Flipping the STEM Classroom

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Yale University
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Think of something you are very good at.

How did you get good at this?

1 listening to lectures
2 practice
3 observation
4 other

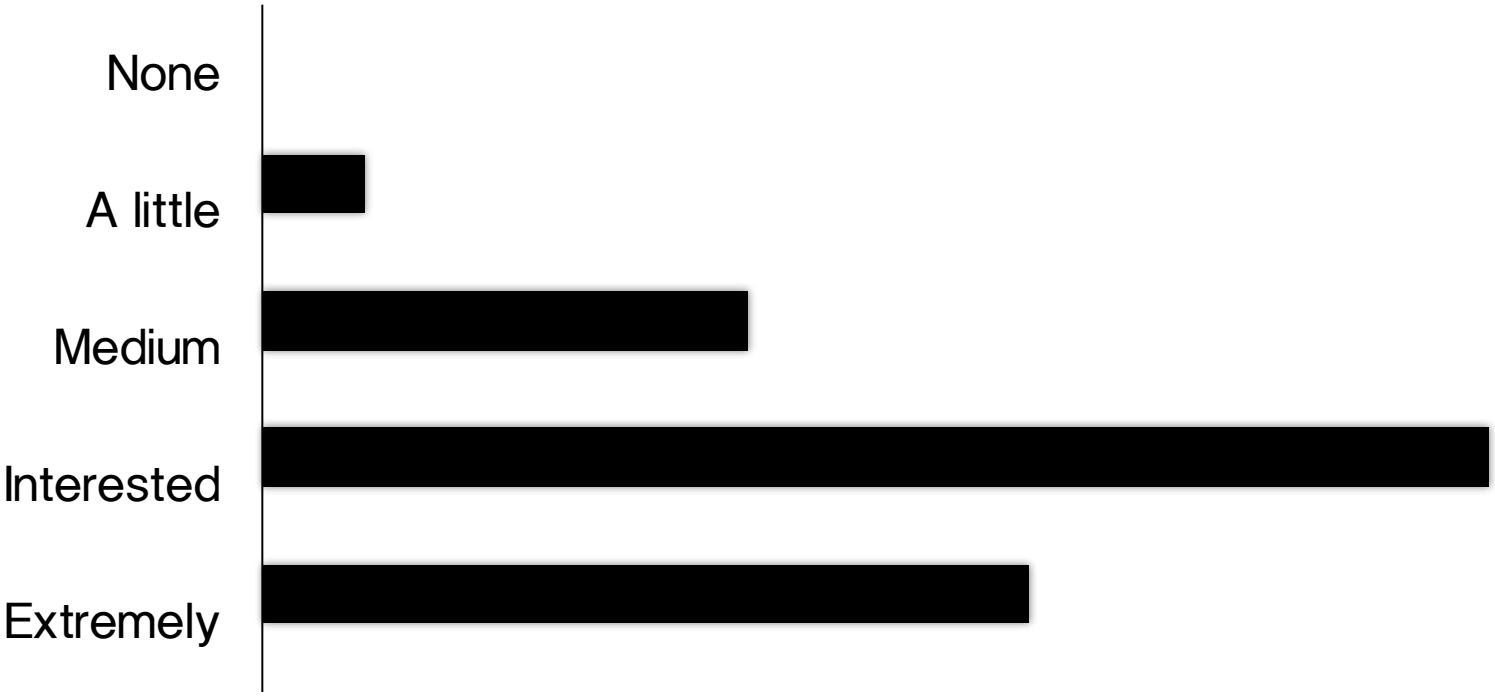
1 listening to lectures
2 practice
3 observation
4 other

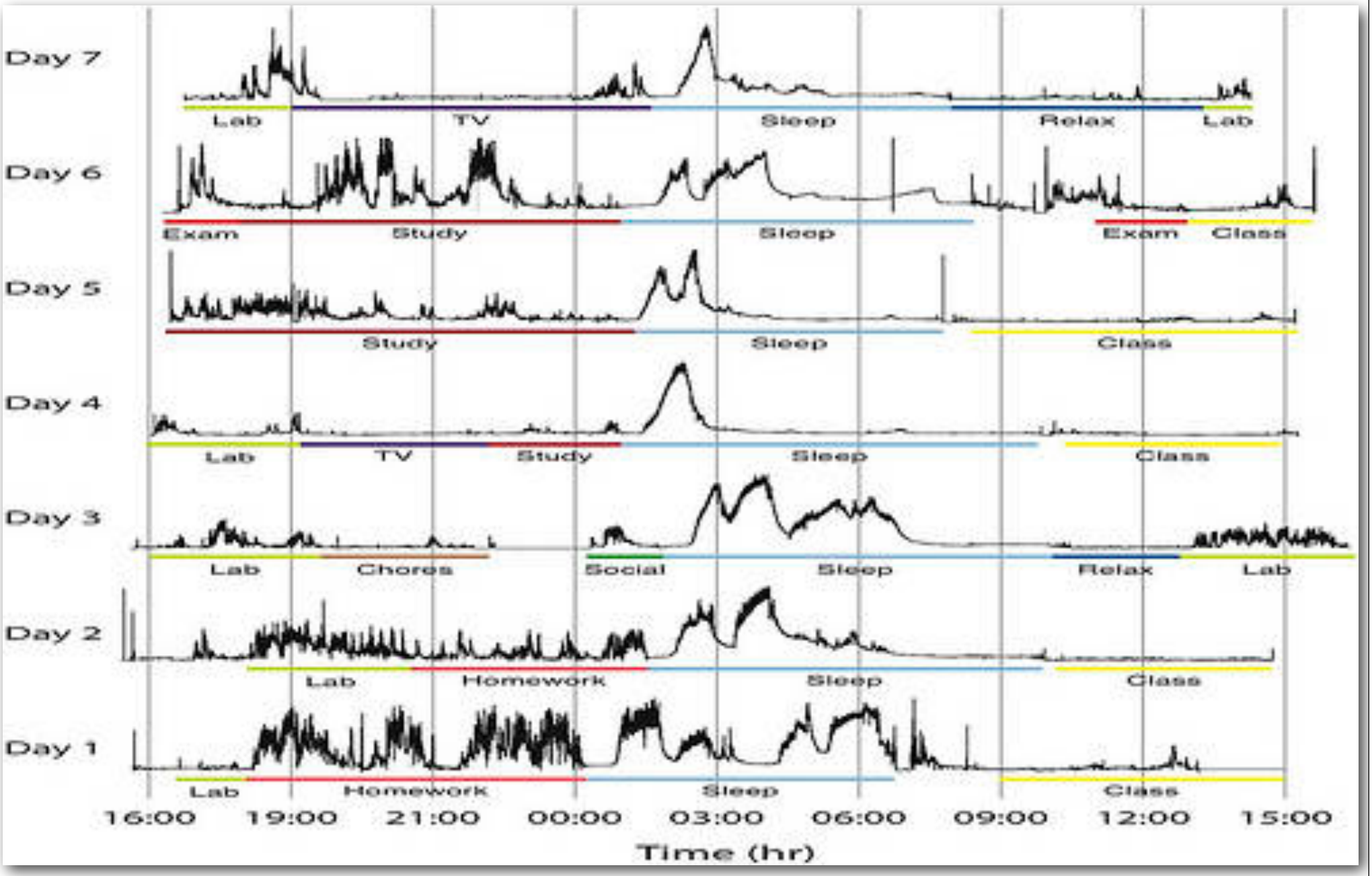
“A student in the elements gets no such training by studying even a good textbook, though he really master it, nor yet by sitting at the feet of the most admirable lecturer.”

Charles Eliot, 1869

What is our current model of education based on?

Interest

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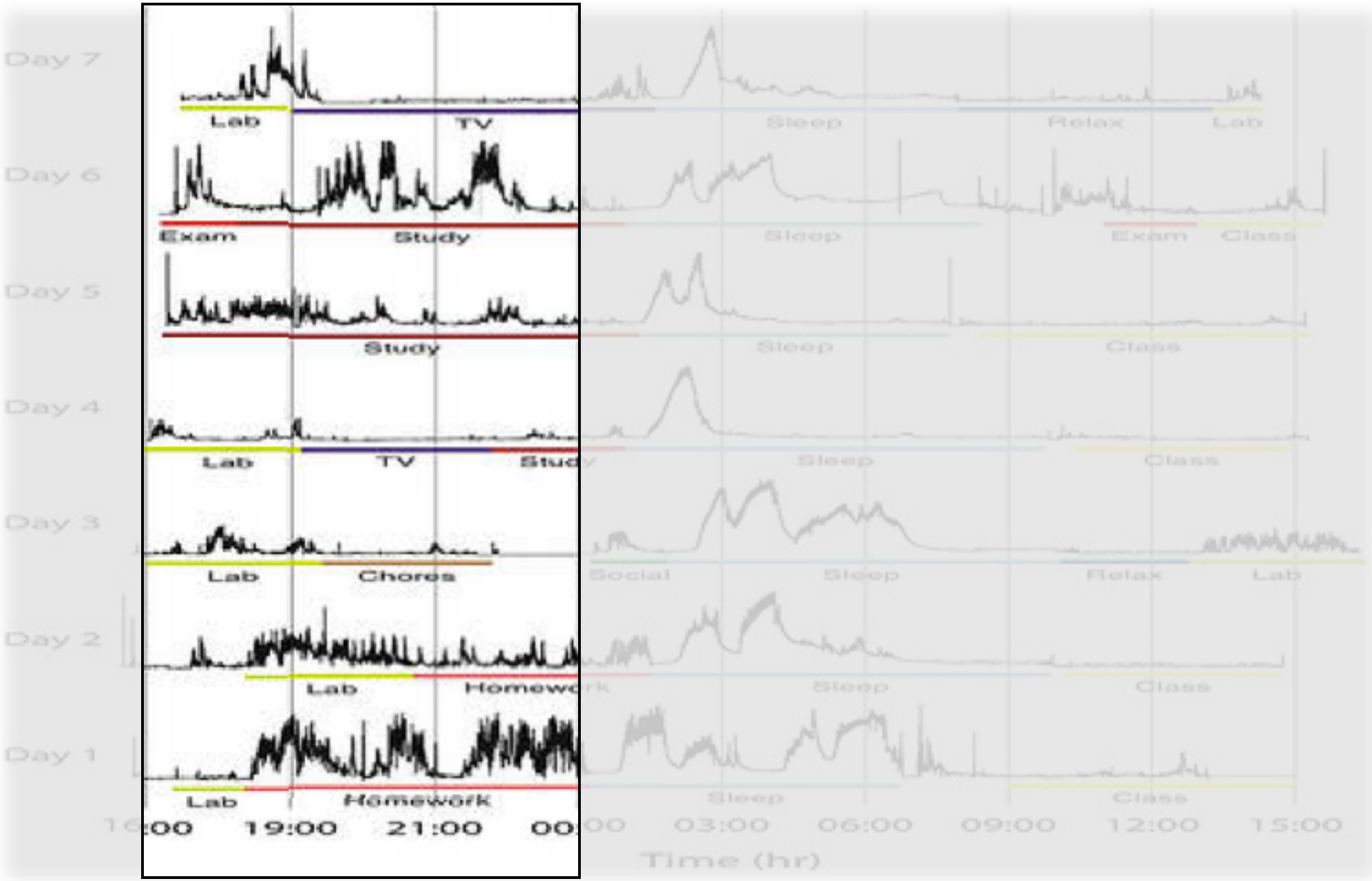
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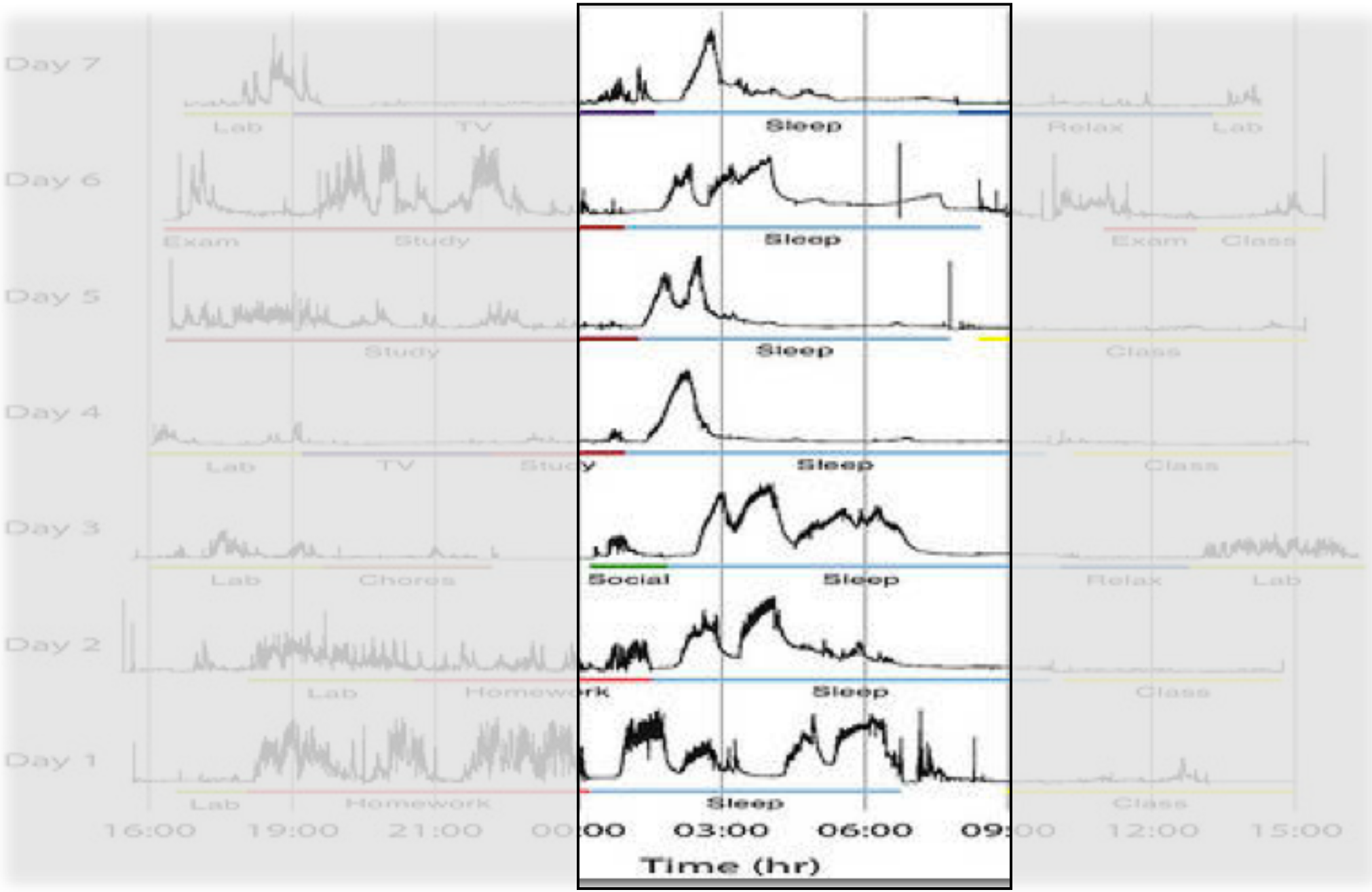
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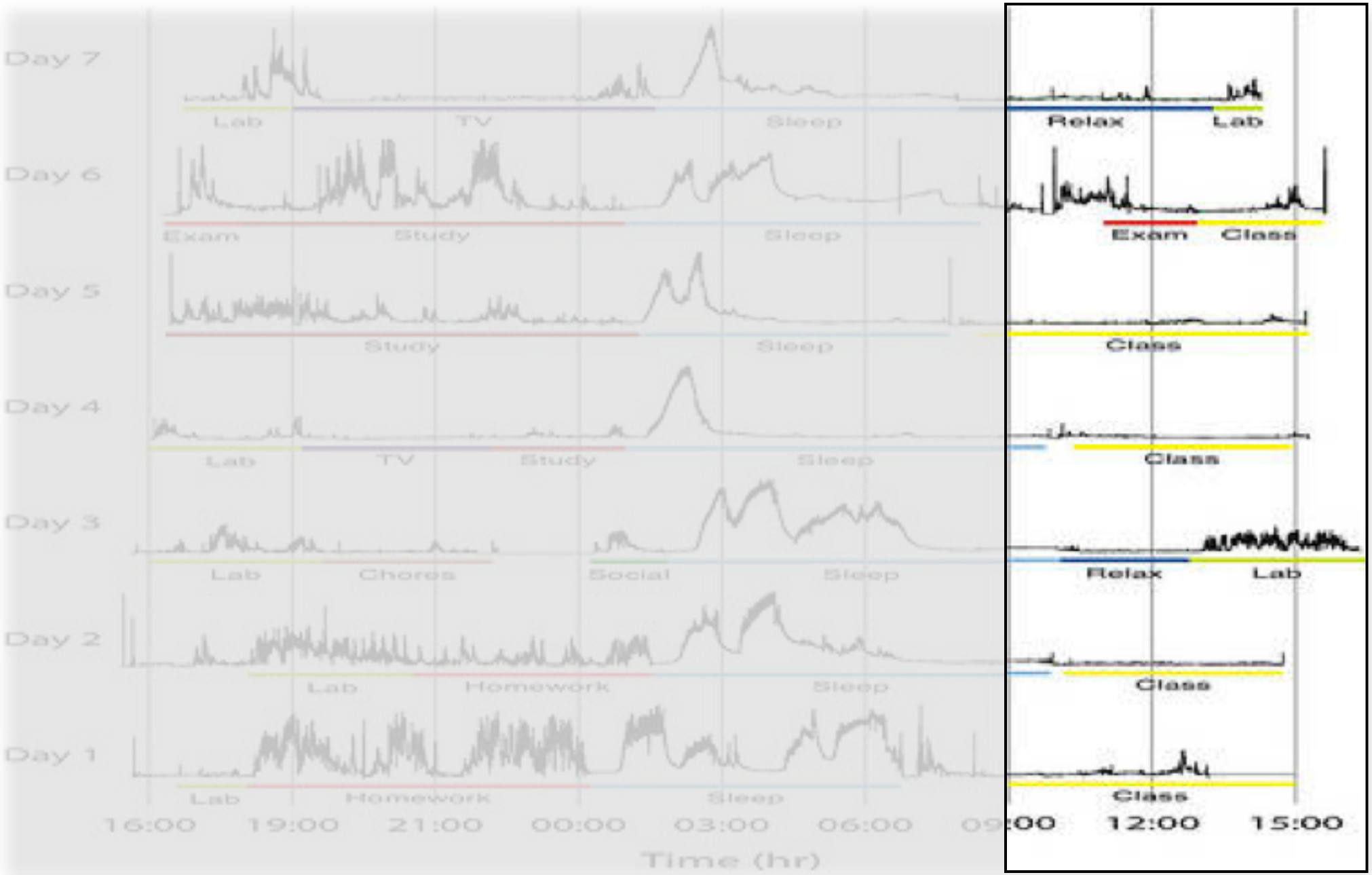
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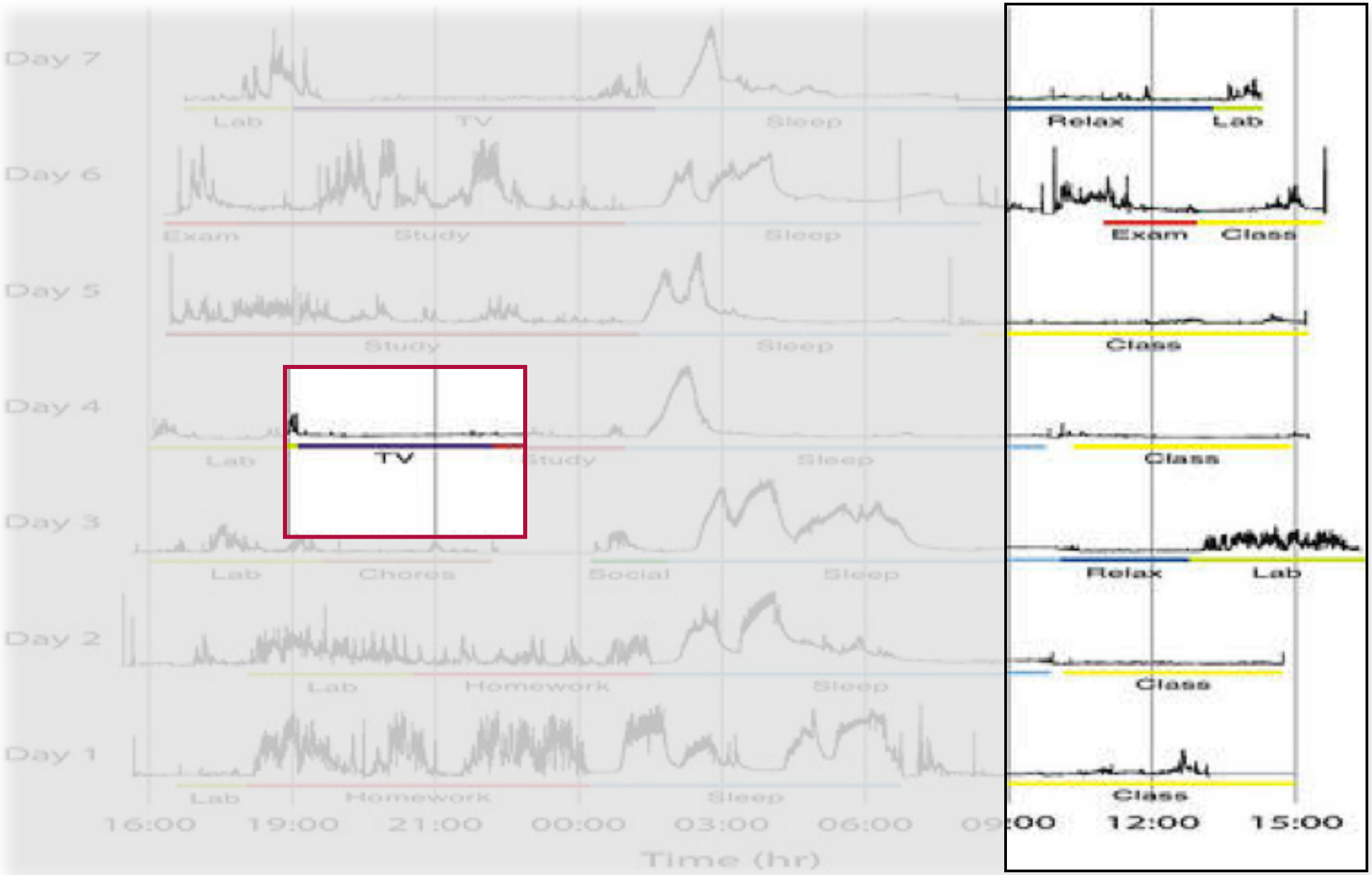
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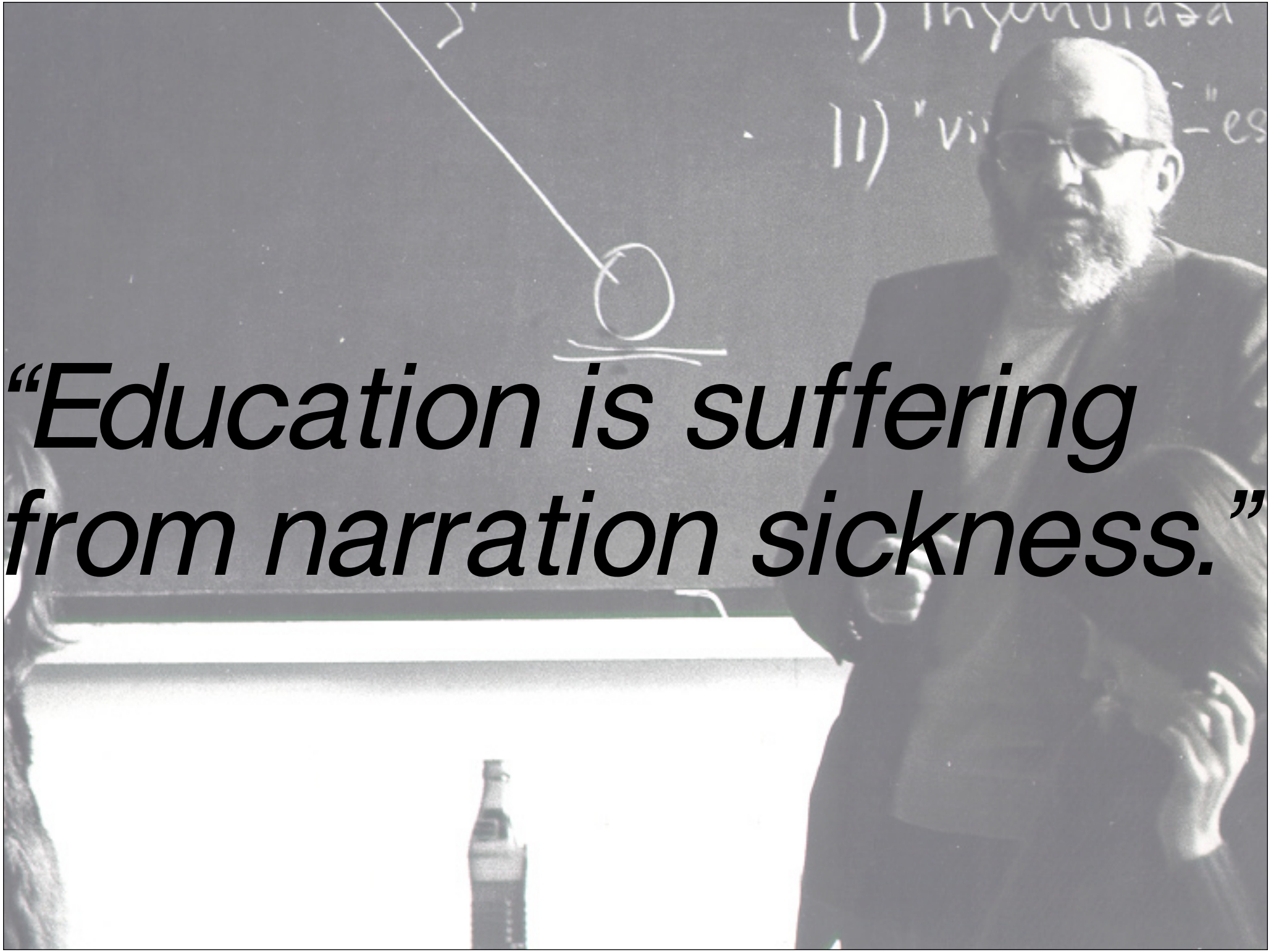


“Education is suffering from narration sickness.”

Education doesn’t have to be this way.

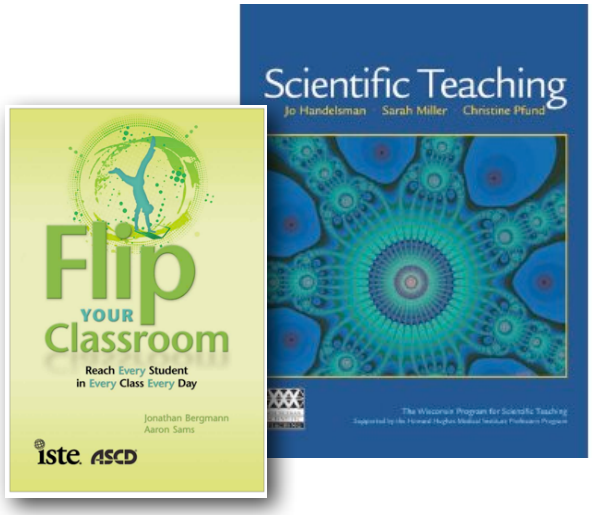
What is a Flipped Classroom?

Interest

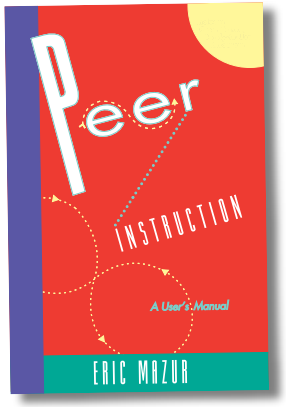
One Possible Timeline

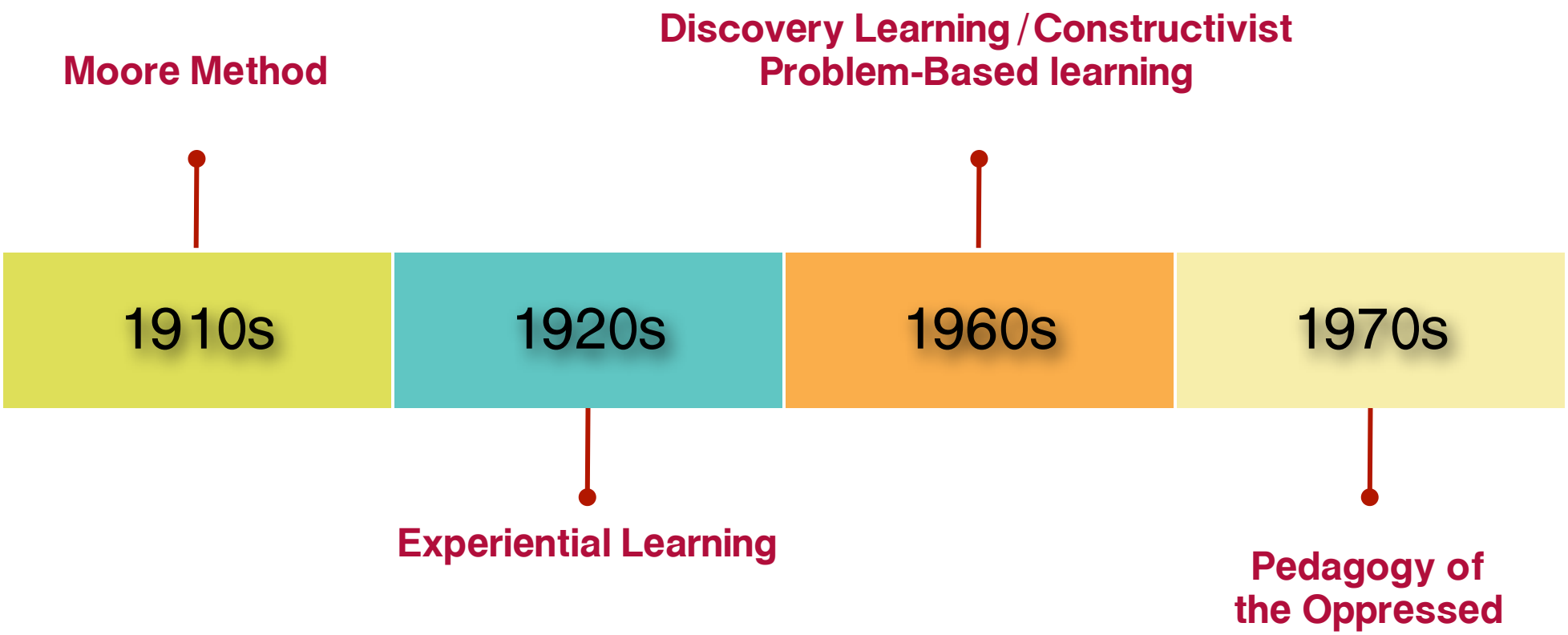
of Calls for Flipped Classrooms

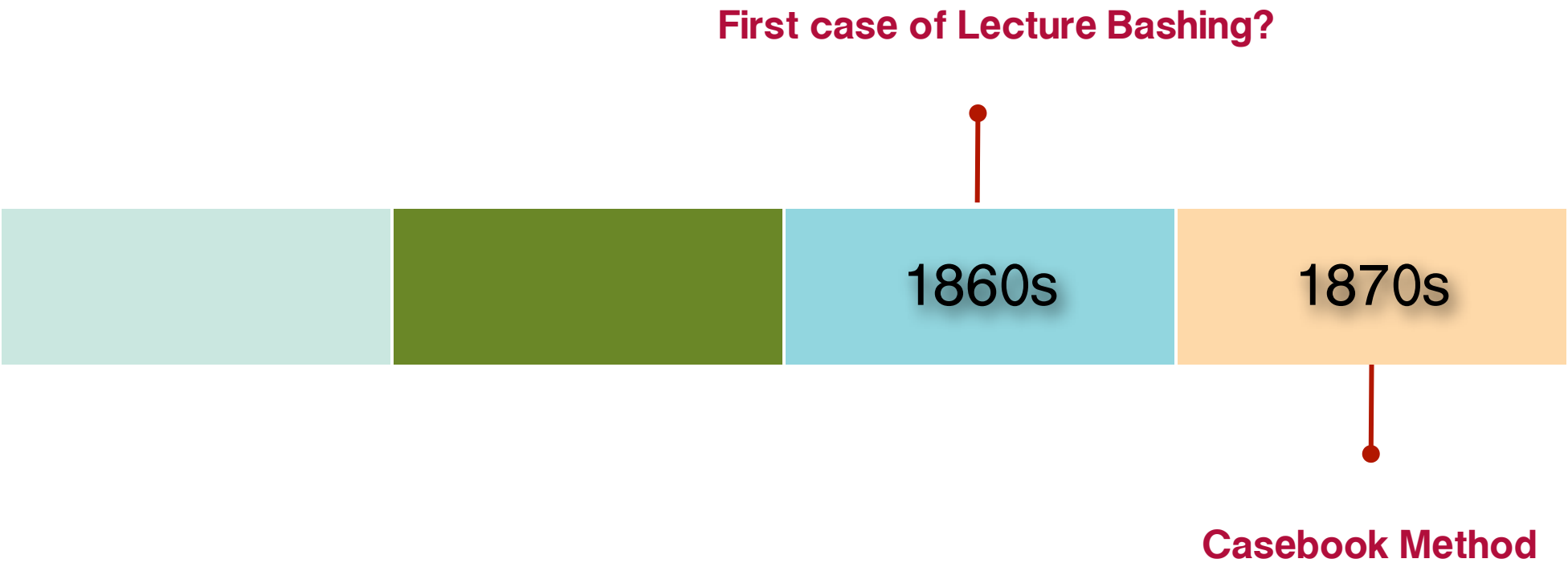
Think-Pair-Share
Team Based Learning



1980s	1990s	2000s	2012

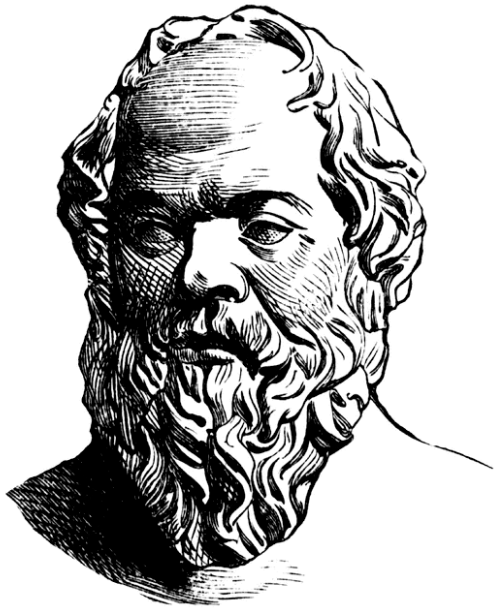



Moore Method
Discovery Learning / Constructivist
Problem-Based learning
1910s
1920s
1960s
1970s
Experiential Learning
Pedagogy of
the Oppressed


First case of Lecture Bashing?
1860s
1870s
Casebook Method

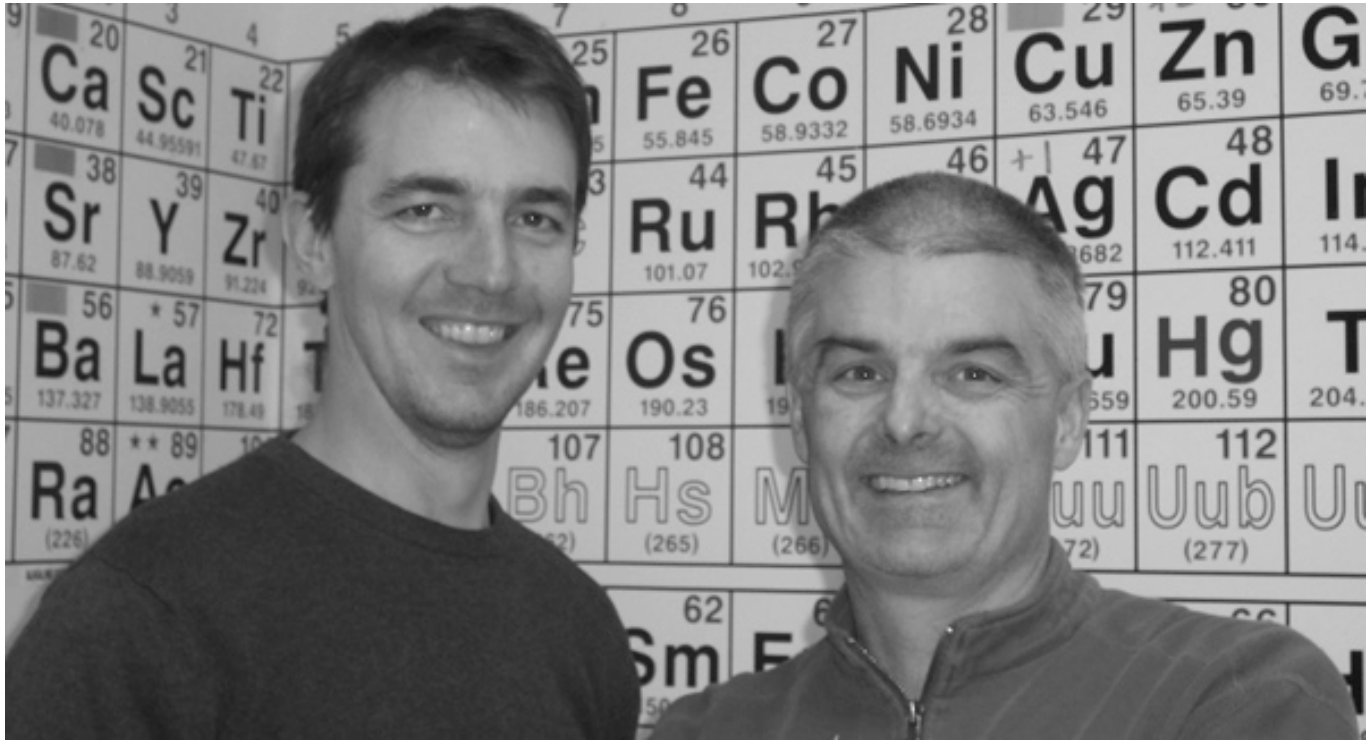
~450 BC

Dialogue



1st Flipped Classroom

“Flipping the classroom is…[a] mindset redirecting attention away from the teacher and putting attention on the learner and the learning.”



Bergmann and Sams p. 12

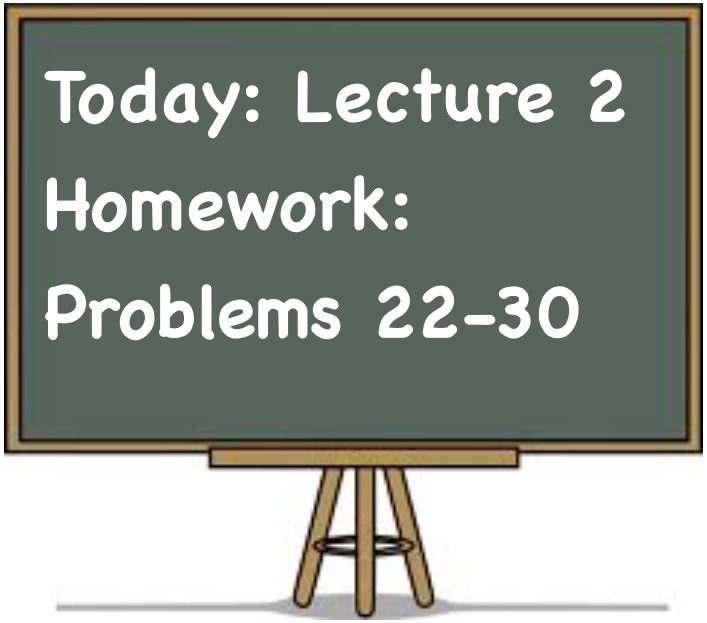
Flipped teaching moves coverage out… and uncoverage in.

How do I flip my classroom?

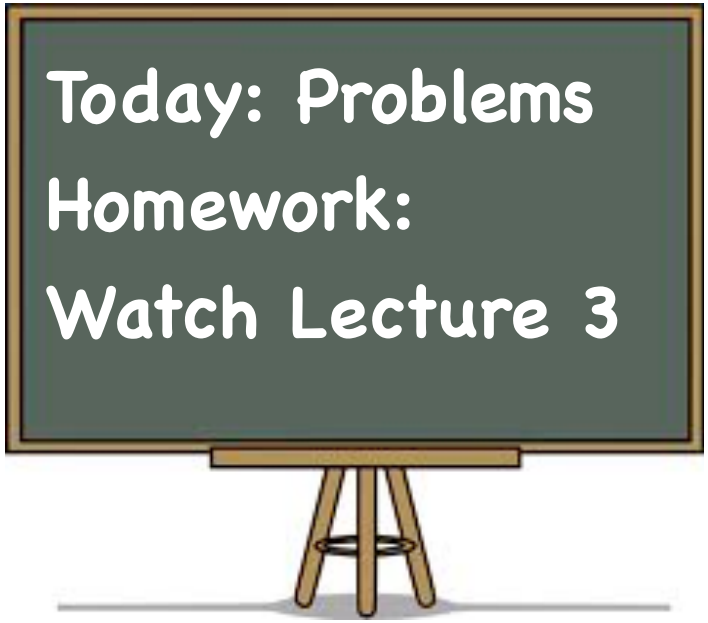
“I already put people to sleep with my lecturing voice. How could I make a pre-recorded lecture tolerable?”

Yale Participant

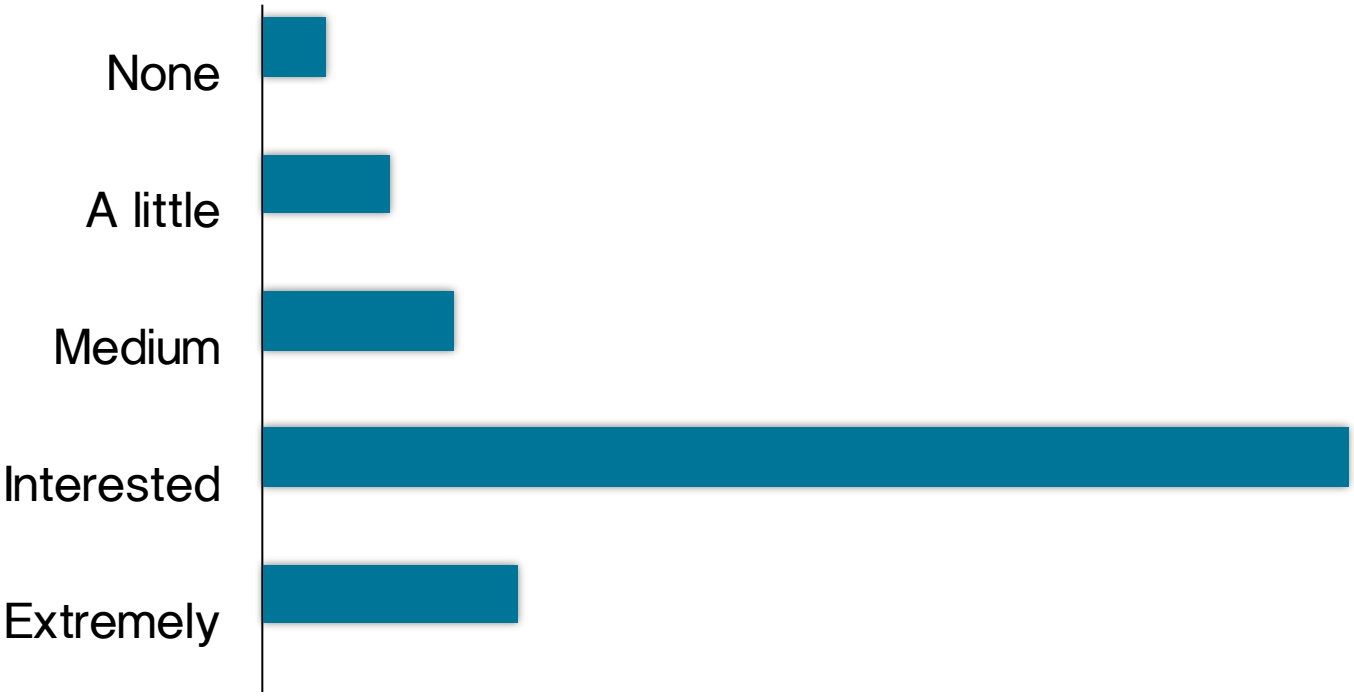
Traditional Class



Flipped Class



Interest



Flipped Class

Protocol

1. Video record lecture

2. Put lecture online provide instruction on watching lecture videos effectively

3. Spend 10 mins of next class talking about video

4. Do homework problems during class, help students work out issues

"How much more time goes into each class period when you flip your course?"

Yale Participant

Traditional Classroom		Traditional Flipped Classroom	
Activity	Time	Activity	Time
Admin	5 min	Admin	5 min
Questions?	10 mins	Questions on video	10 mins
Lecture on new content	30-45 mins	Guided & independent practice	30-45 mins

Adapted from Bergmann and Sams, p. 15

What are tools for engaging students outside of class?

Interest

How do I motivate my students to do their readings before class?

Interest

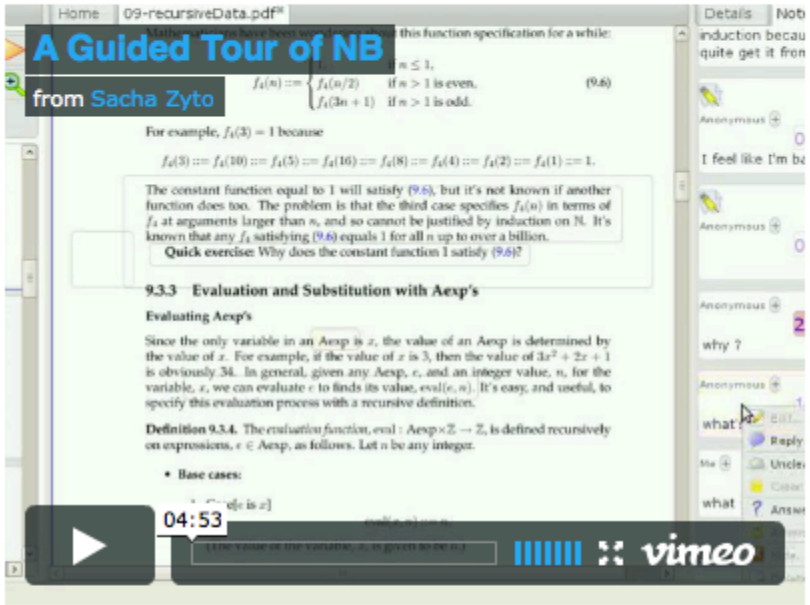
http://nb.mit.edu

About **New:NB@CHI2012** **Tutorial** **Contact Us**

Features

With nb, you can annotate course material online, either for yourself, or to discuss it with the class.

- Did you notice something interesting ?
  Jot a note for others to read...
- Do you have a question ?
  Jot it down to get an answer...
- Did you see a question you can answer ?
  Right-click on it to post an answer...
- Do you like or dislike a note ?
  Moderate it up or down...



For Teaching Staff

- See how you can benefit from nb.
- Create a new nb site now
- Take a 5-minute tutorial
- Already a user ? Access your Staff Console

Give it a try now

nb sandbox

Material courtesy: Professor Albert Meyer

Notes in the sandbox may be discarded.

Login

Email

Password

Lost password ?

OK

strips of tape and various nearby objects, the magnitude of the electric force depends on distance — it decreases as you increase the separation.

22.2 Suspend a freshly pulled strip of transparent tape from the edge of your desk. (*a*) Pull a second strip of tape out of the dispenser and hold it near the first strip. What do you notice? (*b*) Does it matter which sides of the strips you orient toward each other?

As Checkpoint 22.2 makes clear, not all electric interactions are attractive. Even if you increase the mass of the strip by suspending paper clips from them, the repulsion between the strips is large enough to keep the paper clips apart (Figure 22.2). Now place your hand between two repelling strips and notice how both strips fly toward your hand! Then run each tape several times between your fingers and notice how the electric interaction diminishes or even disappears.

22.3 Suspend two freshly pulled 20-cm strips of transparent tape from the edge of your desk. Cut two 20-cm strips of paper, making each strip the same width as the tape, and investigate the interactions between the paper strips and the tape by bringing them near each other. Which of the following combinations display an electric interaction: paper-paper, tape-paper, tape-tape?

22.2 Electrical charge

As we saw in the previous section, electric interacti
are sometimes attractive and sometimes repulsive
addition, the experiment you performed in Checkpo
22.3 demonstrates that paper strips, which do not
teract electrically with each other, do interact elec
cally with transparent tape. What causes th
interactions? To answer this question, we need to ca
out a systematic sequence of experiments.

Figure 22.3 illustrates a simple procedure for rep
ducibly creating strips of tape that interact electric
A suspended strip created according to this proced
interacts in the following ways: it repels another s
created in the same manner, and it attracts any ot

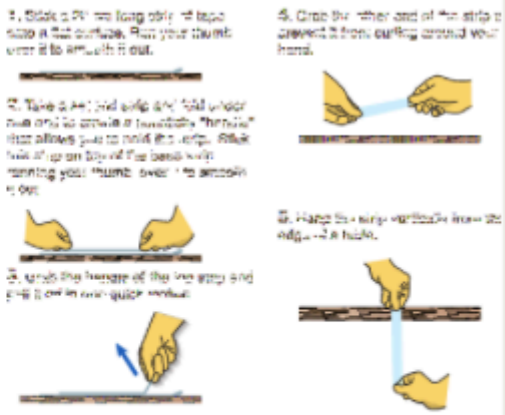
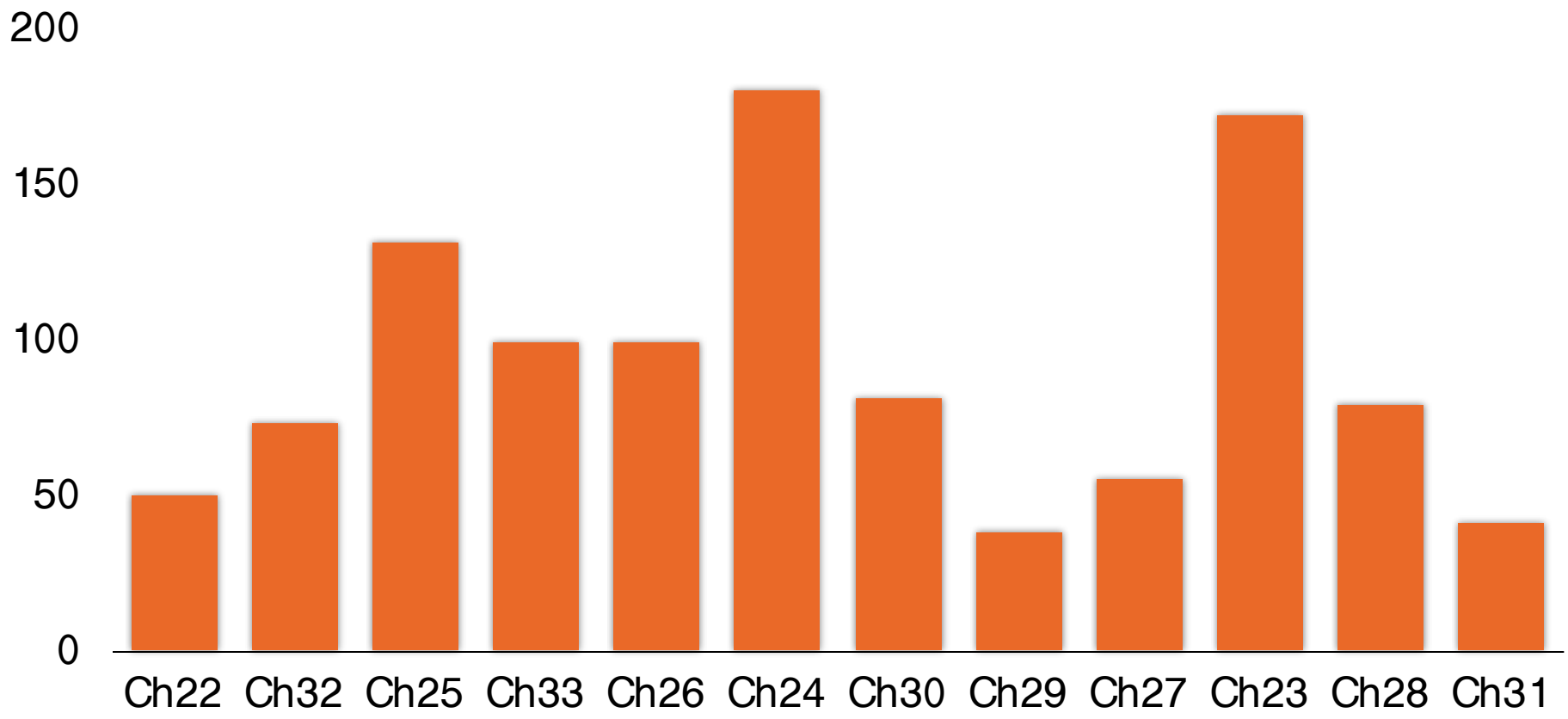
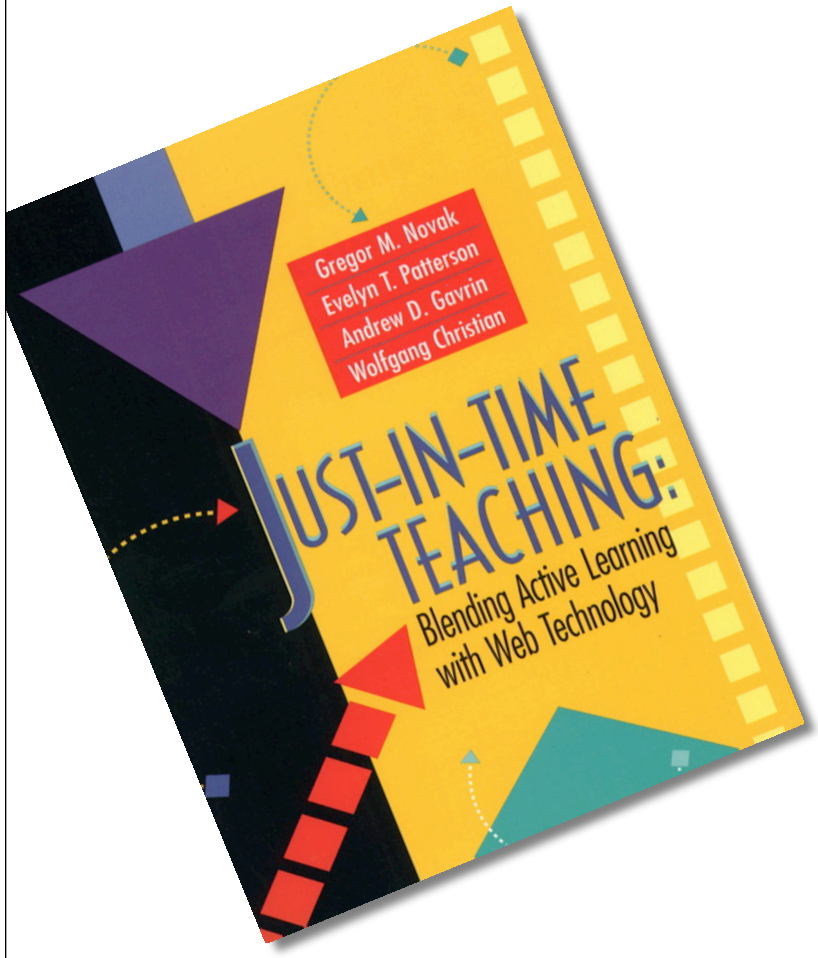


Figure 22.3 Procedure for making strips of transparent t
that interact electrically. The lower strip is used to provi
standard surface—the top side of a piece of tape — beca
surface properties may vary from one tabletop or deskto
another.



of NB Comments


Gregor M. Novak
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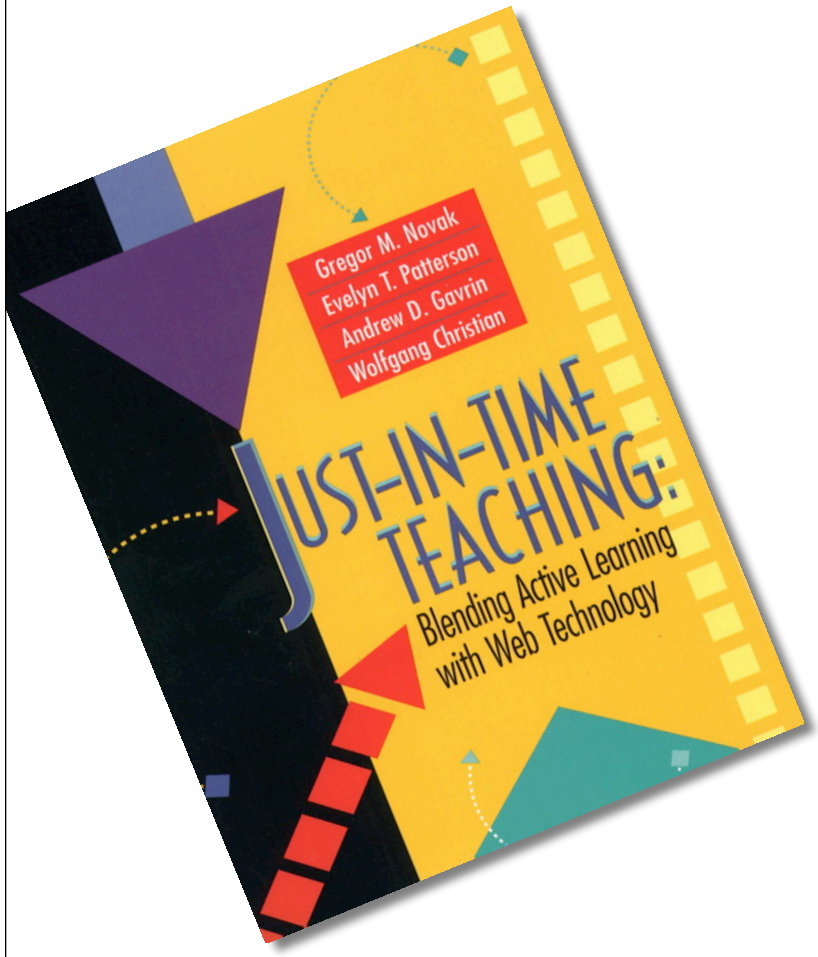
JUST-IN-TIME TEACHING:
Blending Active Learning with Web Technology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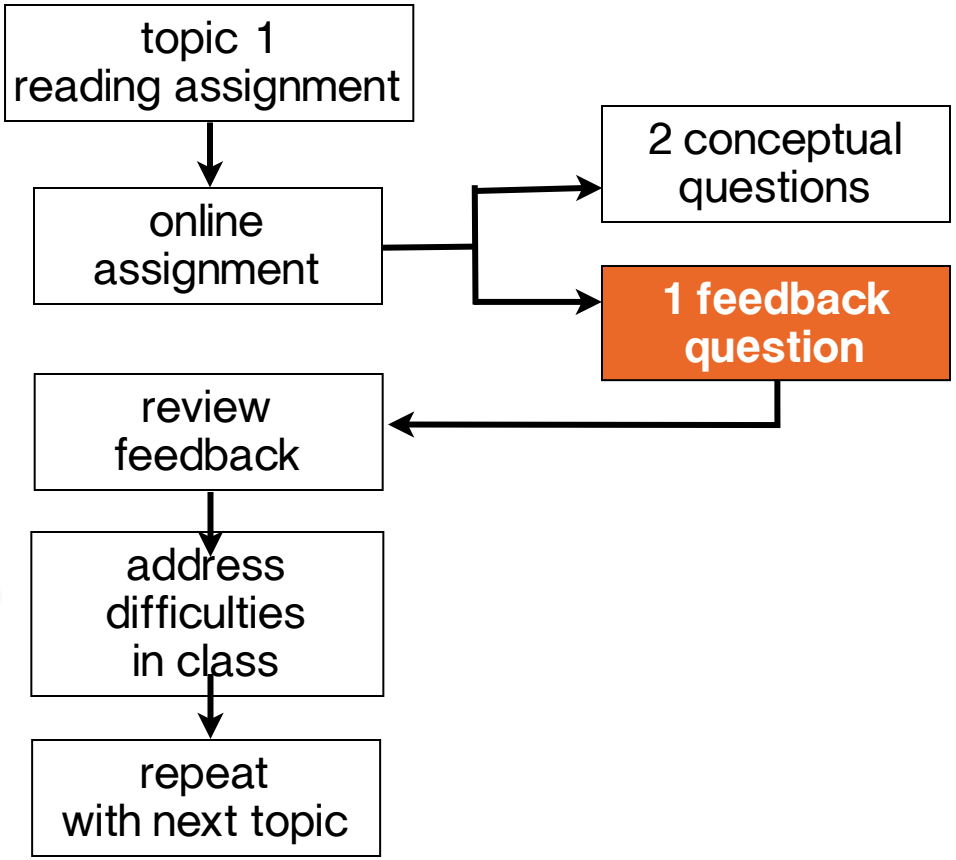
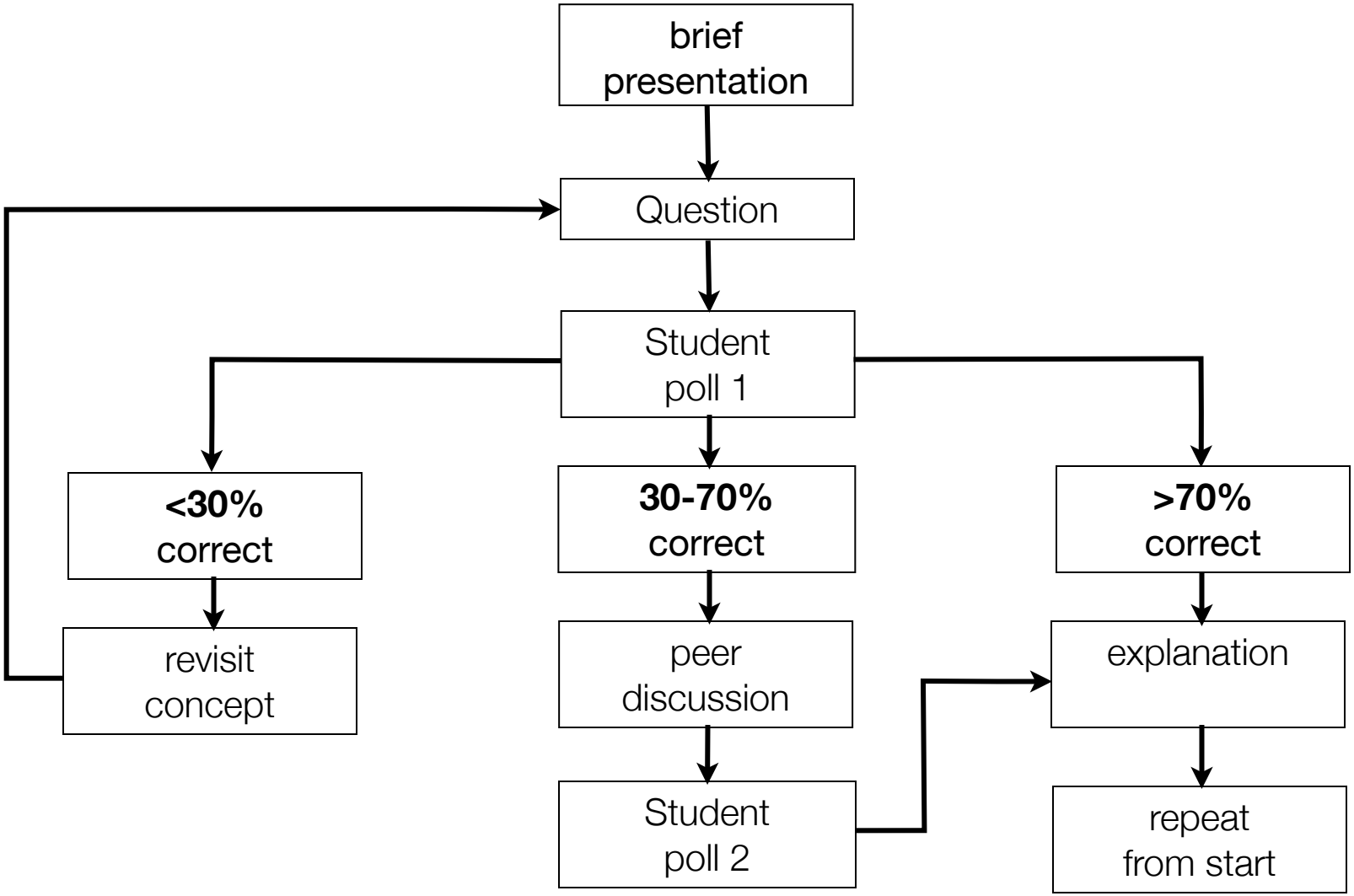

topic 1
reading assignment
online
assignment
2 conceptual
questions
1 feedback
question
review
feedback
address
difficulties
in class
repeat
with next topic

80-95%
reading assignment
completion

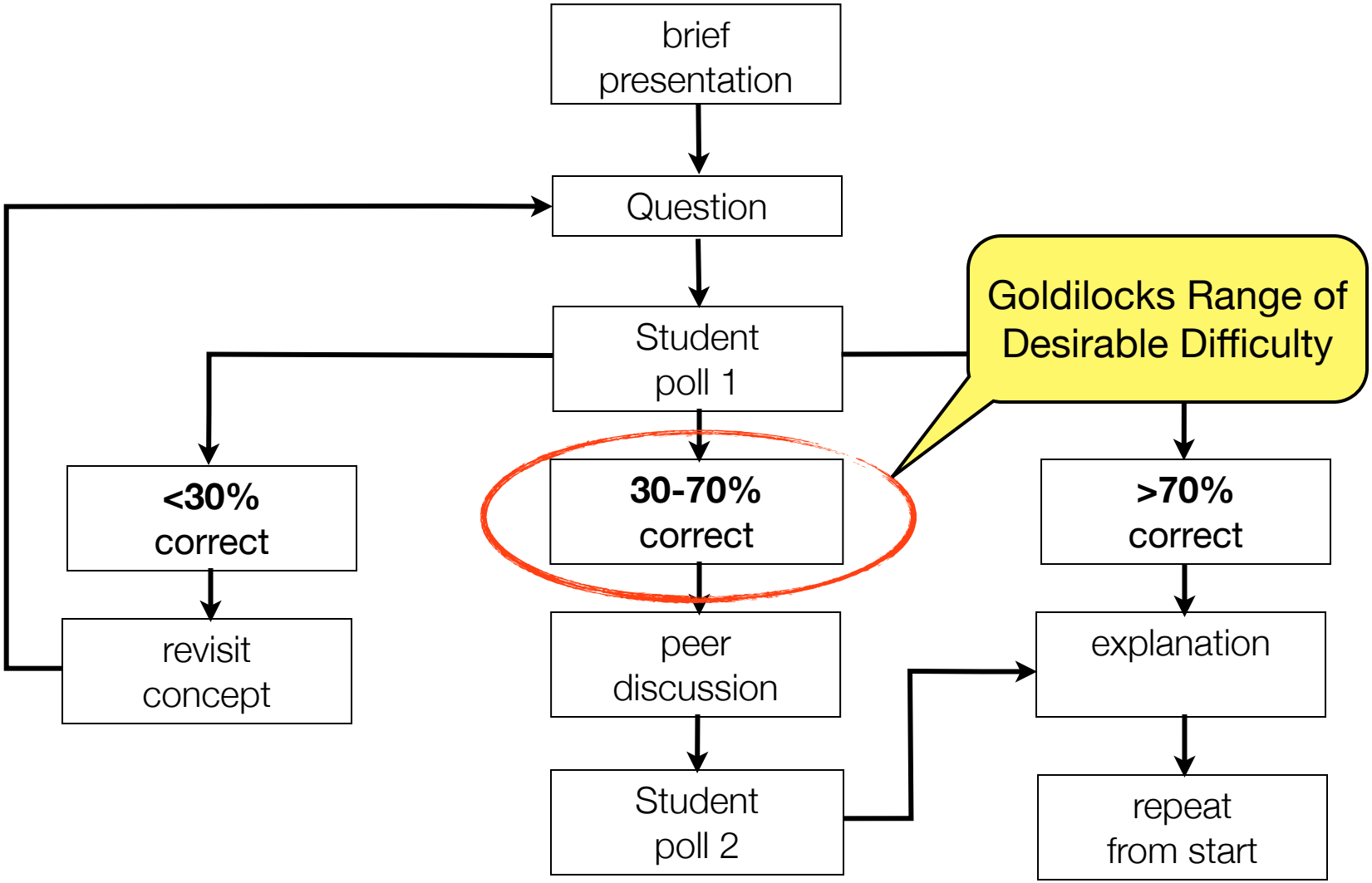
What are tools for engaging students in class?

Interest

Peer Instruction



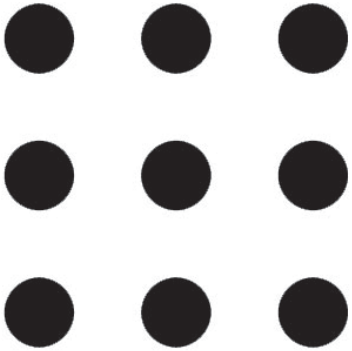
Peer Instruction



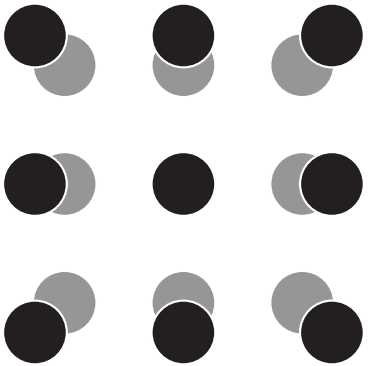
Demo

Thermal Expansion

Demo

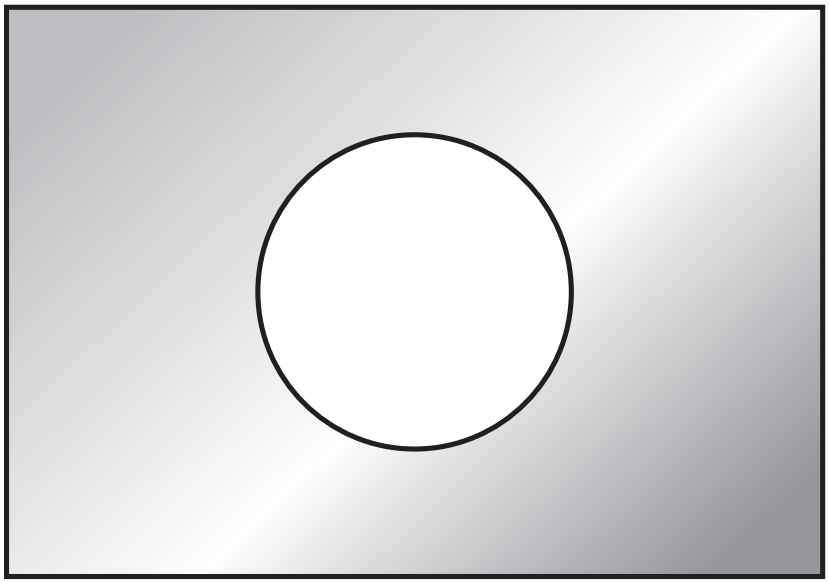


Demo



Demo

Consider a metal plate with a circular hole in it.

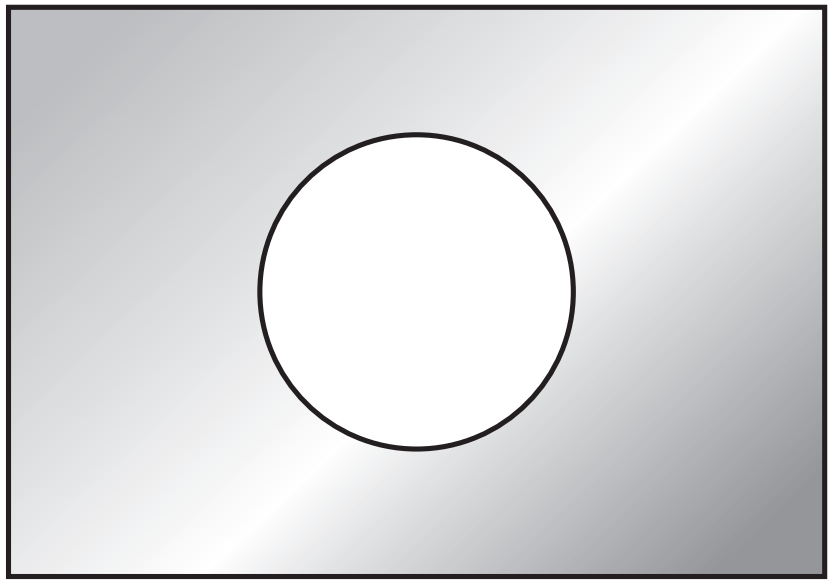


Demo

Consider a metal plate with a circular hole in it.

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

A. increases.
B. stays the same.
C. decreases.



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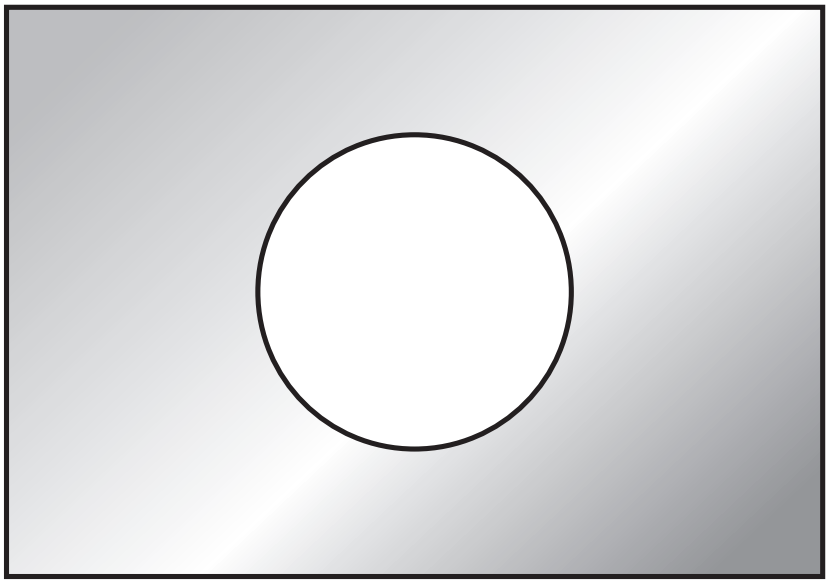

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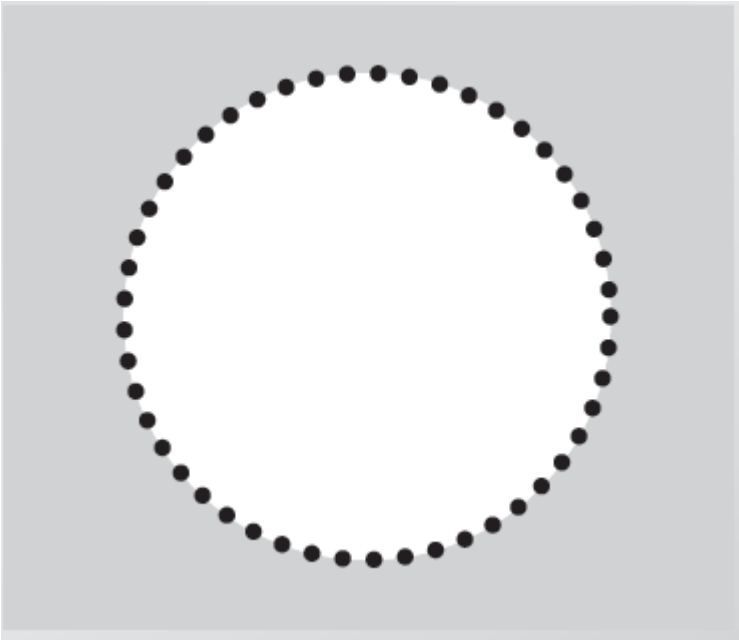

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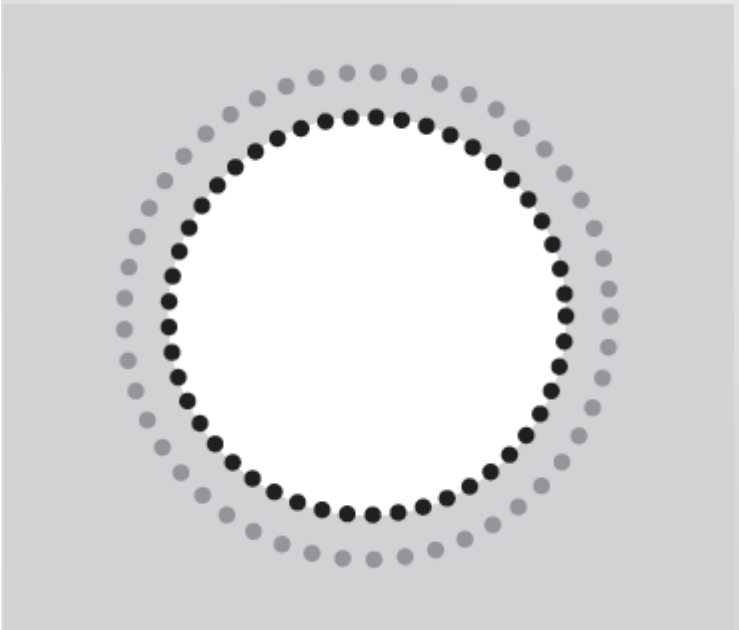

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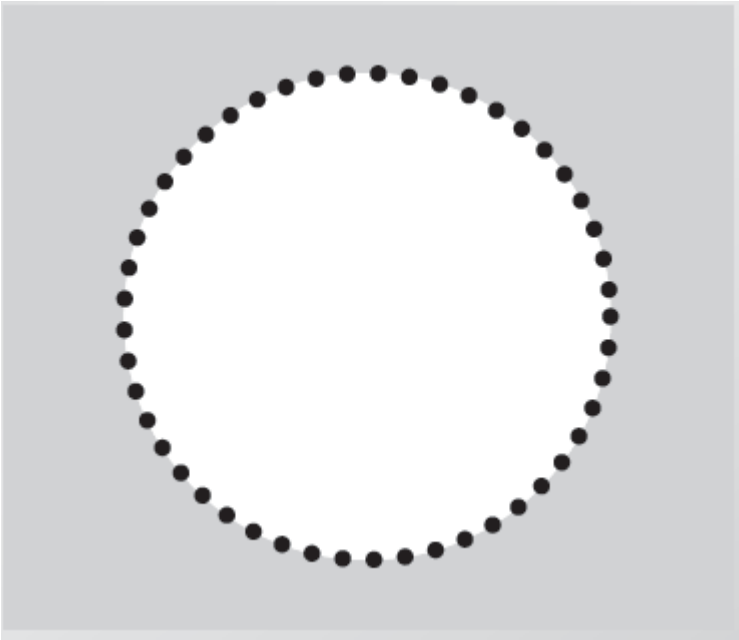

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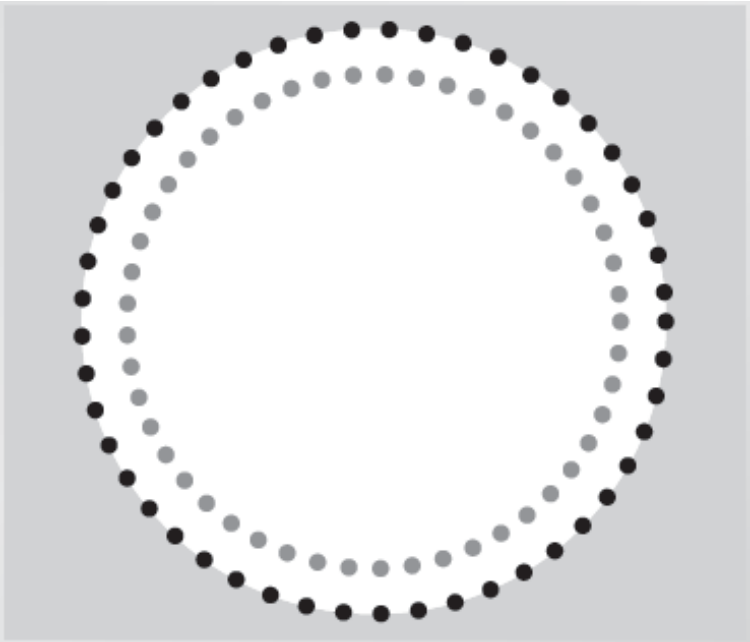

Systematic Moral Analysis

Systematic Moral Analysis

Gert's Moral Rues

1. Do not kill.
2. Do not cause pain.
3. Do not disable.
4. Do not deprive of freedom.
5. Do not deprive of pleasure.
6. Do not deceive.
7. Keep your promises.
8. Do not cheat.
9. Obey the law.
10. Do your duty. (i.e. what is required by your job, social role of special circumstances.)

Demo

Heinz's wife was near death, and her only hope was a drug that had been discovered by a pharmacist who was selling it for an exorbitant price. The drug cost $20,000 to make, and the pharmacist was selling it for $200,000. Heinz could only raise $50,000 and insurance wouldn't make up the difference. He offered what he had to the pharmacist, and when his offer was rejected, Heinz said he would pay the rest later. Still the pharmacist refused. In desperation, Heinz broke into the store and stole the drug.

Should Heinz have broken into the store to steal the drug for his wife?

A. Yes
B. No
C. I'm not sure

“What is the best way to learn the most effective strategies for teaching and ways to put these into practice…?”

Yale Participant

Peer Instruction Network

Connect. Share. Learn.

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Acknowledgements

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Understanding by Design, Wiggins & McTighe
Why don’t students like school?, Daniel Willingham

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