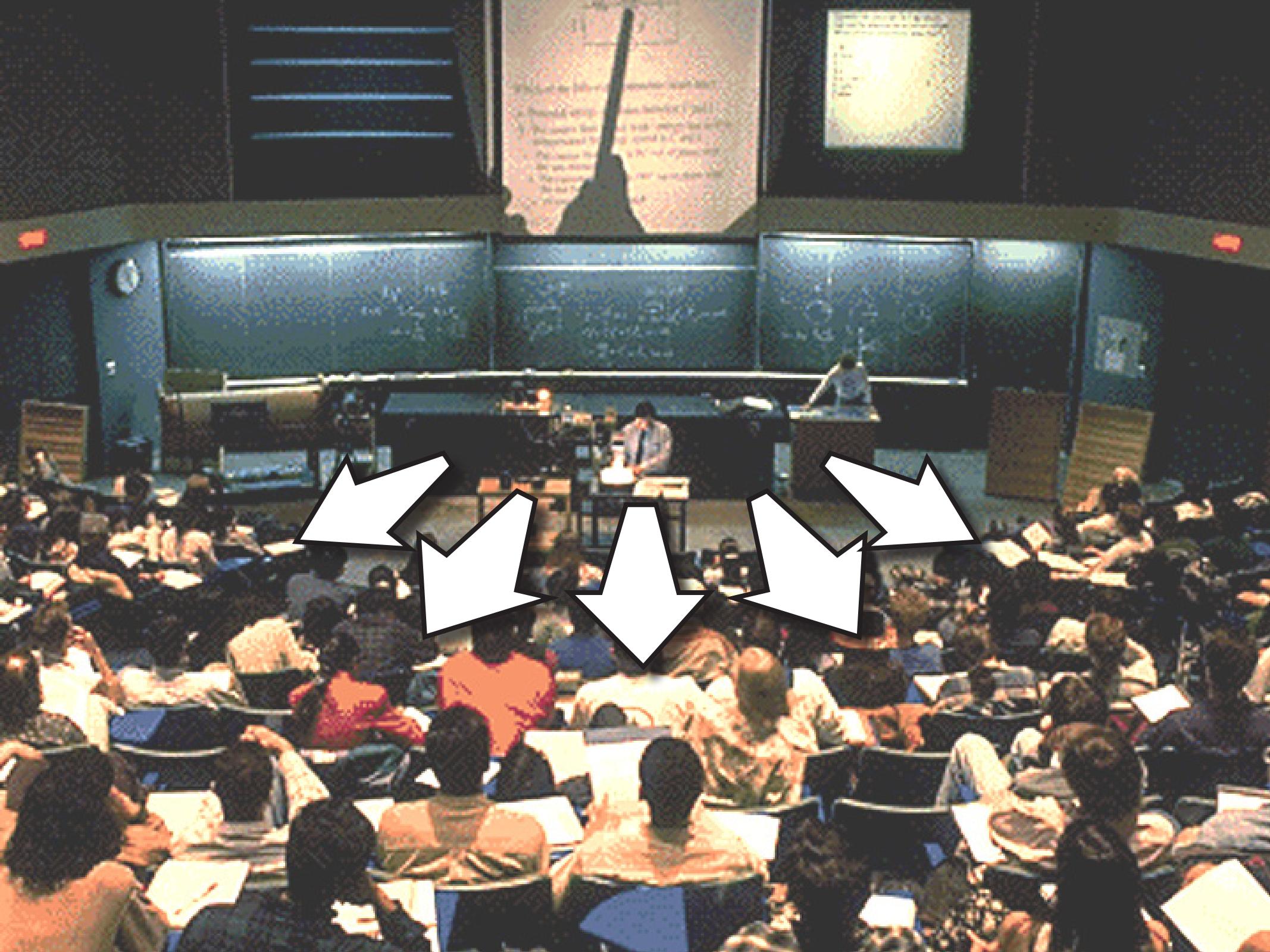
















an illusion. . .

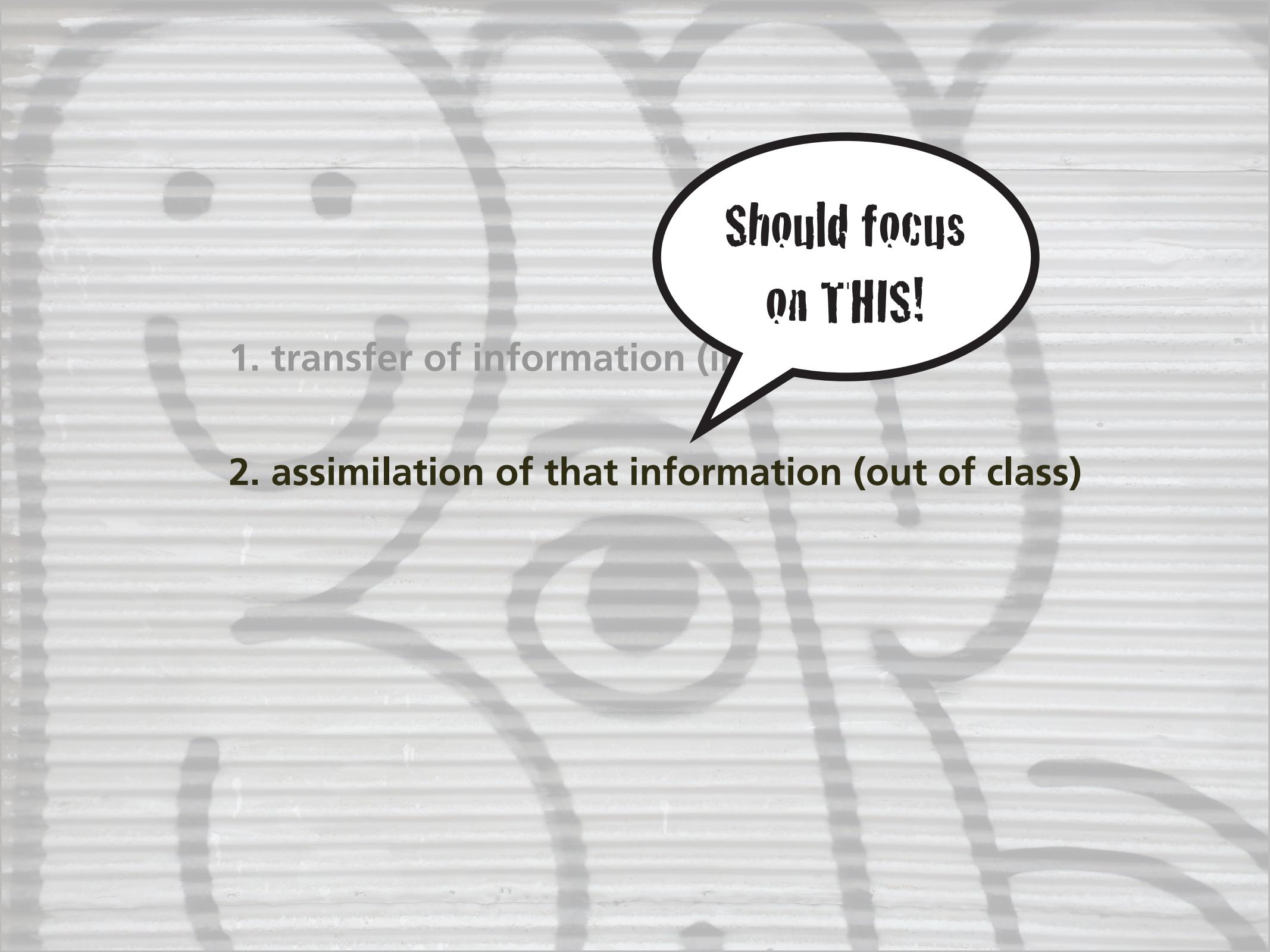


1. transfer of information

- 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)

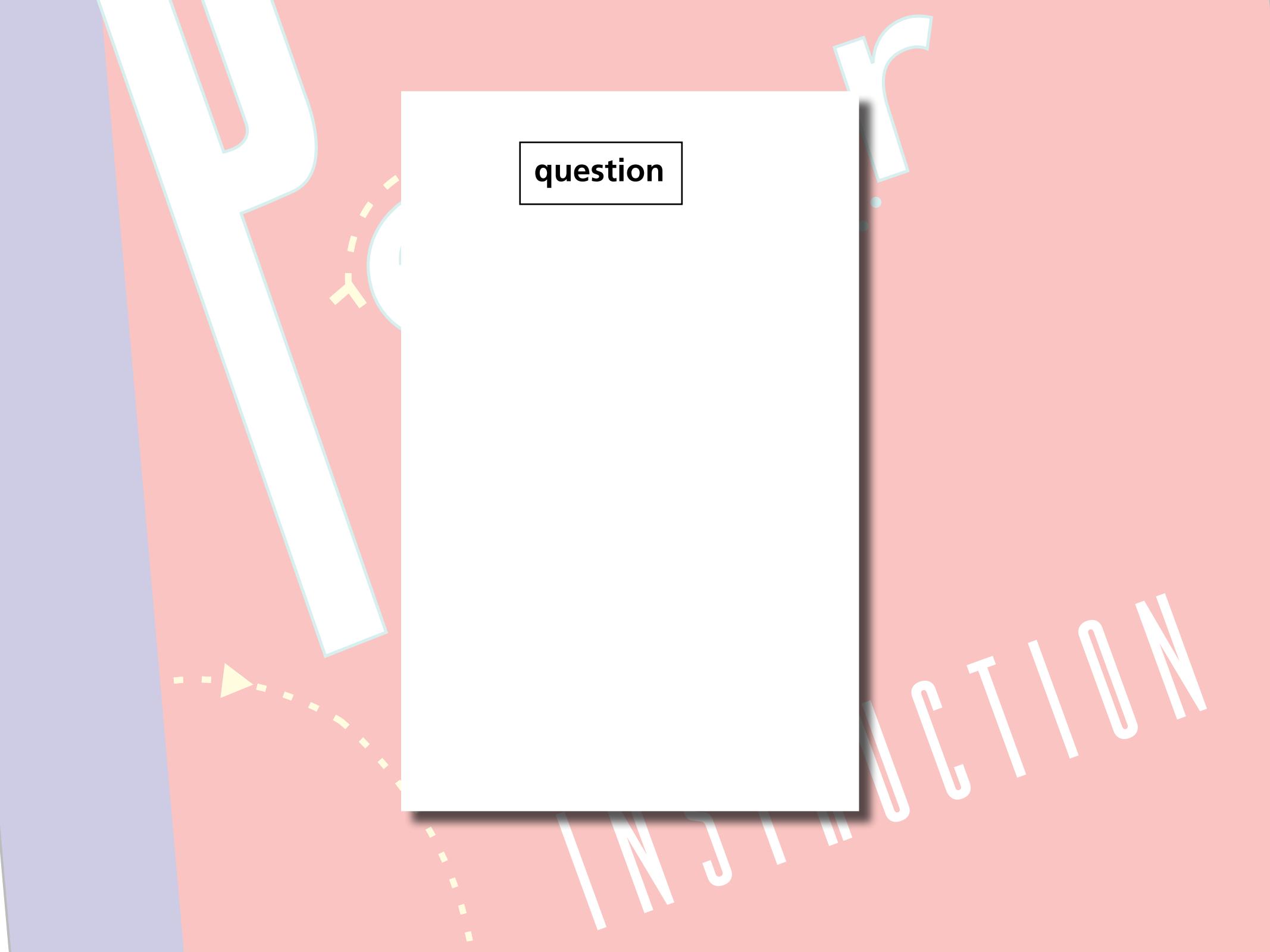
- 1. transfer of information (in class)**
- 2. assimilation of that information (out of class)**

- 1. transfer of information (out of class)**
- 2. assimilation of that information (in class)**

The diagram features a large, stylized word "INSTRUCTION" in white, outlined in black, and tilted diagonally across the page. Above it, the letters "e" and "r" are enclosed in dashed circles with yellow sunburst icons, suggesting energy or transmission. A blue dotted line with arrows connects these letters to a white rectangular box containing the text "1. transfer of information (out of class)".

1. transfer of information (out of class)

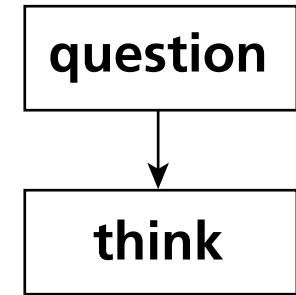
2. assimilation of that information (in class)



question

INTRODUCTION

INJECTION

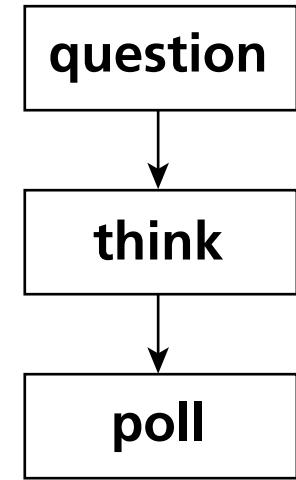


question

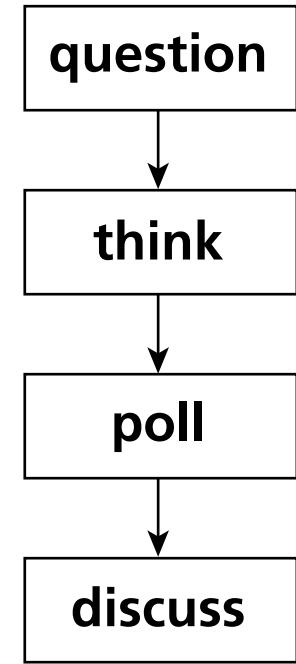
think

NJII

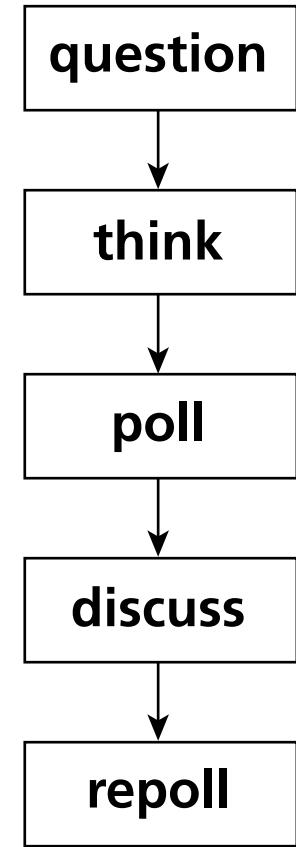
DUCTION



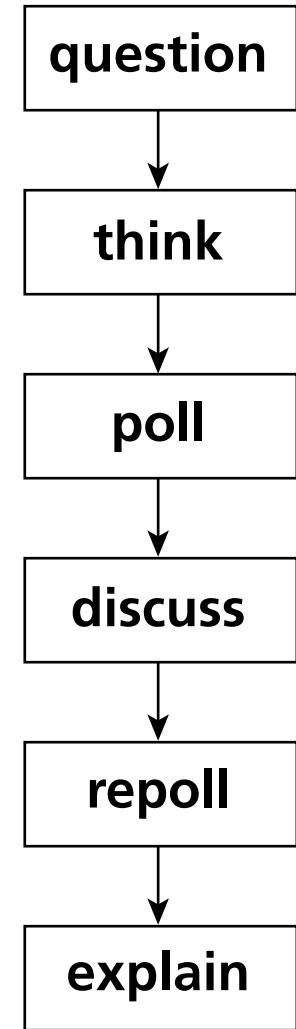
QUESTION



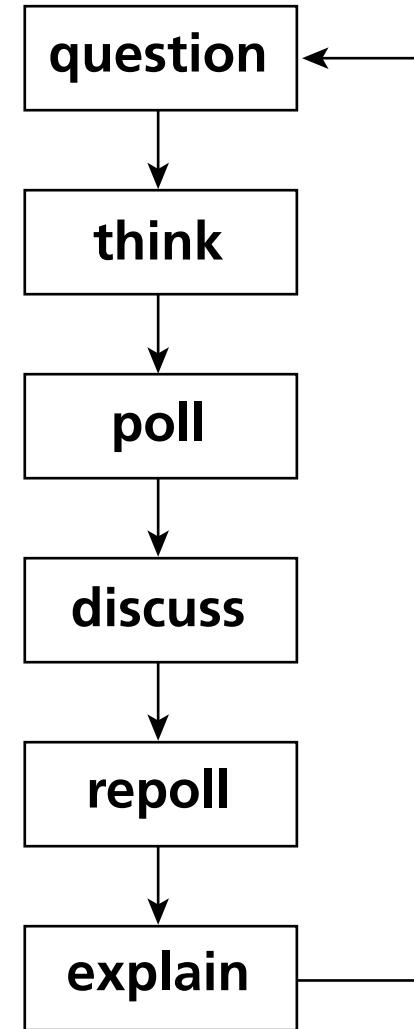
QUESTION



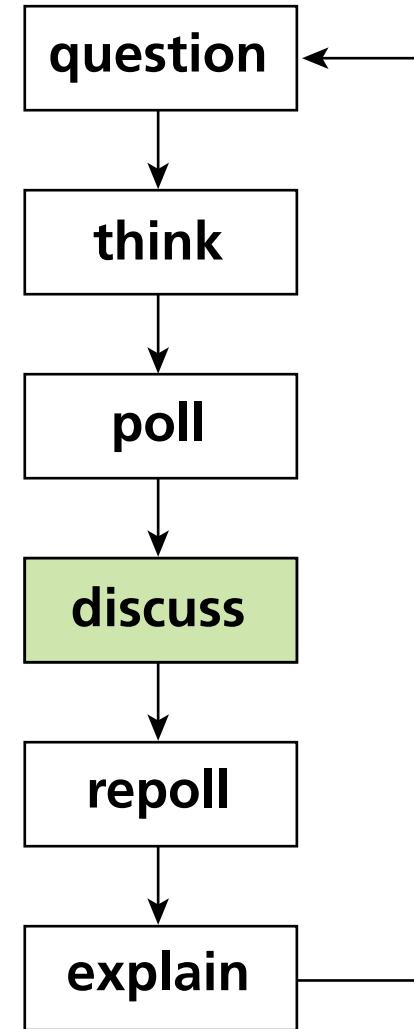
NJUCTION



INTRODUCTION



R
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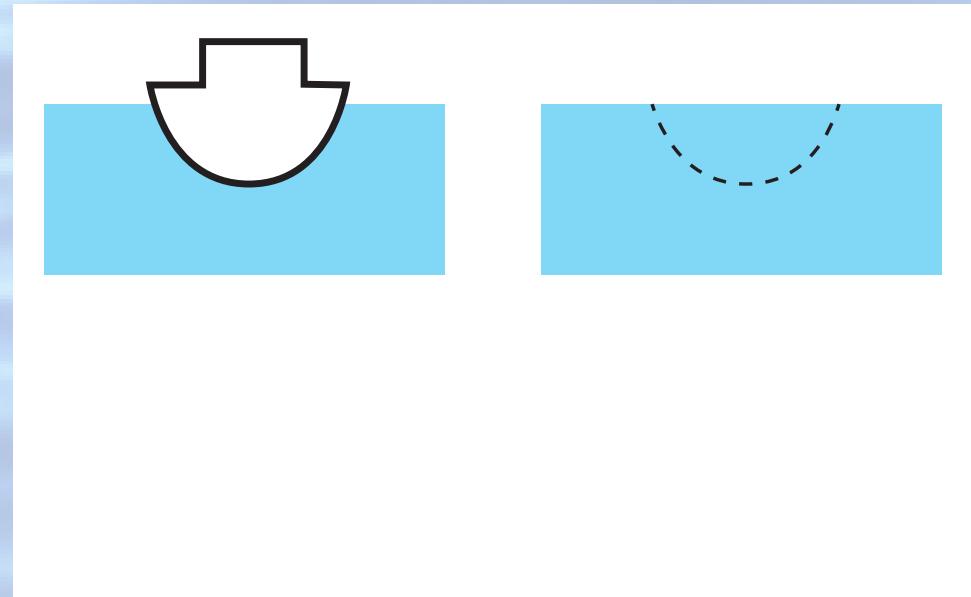


R
I
D
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N

Archimedes Principle

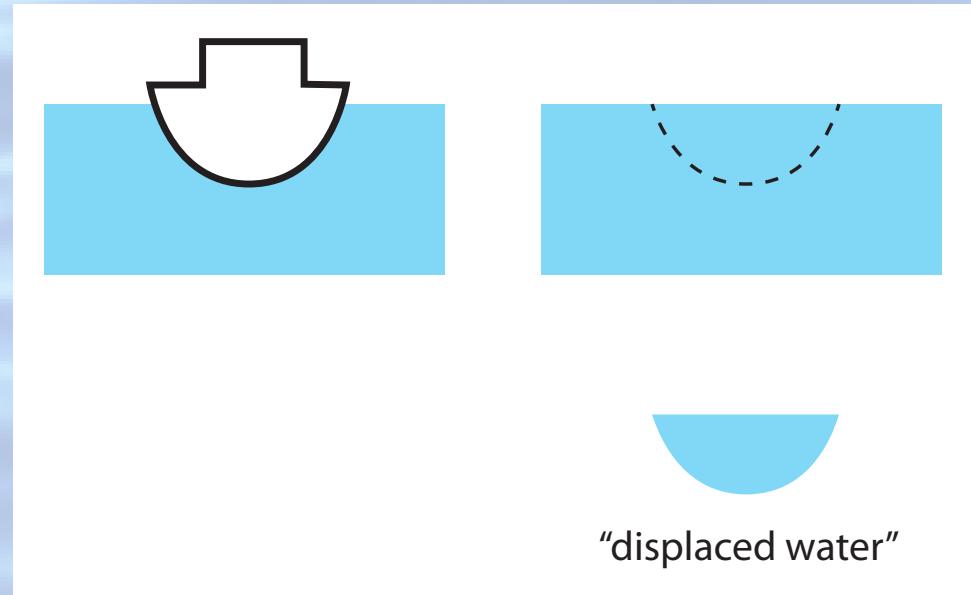
An object submerged either fully or partially in a fluid experiences an upward buoyant force the magnitude of which is equal to the magnitude of the force of gravity exerted on the fluid displaced by the object.

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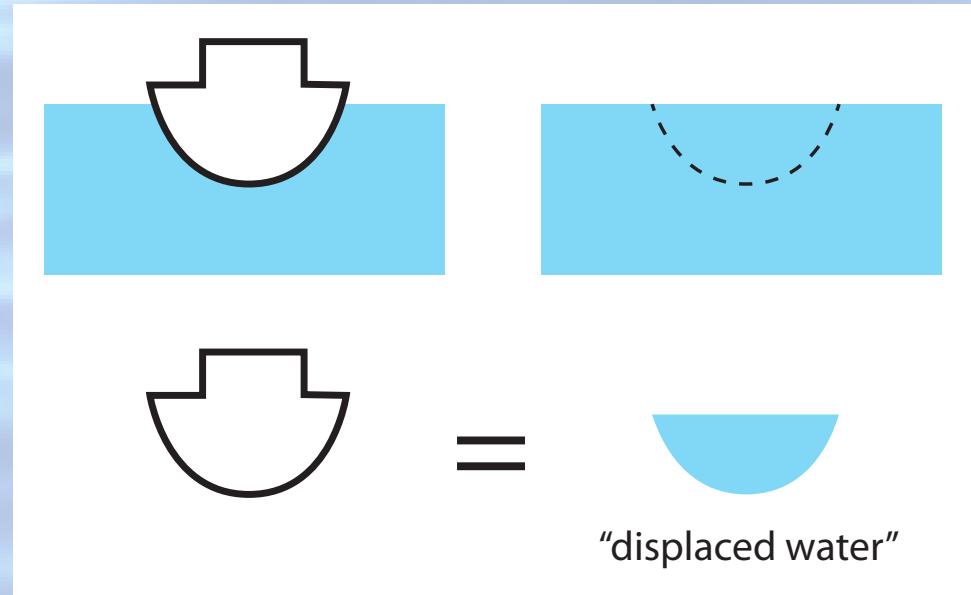
The volume of displaced fluid is equal to the volume of the submerged portion of the object.

An object submerged either fully or partially in a fluid experiences an upward buoyant force the magnitude of which is equal to the magnitude of the force of gravity exerted on the fluid displaced by the object.



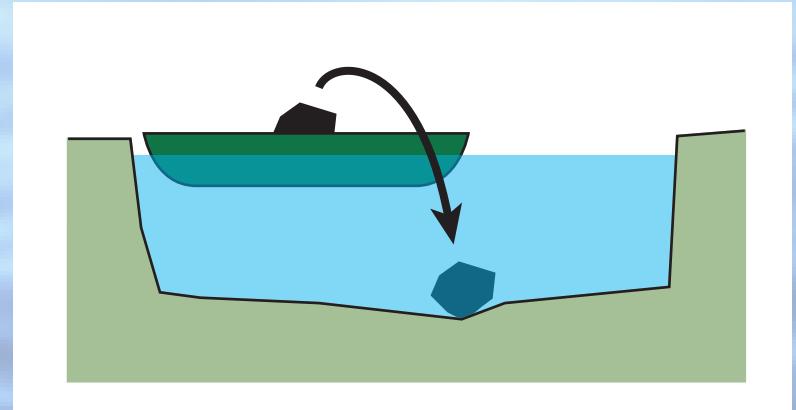
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An object submerged either fully or partially in a fluid experiences an upward buoyant force the magnitude of which is equal to the magnitude of the force of gravity exerted on the fluid displaced by the object.

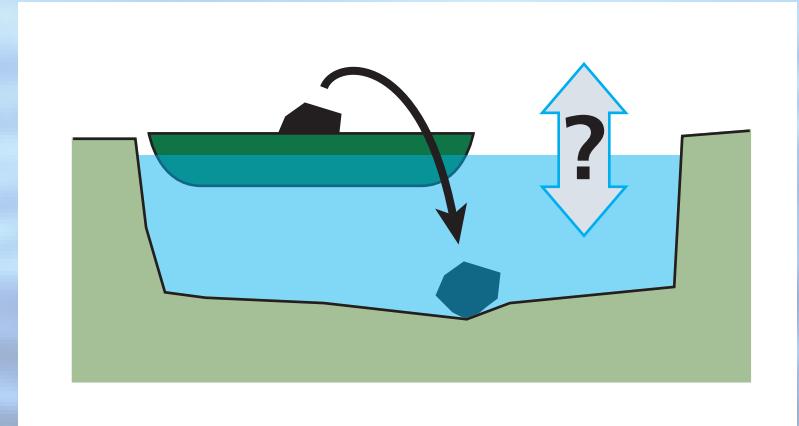


The volume of displaced fluid is equal to the volume of the submerged portion of the object.

A boat carrying a large boulder is floating on a small pond. The boulder is thrown overboard and sinks to the bottom of the pond.



A boat carrying a large boulder is floating on a small pond. The boulder is thrown overboard and sinks to the bottom of the pond.



After the boulder sinks to the bottom of the pond, the level of the water in the pond is

1. higher than
2. the same as
3. lower than

it was when the boulder was in the boat.

A boat carrying a large boulder is floating on a small pond. The boulder is thrown overboard and sinks to the bottom of the pond.



After the boulder sinks to the bottom of the pond, the level of the water in the pond is

- 1. higher than
- 2. the same as
- 3. lower than

it was when the boulder was in the boat.

A boat carrying a large boulder is

fl

de

to

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

A

th

1.

2.

3.

it was when the boulder was in the boat.

A boat carrying a large boulder is

fl

de

to

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

A

th

1.

2.

3.

it was when the boulder was in the boat.

A boat carrying a large boulder is

fl

de

to

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

1. made a commitment

A
th

1.

2.

3.

it was when the boulder was in the boat.

A boat carrying a large boulder is

fl

de

to

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

1. made a commitment
2. externalized your answer

1.

2.

3.

it was when the boulder was in the boat.

A boat carrying a large boulder is

fl

de

to

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

1.

2.

3.

it was when the boulder was in the boat.

A boat carrying a large boulder is

fl

de

to

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

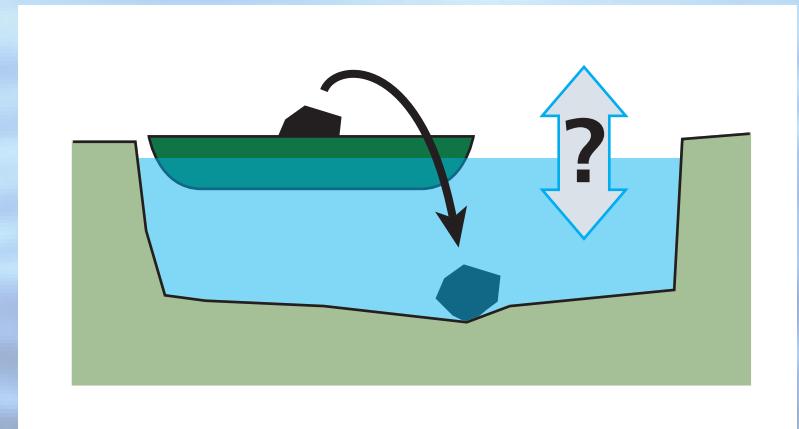
1.

2.

3.

it was when the boulder was in the boat.

A boat carrying a large boulder is floating on a small pond. The boulder is thrown overboard and sinks to the bottom of the pond.

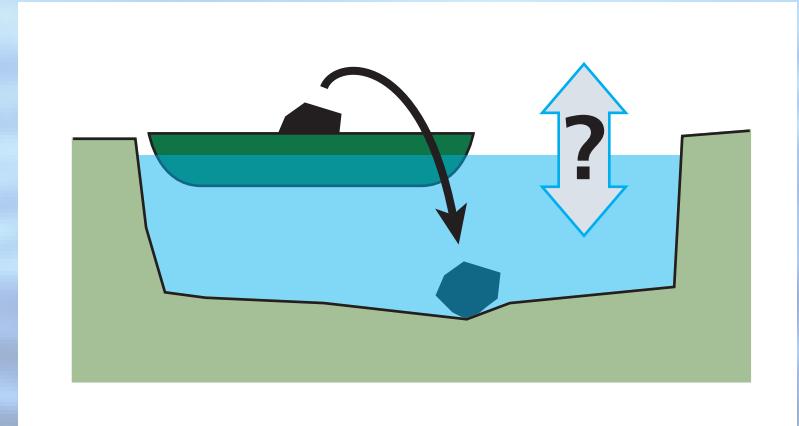


After the boulder sinks to the bottom of the pond, the level of the water in the pond is

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it was when the boulder was in the boat.

A boat carrying a large boulder is floating on a small pond. The boulder is thrown overboard and sinks to the bottom of the pond.

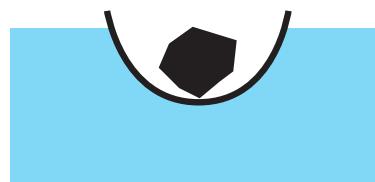


After the boulder sinks to the bottom of the pond, the level of the water in the pond is

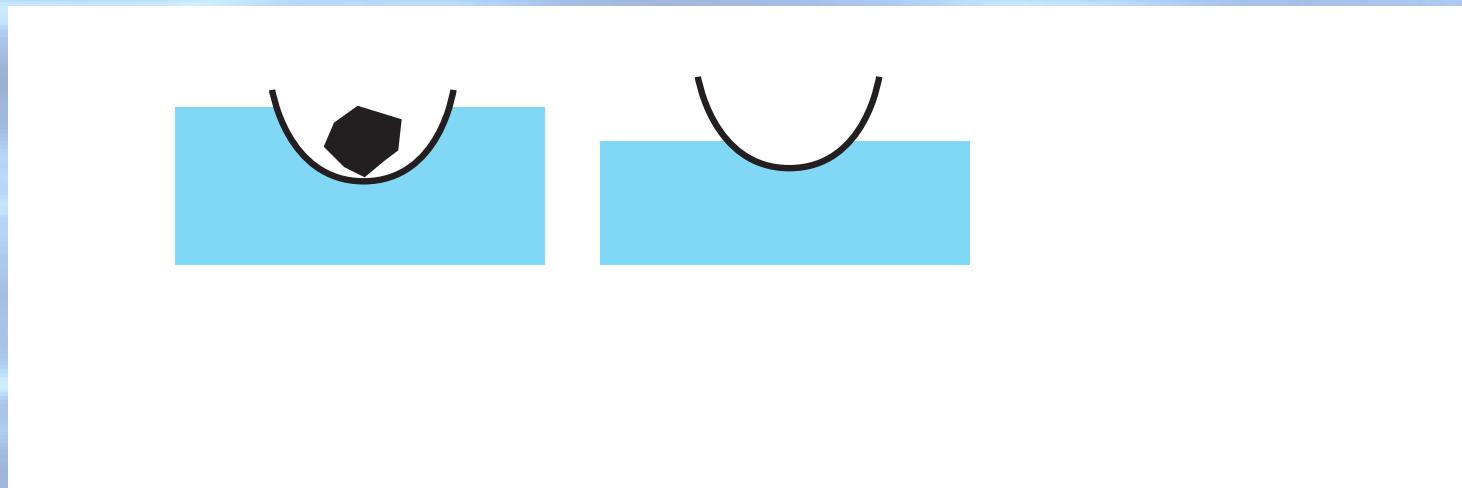
1. higher than
2. the same as
3. lower than ✓

it was when the boulder was in the boat.

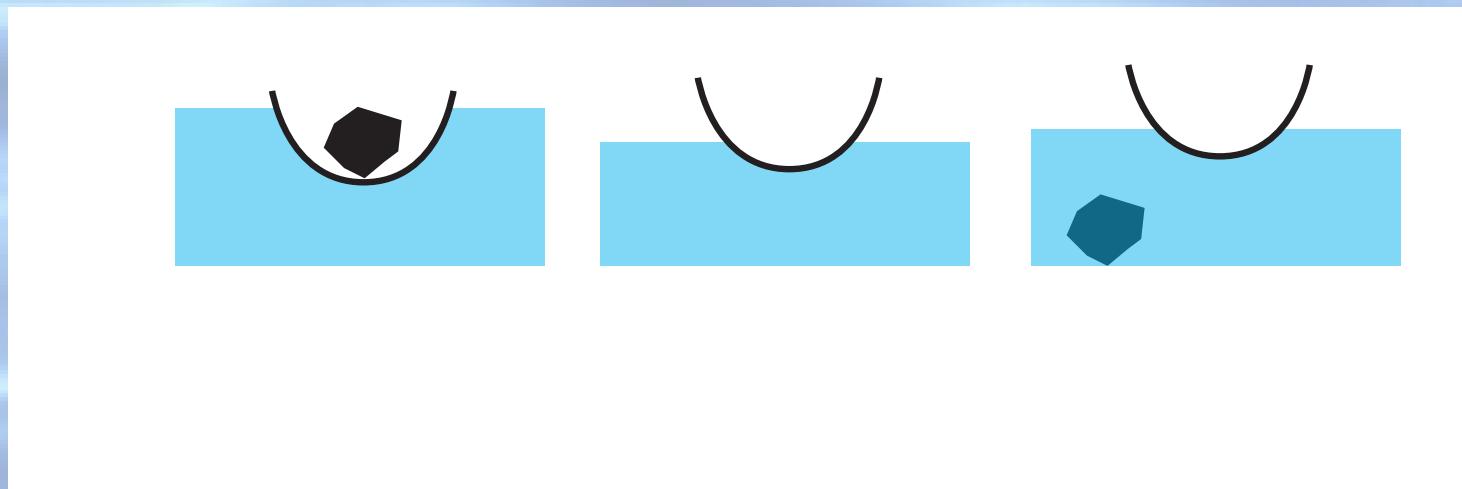
remember: amount of displaced water



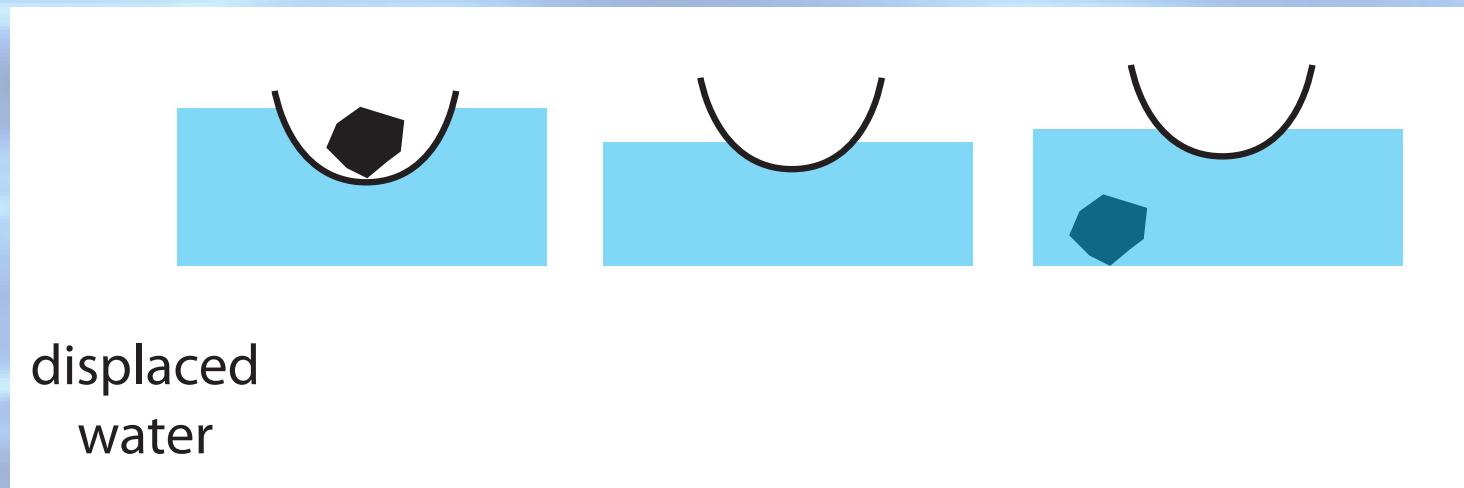
remember: amount of displaced water



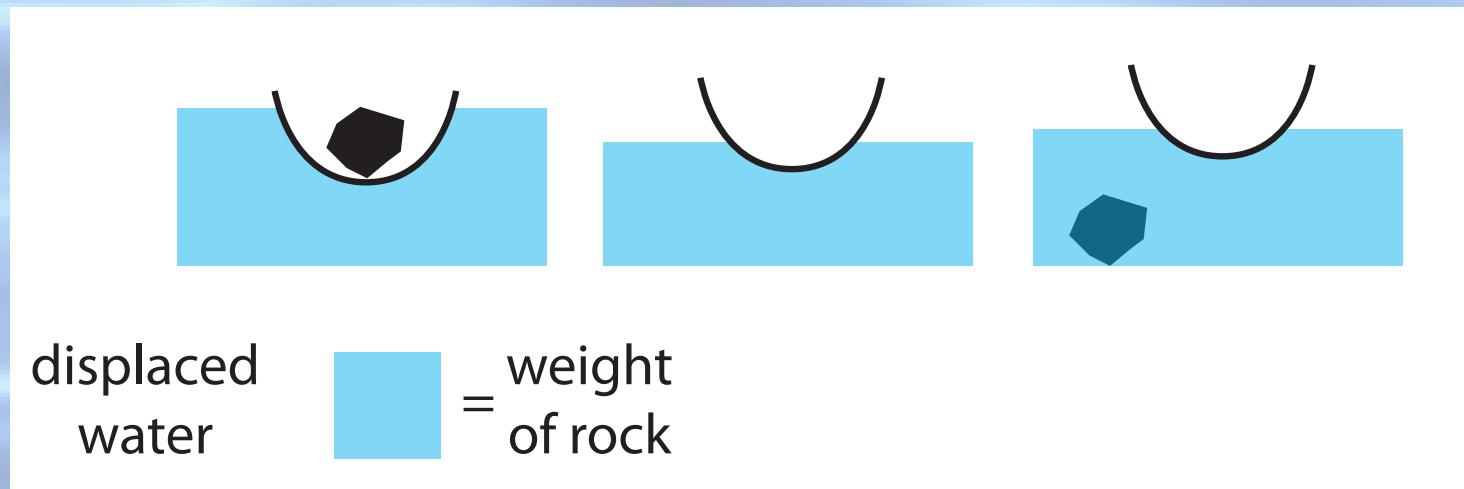
remember: amount of displaced water



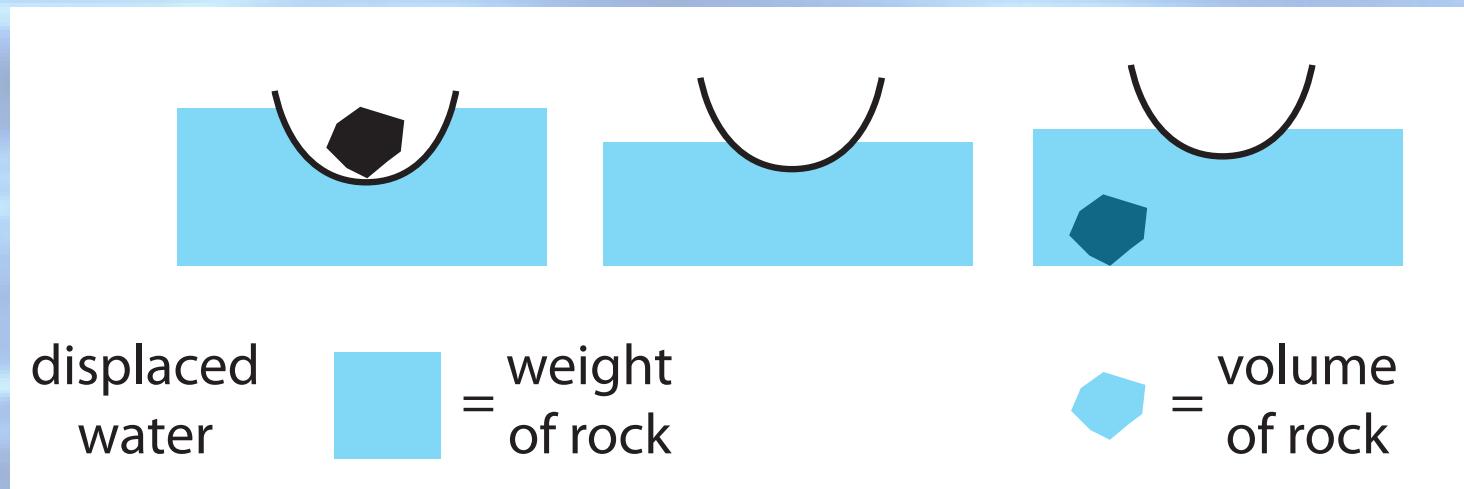
remember: amount of displaced water



remember: amount of displaced water



remember: amount of displaced water



remember: amount of displaced water



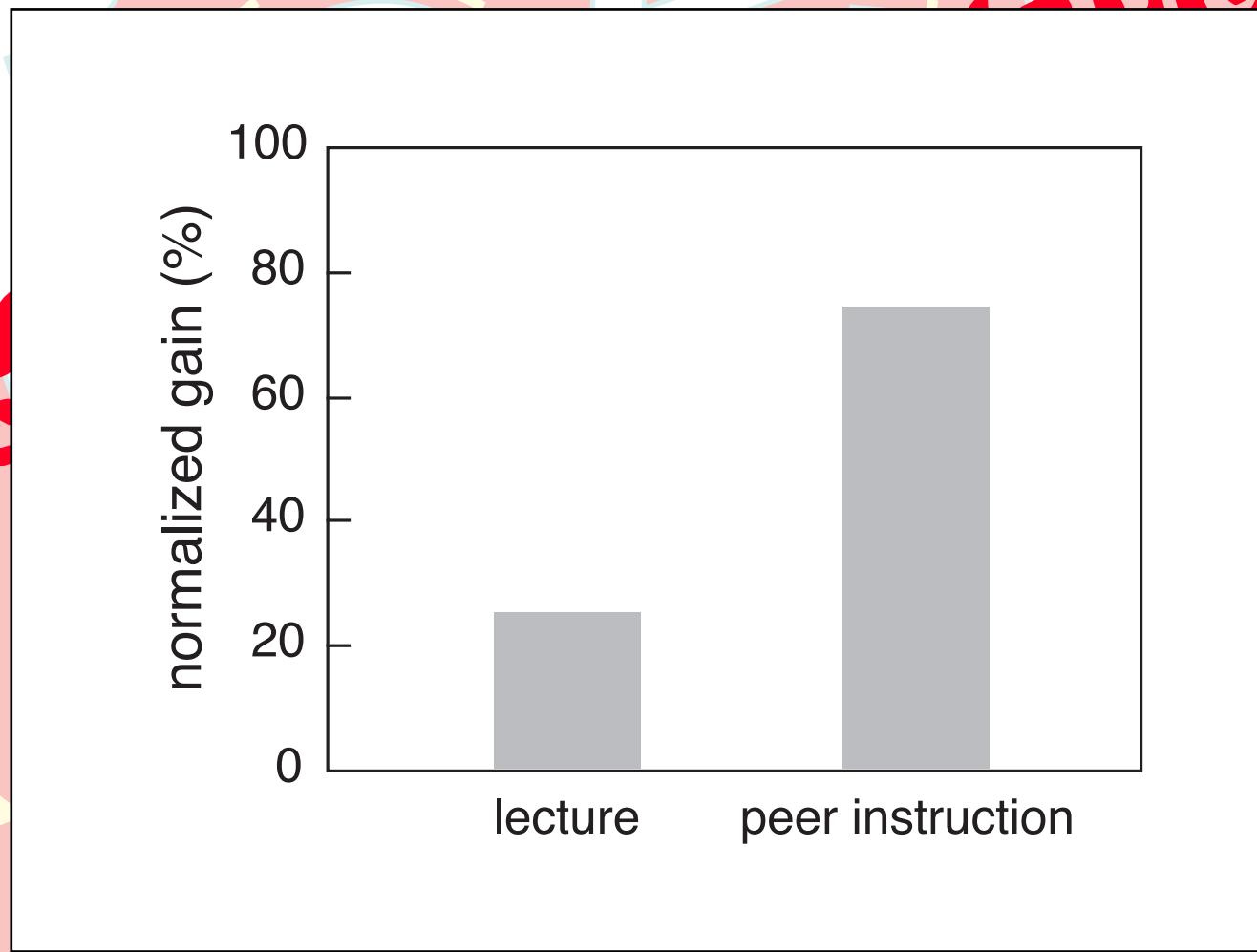
ever
back to pl

INSTRUCTION

Higher learning gains

INSTRUCTION

The image features a large, white, stylized letter 'I' on a light blue background. Inside the vertical stroke of the 'I', there is a graphic of a sun with yellow rays. A red banner with the words 'Higher learning gains' in white, bold, sans-serif font is draped diagonally across the upper portion of the 'I'. Below the 'I', the word 'INSTRUCTION' is written in a large, white, bold, sans-serif font, also oriented diagonally. A blue dotted line with small arrows at each end runs from the bottom left towards the top right, intersecting the 'I' and the banner.

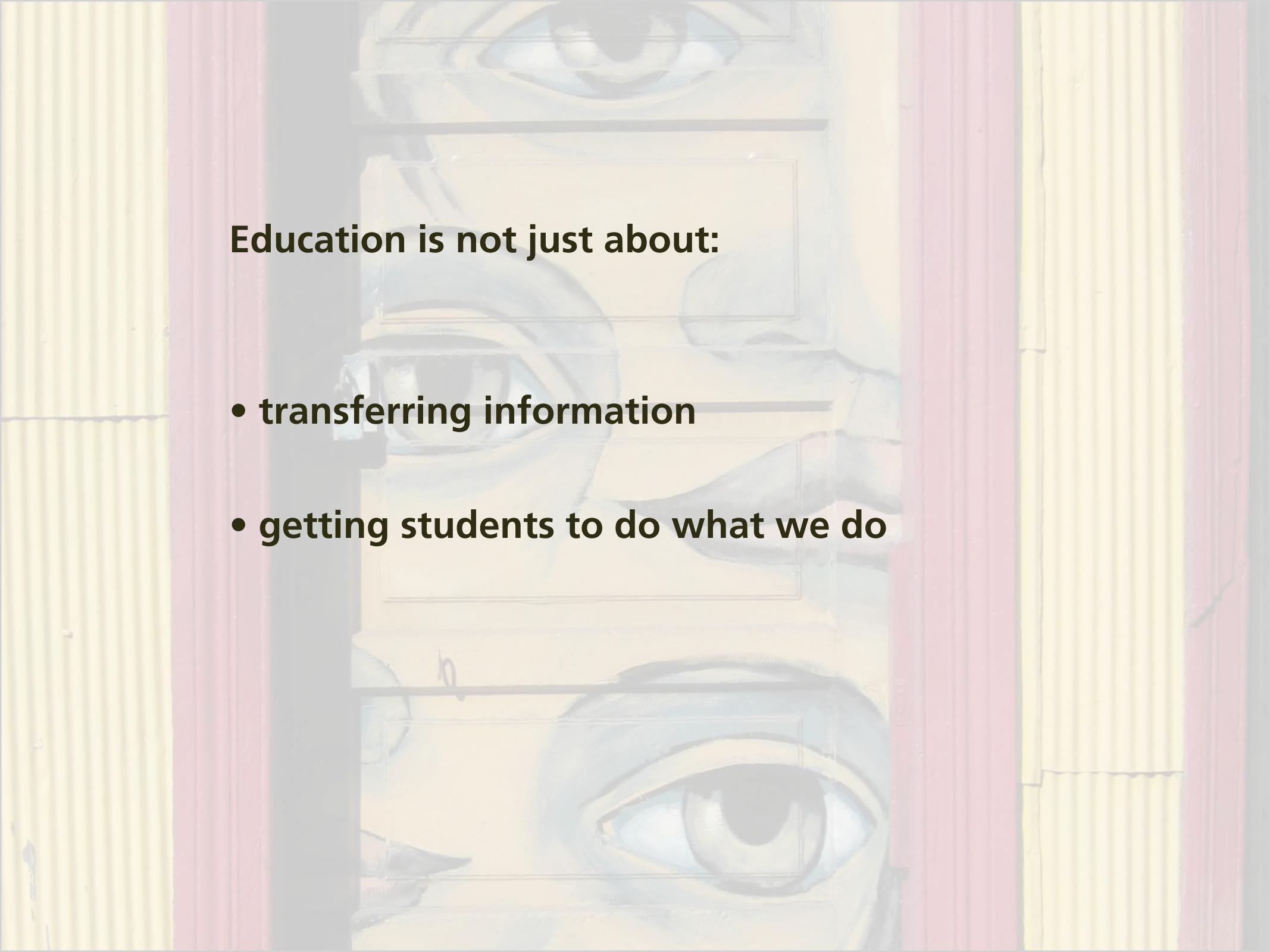


Higher learning gains

Better retention

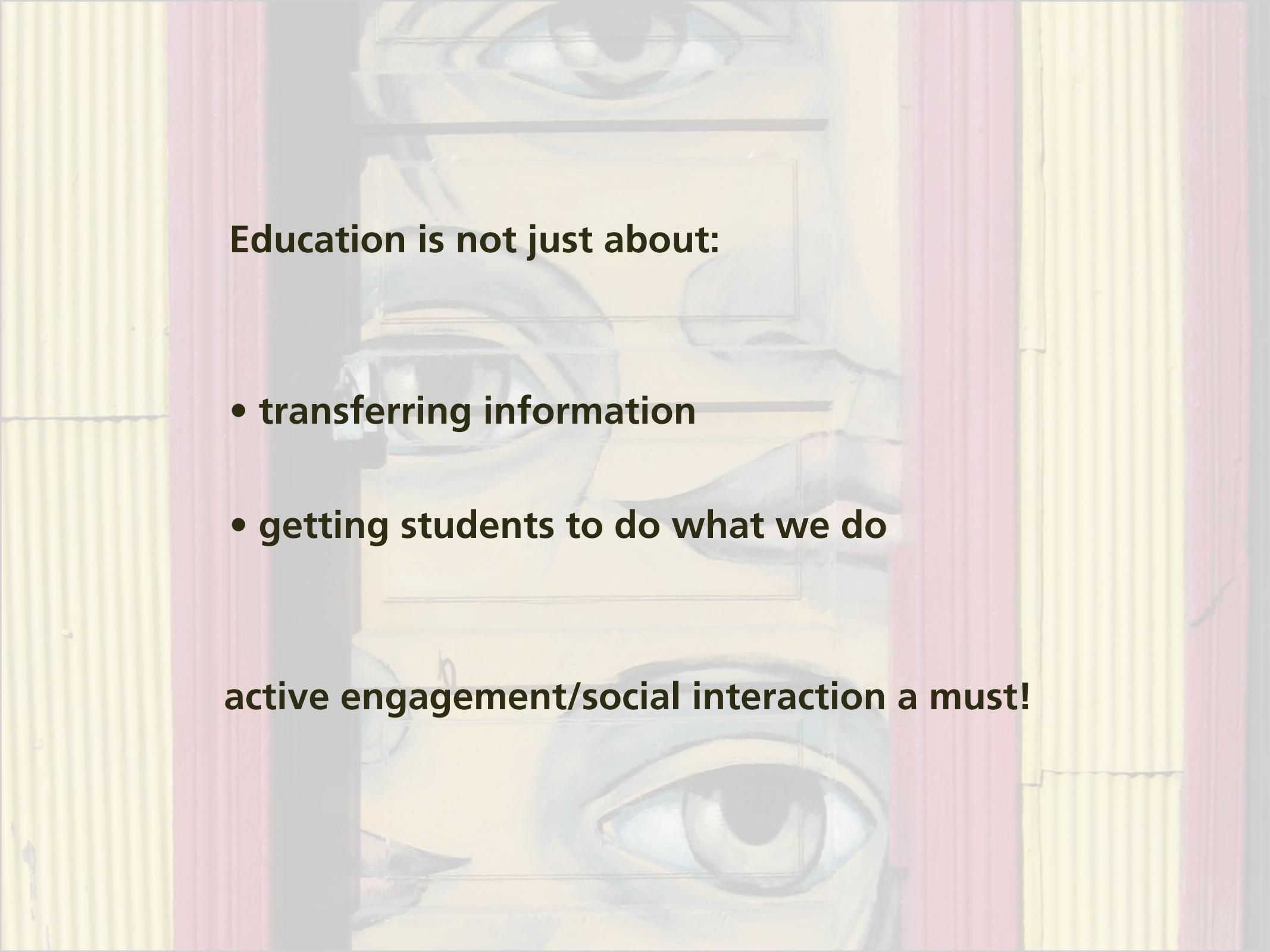
INSTRUCTION

The image features a large, white, stylized question mark centered on a light blue background. Inside the question mark, the letter 'e' is prominently displayed in a large, light blue font with a dashed yellow outline. A dotted yellow arrow originates from the bottom left and points towards the 'e'. Below the question mark, three main text elements are arranged diagonally from bottom-left to top-right: 'Higher learning gains' in a bold, red, sans-serif font; 'Better retention' in a bold, red, sans-serif font; and 'INSTRUCTION' in a bold, white, sans-serif font. All three text elements are slanted at approximately a 45-degree angle.

The background of the slide features a stack of books with spines in various colors like yellow, pink, and red. On top of the stack is a book with a large, detailed illustration of a human eye looking directly forward. The eye has a light blue iris and a dark pupil. The surrounding books have simple, dark-colored spines.

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

active engagement/social interaction a must!



ericmazur.com

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