

# Innovating education to educate innovators



NMES Faculty Education Network – Distinguished  
Speaker Series/King's Education Talk  
King's College, London  
June 25, 2021



# Innovating education to educate innovators



**@eric\_mazur**

NMES Faculty Educator Series/Invited  
Speaker Series/King's Education Talk  
King's College, London  
June 25, 2021





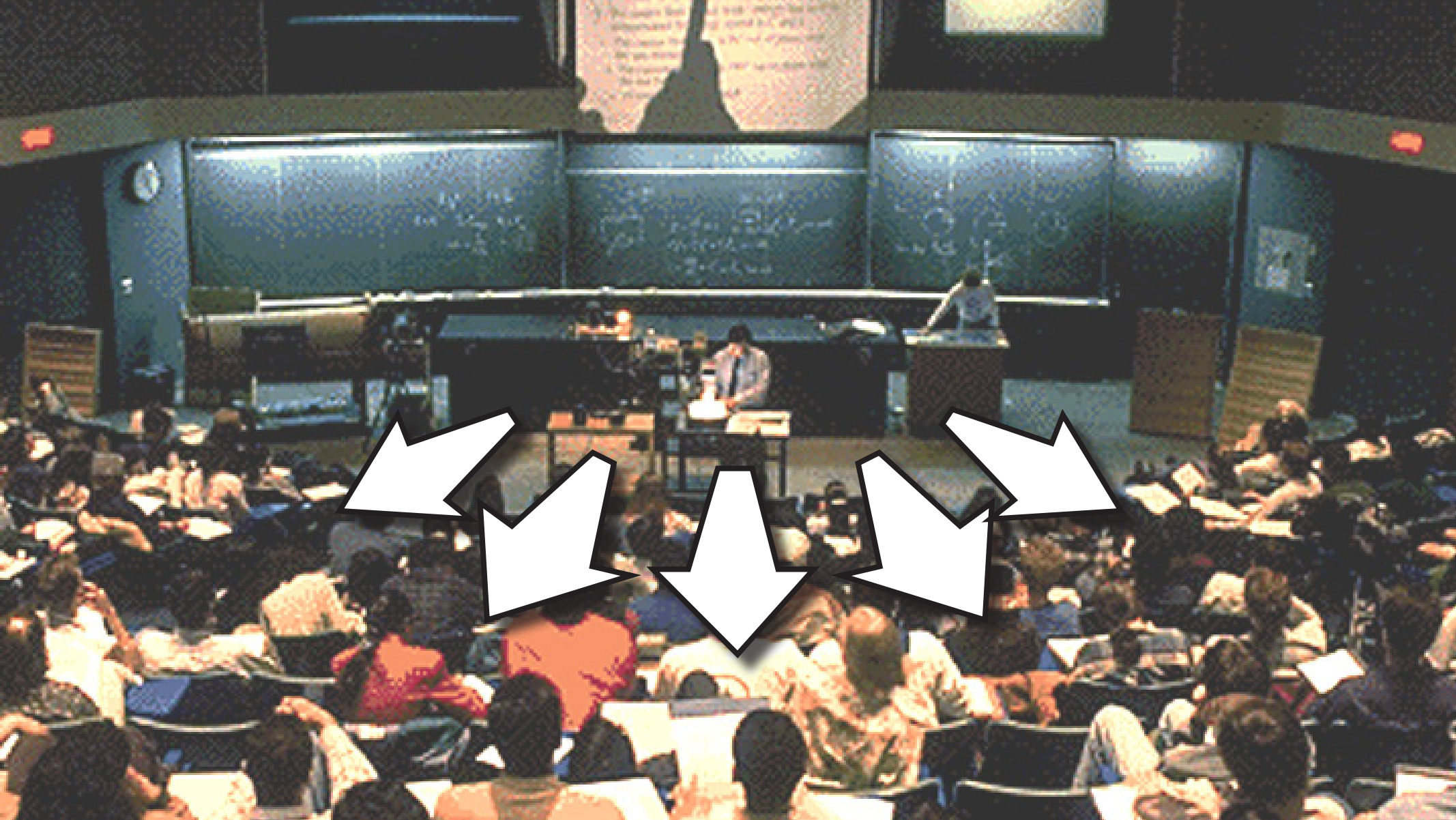












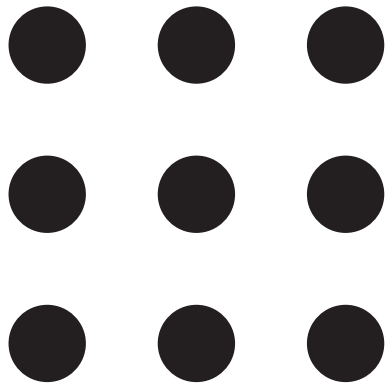
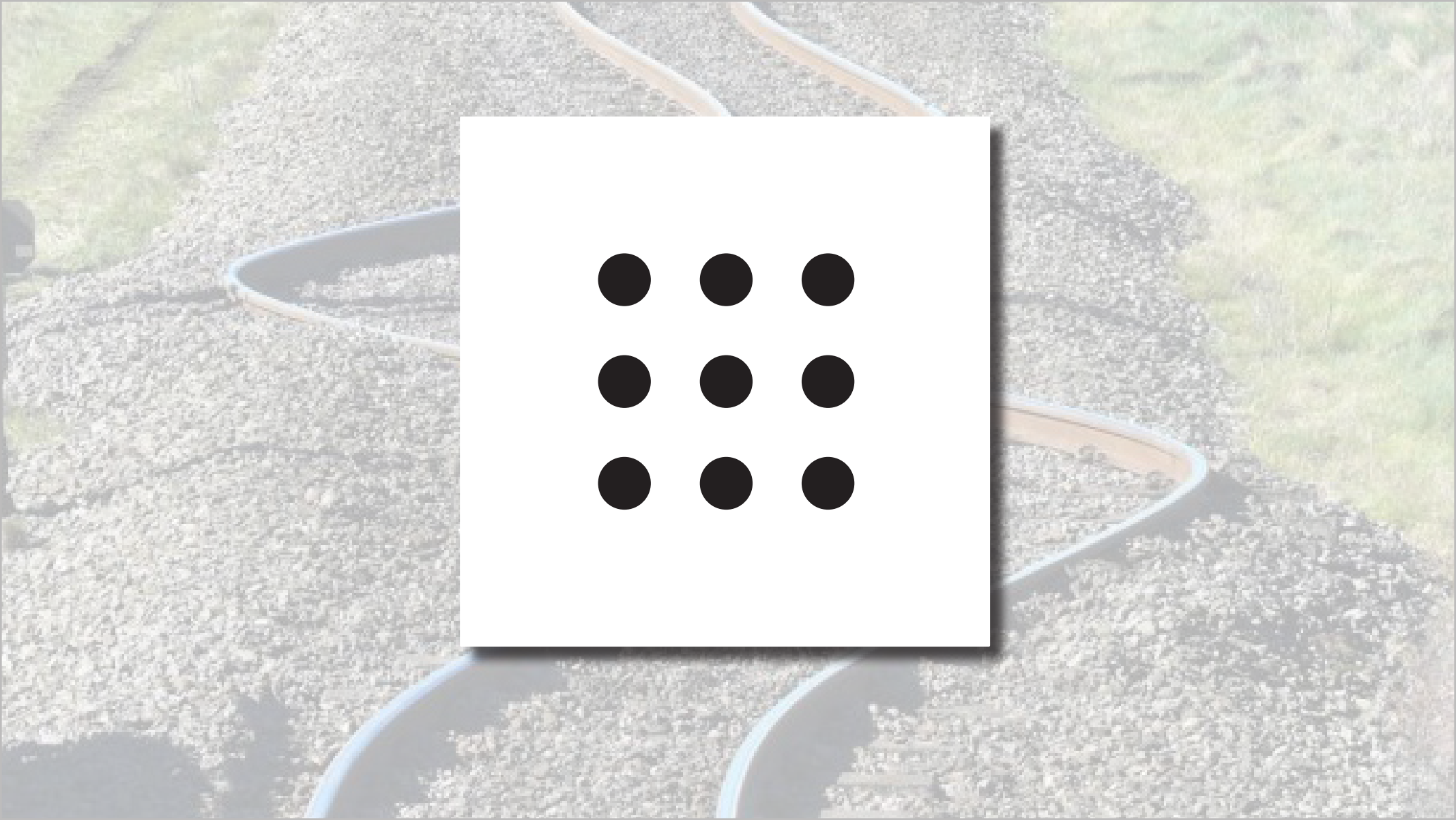


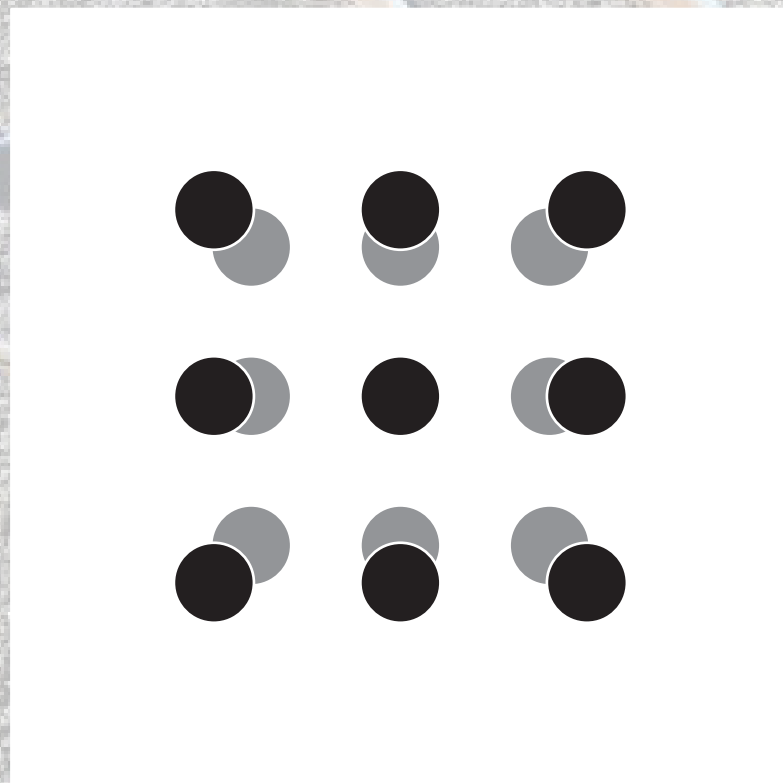
**try something different?**



An aerial photograph of a railway track. The track is composed of two parallel steel rails, one of which is highlighted in a light blue color. The rails are supported by wooden sleepers and are laid on a bed of dark grey 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.

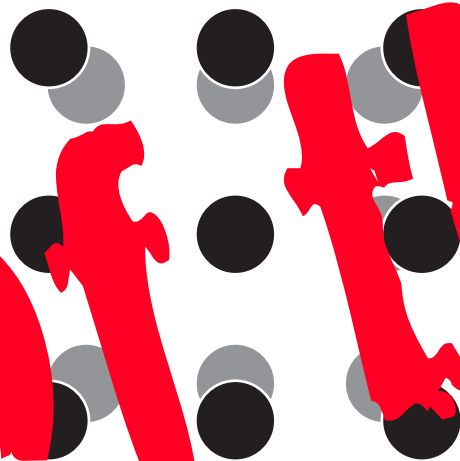
**thermal expansion**





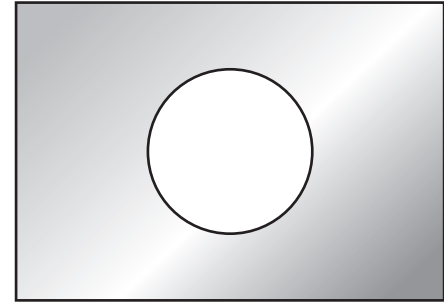


**all of them!**



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

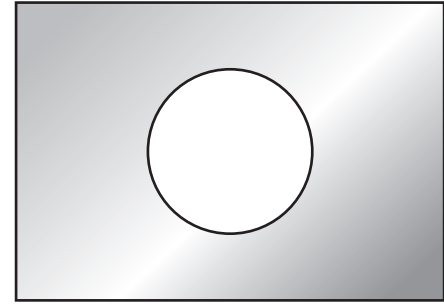
**When the plate is uniformly heated, the diameter of the hole**



**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

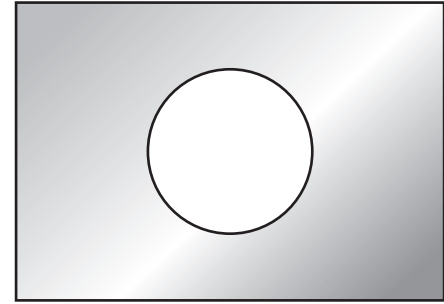


1. increases.
2. stays the same.
3. decreases.

**Consider 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...**

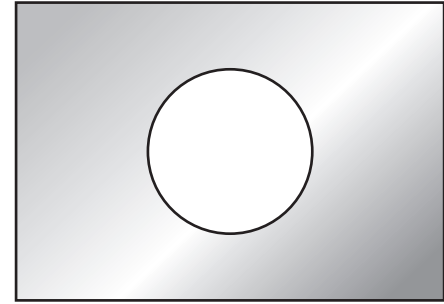
- 1. made a commitment**
- 2. externalized your answer**
- 3. moved from the answer/fact to reasoning**
- 4. became emotionally invested in the learning process**



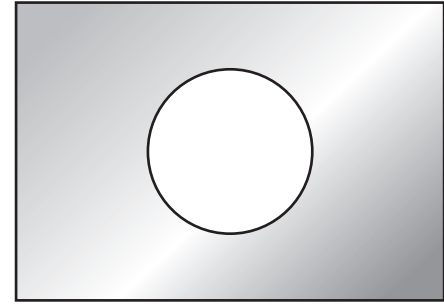
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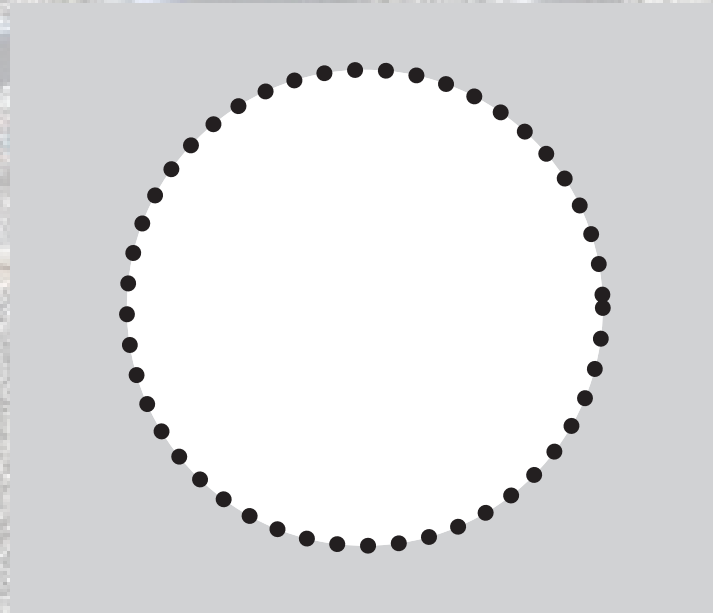
**Consider a rectangular metal plate with a circular hole in it.**



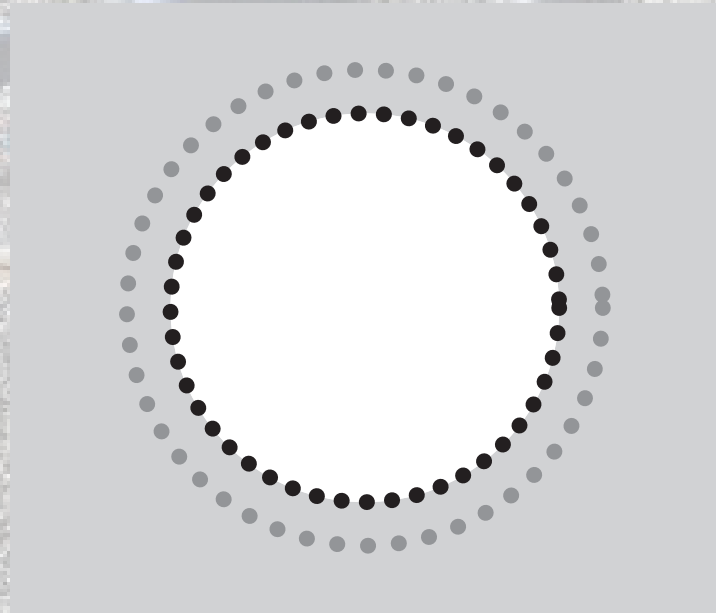
**When the plate is uniformly heated, the diameter of the hole**

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

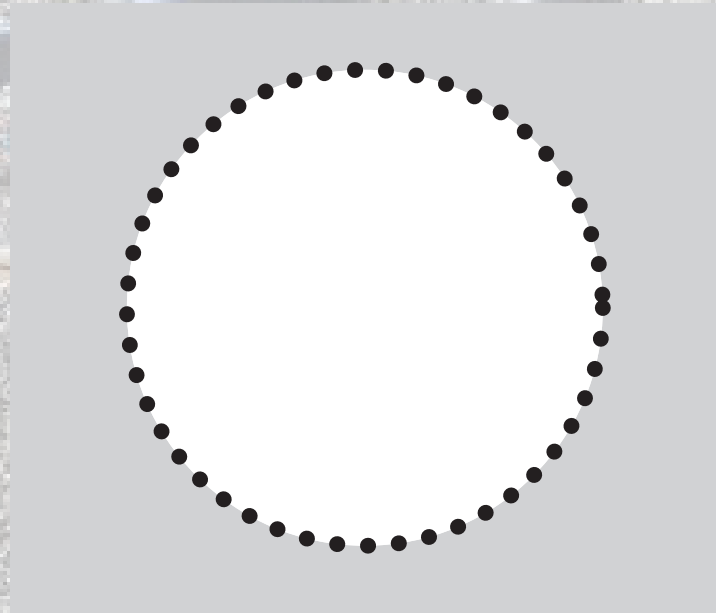
**consider atoms at rim of hole**



**consider atoms at rim of hole**

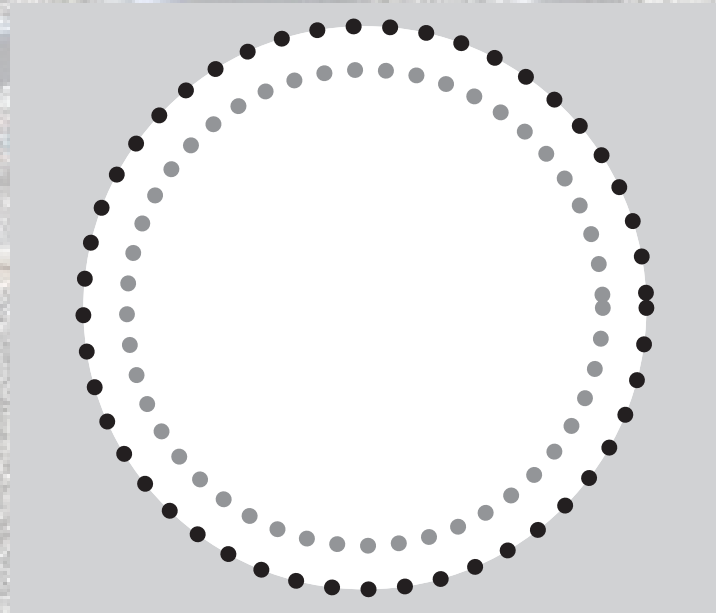


**consider atoms at rim of hole**





**consider atoms at rim of hole**



consider atoms at rim of hole

**you won't forget this**

A diagram showing a spiral path on a gravel surface, with a central circular graphic containing a dotted border and a white center. The text "you won't forget this" is written in a large, red, stylized font across the center of the image.

Back to pl

tion

Peer



TION

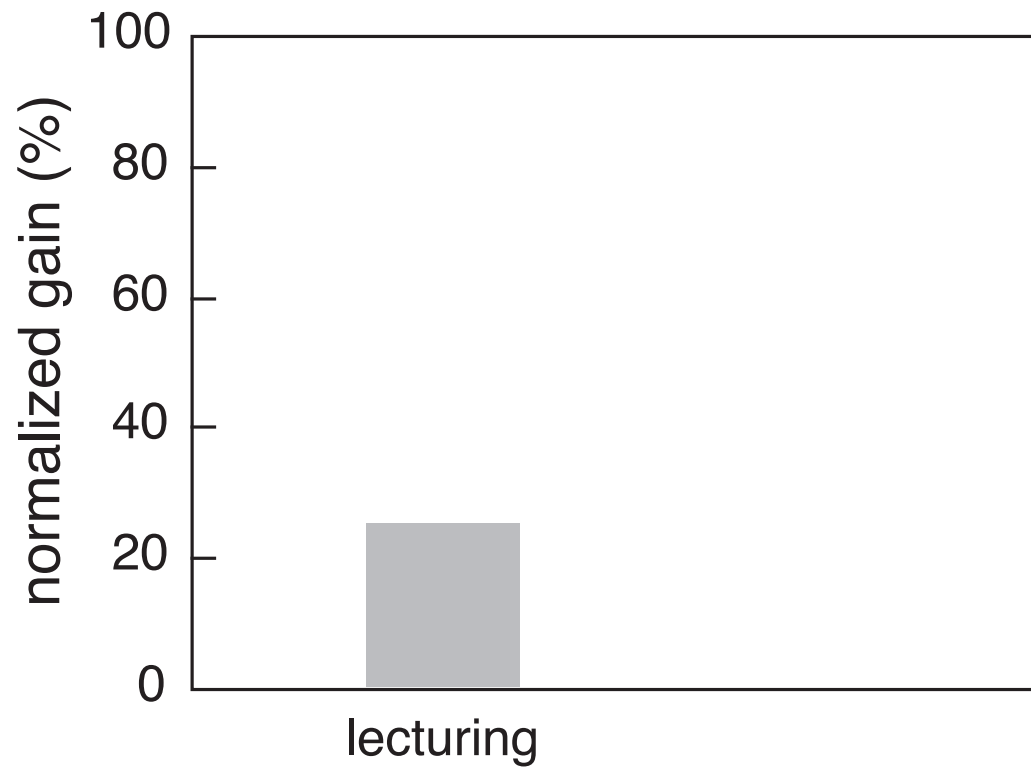
**Higher learning gains**

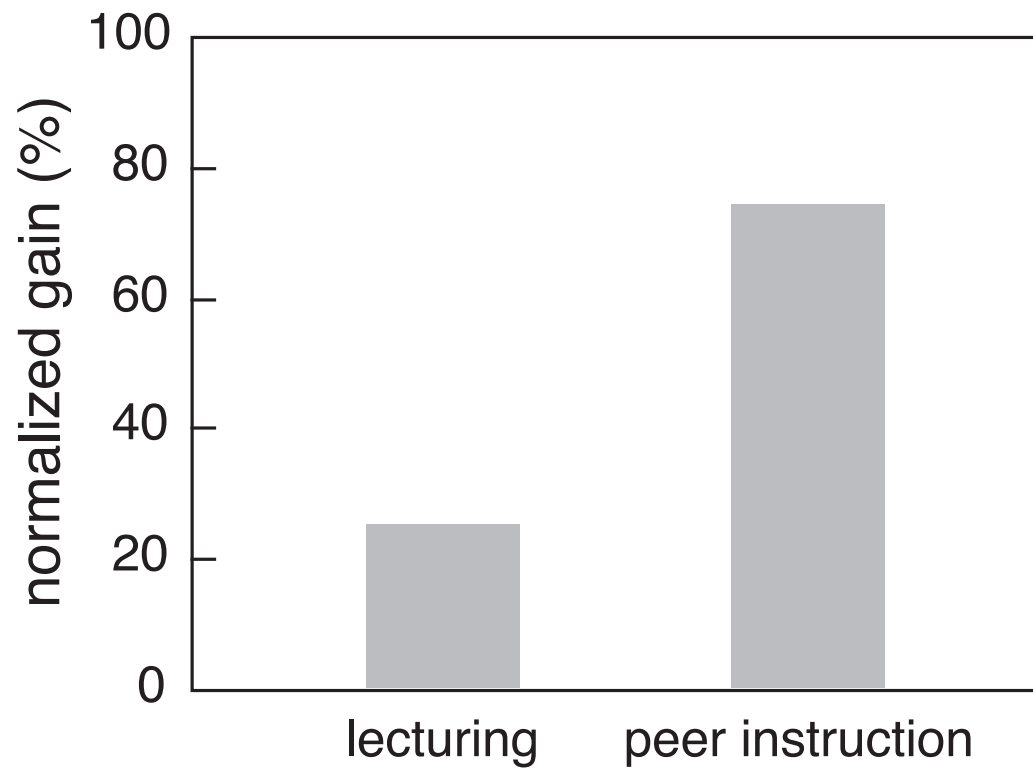


The background features a large, stylized white 'U' and 'e' on a pink background. A dashed yellow arrow points from the 'e' towards the top right. A dotted blue arrow points from the bottom left towards the 'e'. The text 'Higher learning gains' is written in a bold, red, sans-serif font, slanted upwards from left to right, and is positioned over the 'U' and 'e'.

U  
e  
N







**Higher learning gains**

**Better retention**

INSTRUCTION





# Moving online

***"How can I transfer online what I do in the classroom?"***

***(challenge)***

***"What can I do online that I cannot do in the classroom?"***

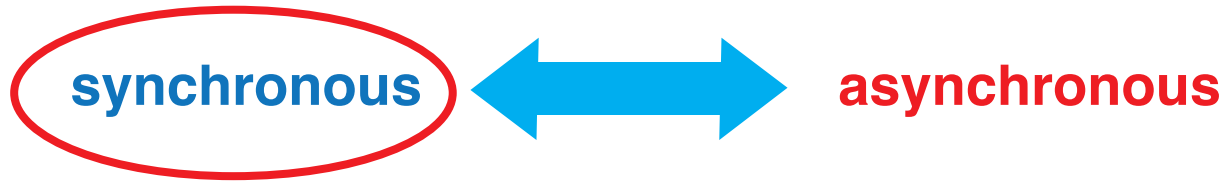
***(opportunity)***



# Moving online

**synchronous**  **asynchronous**

# Moving online



**everybody together  
at the same *time***

# Moving online

**synchronous**



**asynchronous**

**instructor-paced**



**self-paced**

# Moving online

synchronous



asynchronous

instructor-paced



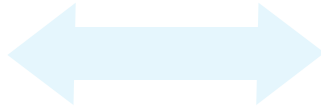
self-paced

everybody together  
at the same *pace*

# Moving online

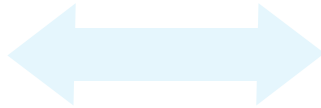
**lecture**

**synchronous**



**asynchronous**

**instructor-paced**

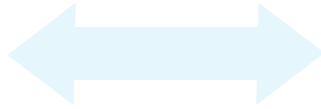


**self-paced**

# Moving online

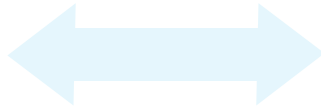
**recorded lecture**

synchronous



**asynchronous**

**instructor-paced**



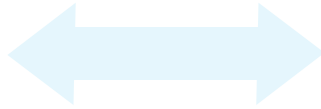
**self-paced**



# Moving online

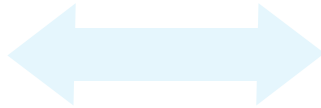
lab

**synchronous**



**asynchronous**

**instructor-paced**

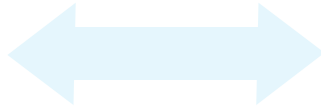


**self-paced**

# Moving online

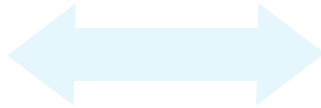
homework/study

synchronous



**asynchronous**

instructor-paced



**self-paced**

# Moving online

**synchronous**



**asynchronous**

**instructor-paced**



**self-paced**

# Moving online

**synchronous**



**asynchronous**

**instructor-paced**



**self-paced**

# Moving online

**synchronous**



**asynchronous**

**instructor-paced**



**self-paced**

# Moving online

**synchronous**



**asynchronous**

**instructor-paced**



**self-paced**

**more time for personalized instruction!**





**Education in 21st century is not just about:**

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

**social engagement in & out of classroom a must!**



**ericmazur.com**

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**@eric\_mazur**