

D-LAB, MIT, 2014. LAURA TUCKER.

PEER INSTRUCTION



YOUR PLANS?



WHAT DO YOU WANT STUDENTS TO
TAKE FROM YOUR COURSE?



WHAT DO YOU WANT STUDENTS TO
TAKE FROM YOUR COURSE?



WHAT DO YOU WANT STUDENTS TO TAKE FROM YOUR COURSE?

CONTENT KNOWLEDGE

INSPIRATION

SKILLS



WHICH CAN THE BEST LECTURE ACHIEVE?

CONTENT KNOWLEDGE

INSPIRATION

SKILLS



HOW EFFECTIVELY DOES LECTURE TEACH CONTENT KNOWLEDGE?



YOUTUBE: "FIVE MINUTE UNIVERSITY"

WHICH CAN THE BEST LECTURE ACHIEVE?

CONTENT KNOWLEDGE?

INSPIRATION

~~SKILLS~~

GOOD TARGET: 5-15 MINUTES OF INSTRUCTOR TALKING

1976, A. H. Johnstone and F. Percival observed students in over 90 lectures, with 12 different lecturers, recording breaks in student attention. They identified a general pattern of attention breaks: after three to five minutes of “settling down” at the start of class, one study found that “the next lapse of attention usually occurred some 10 to 18 minutes later, and as the lecture proceeded the attention span became shorter and often fell to three or four minutes towards the end of a standard lecture” (p. 49 - 50). These findings, except for the “settling period,” seem to be confirmed by Ralph A. Burns 1985 study. Burns asked students to write summaries of presentations and tallied the bits of information reported by the “half-minute segment of the presentation” in which they occurred. He reports that students recalled the most information from the first 5 minutes of the presentation. “Impact declined, but was relatively constant for the next two 5-minute portions, and dropped to the lowest level during the 15- to 20-minute interval” (Burns, 1985). Both of these studies note the severe lapse of attention 15 to 20 minutes into a lecture. P. J. Fen sham explains this phenomenon, “During

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IF NOT LECTURE, THEN WHAT?

IF NOT LECTURE, THEN WHAT?

1. What do we do in class?
2. How will information transfer happen?

PEER INSTRUCTION

BRIEF PRESENTATION

PEER INSTRUCTION

BRIEF PRESENTATION

QUESTION

VOTE

PEER INSTRUCTION

BRIEF PRESENTATION

QUESTION

VOTE

IF 30-70% CORRECT:

PEER INSTRUCTION

BRIEF PRESENTATION

QUESTION

VOTE

IF 30-70% CORRECT:

DISCUSS

PEER INSTRUCTION

BRIEF PRESENTATION

QUESTION

VOTE

IF 30-70% CORRECT:

DISCUSS

RE-VOTE

PEER INSTRUCTION

BRIEF PRESENTATION

QUESTION

VOTE

IF 30-70% CORRECT:

DISCUSS

RE-VOTE

BRIEF EXPLANATION

PEER INSTRUCTION

BRIEF PRESENTATION

QUESTION

VOTE

IF MORE THAN 70% CORRECT:

DISCUSS

RE-VOTE

BRIEF EXPLANATION



PEER INSTRUCTION

BRIEF PRESENTATION

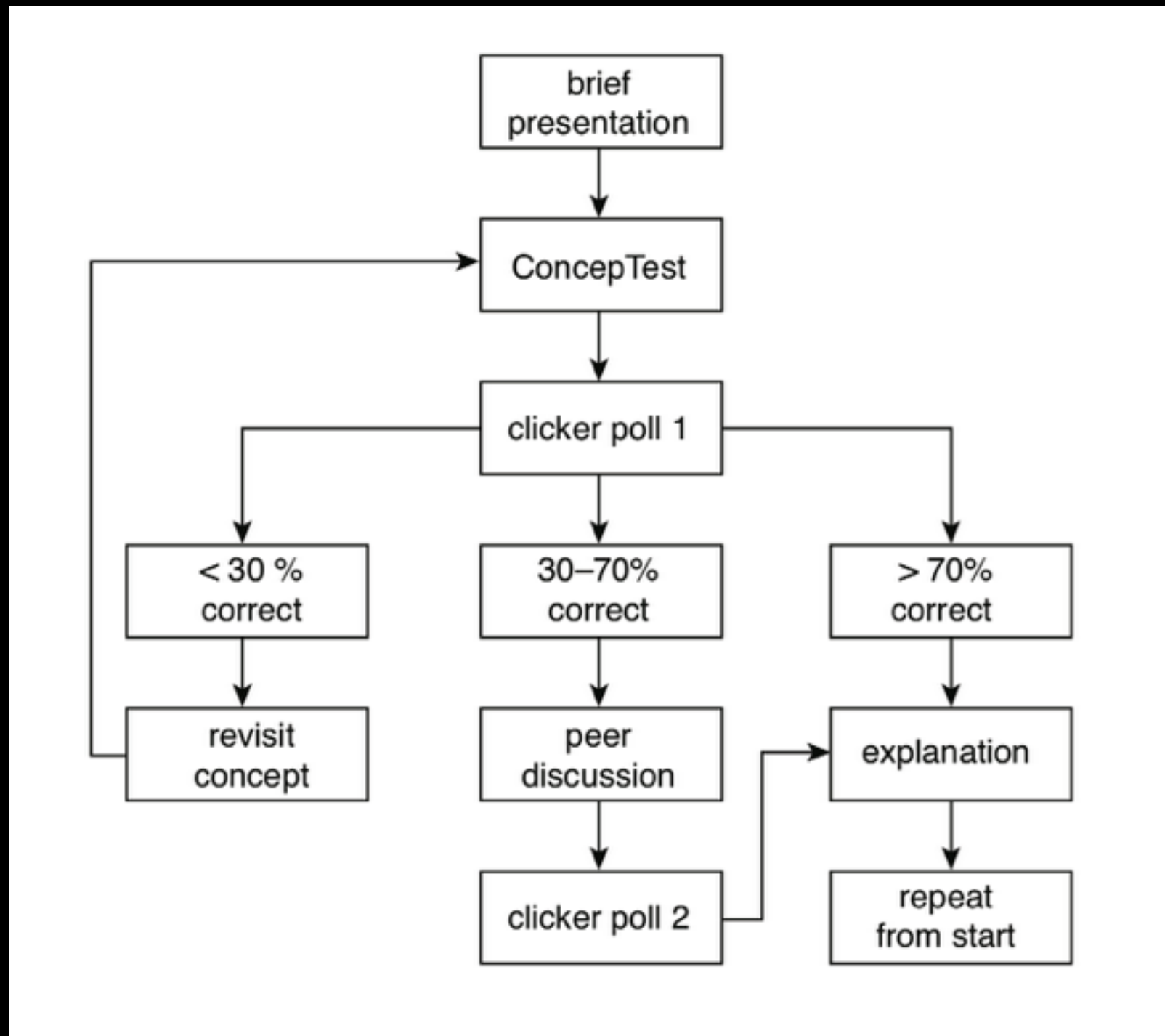
QUESTION

VOTE

IF LESS THAN 30% CORRECT:



PEER INSTRUCTION



LET'S TRY IT!

LET'S TRY IT!



WHEN METALS HEAT UP, THEY EXPAND



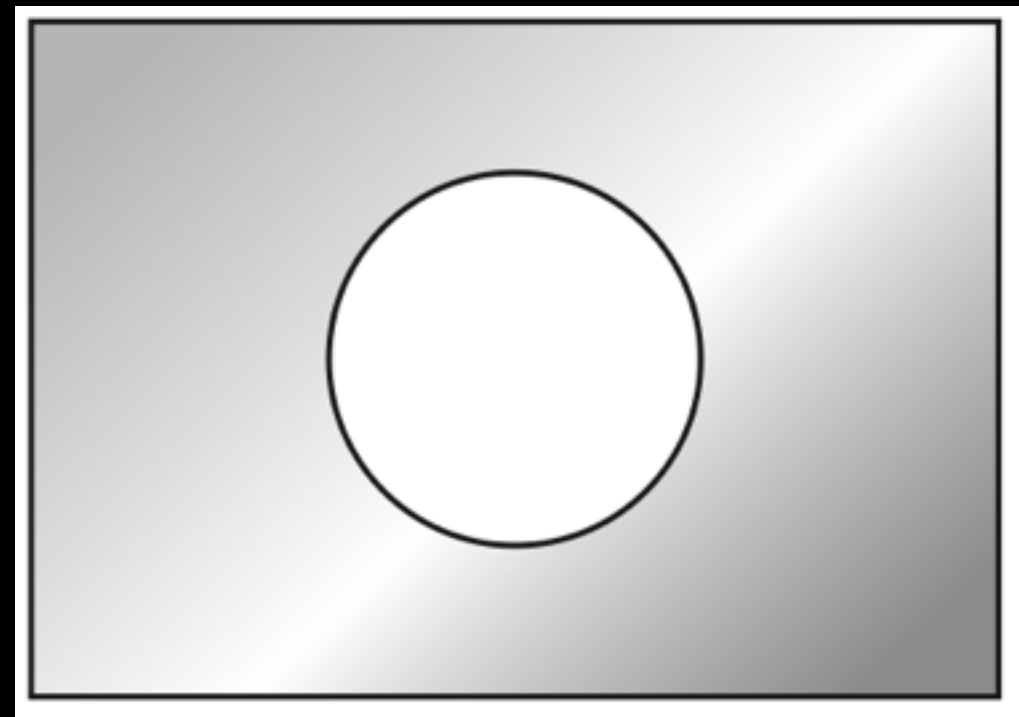
QUESTIONS?



M.SOCRATIVE.COM

WHAT HAPPENS TO THE DIAMETER OF THE HOLE AS THE PLATE IS HEATED UNIFORMLY?

- a. increases
- b. decreases
- c. stays the same



METAL PLATE WITH A HOLE IN THE CENTER

WHY PEER INSTRUCTION WORKS

INSPIRATION

SKILLS

CONTENT KNOWLEDGE

WHY PEER INSTRUCTION WORKS

INSPIRATION

- you're *invested*

SKILLS

CONTENT KNOWLEDGE

WHY PEER INSTRUCTION WORKS

INSPIRATION

- you're **invested**

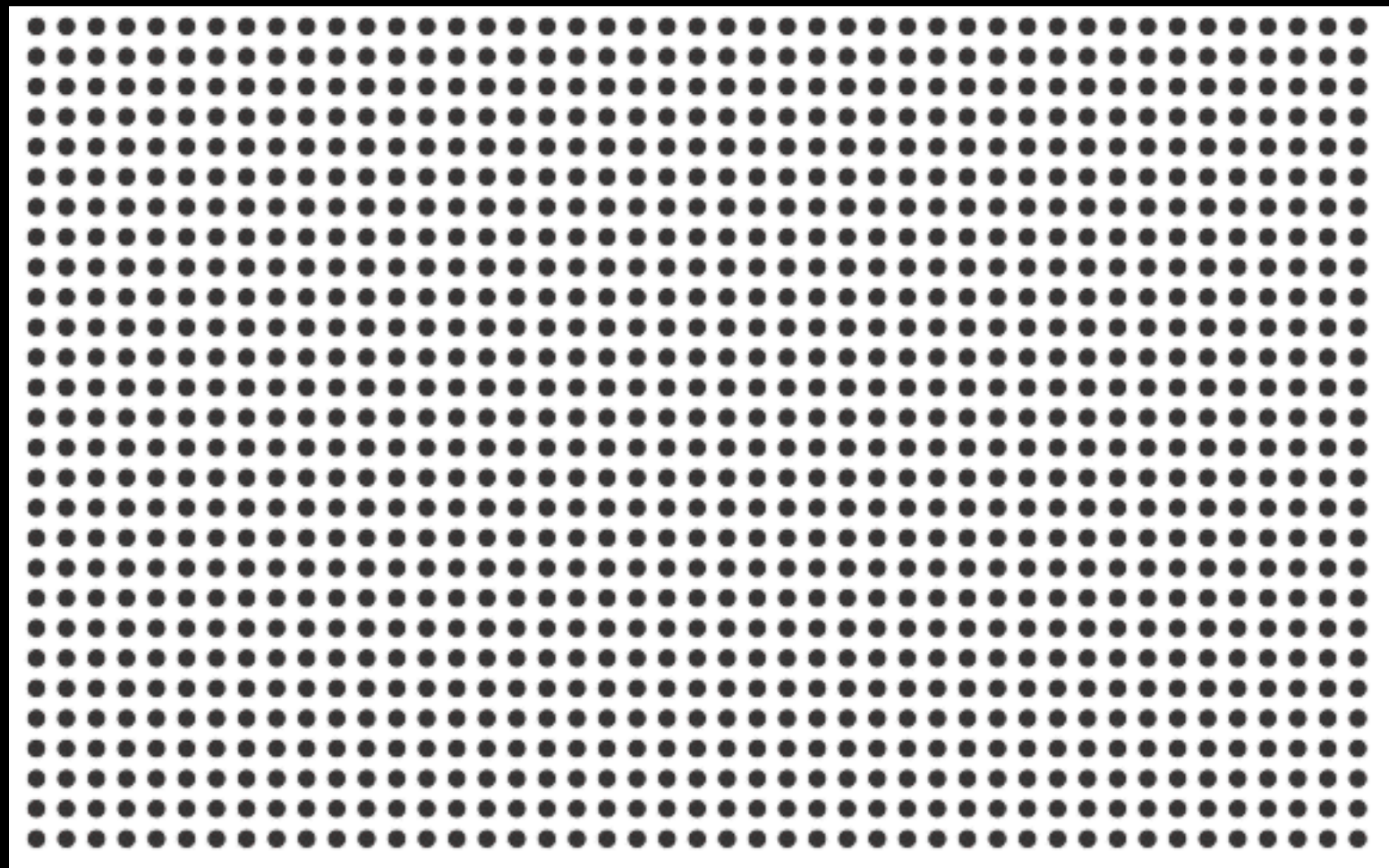
SKILLS

- you're **applying** knowledge

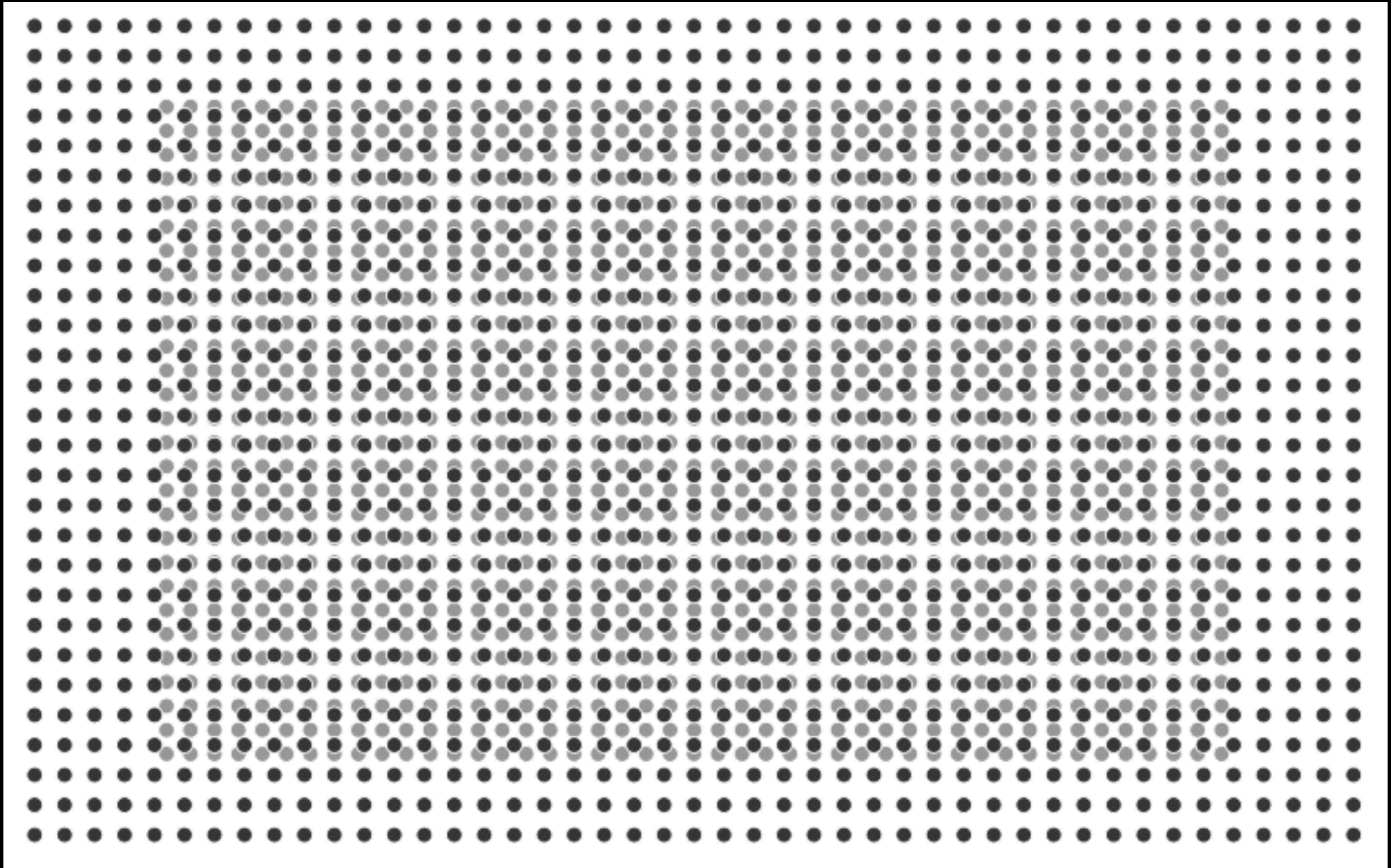
CONTENT KNOWLEDGE

WHAT HAPPENS TO THE DIAMETER OF THE
HOLE AS THE PLATE IS HEATED UNIFORMLY?

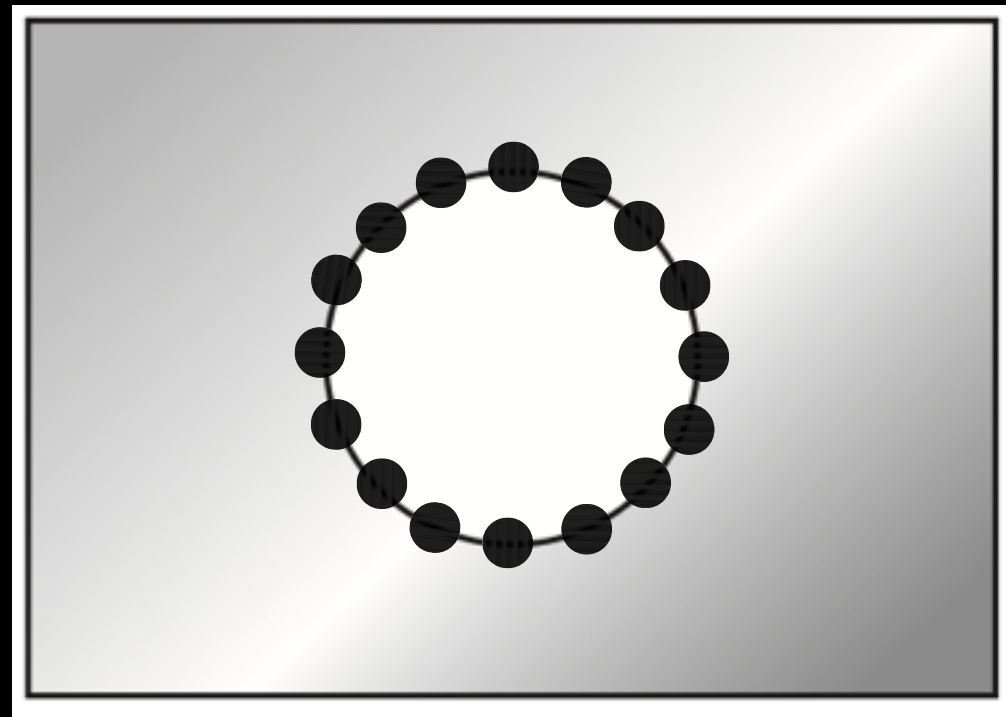
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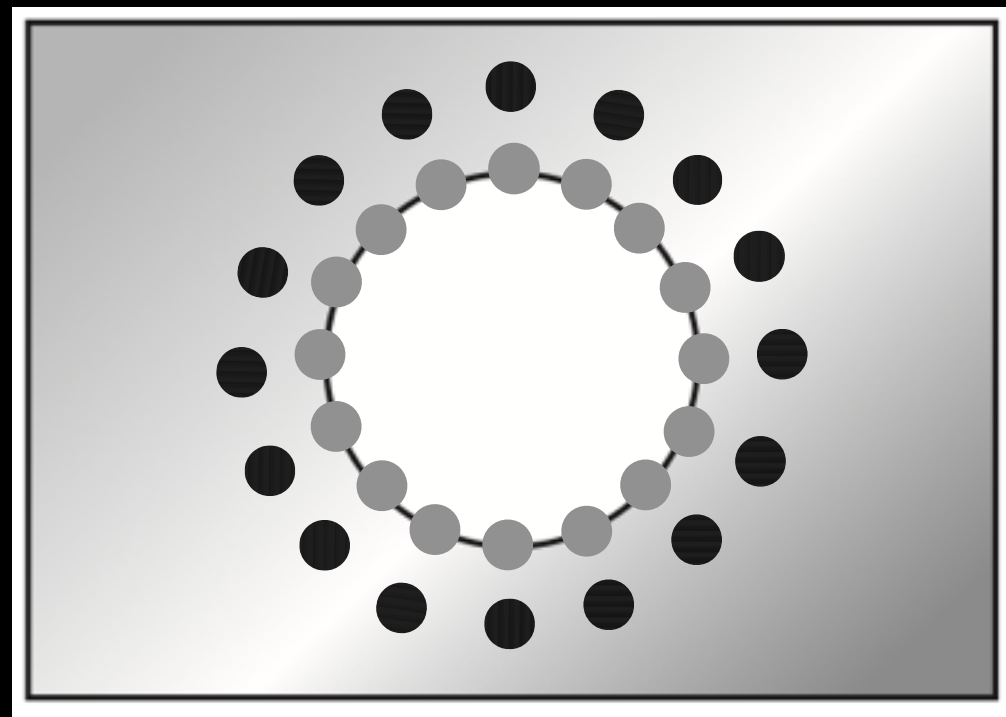
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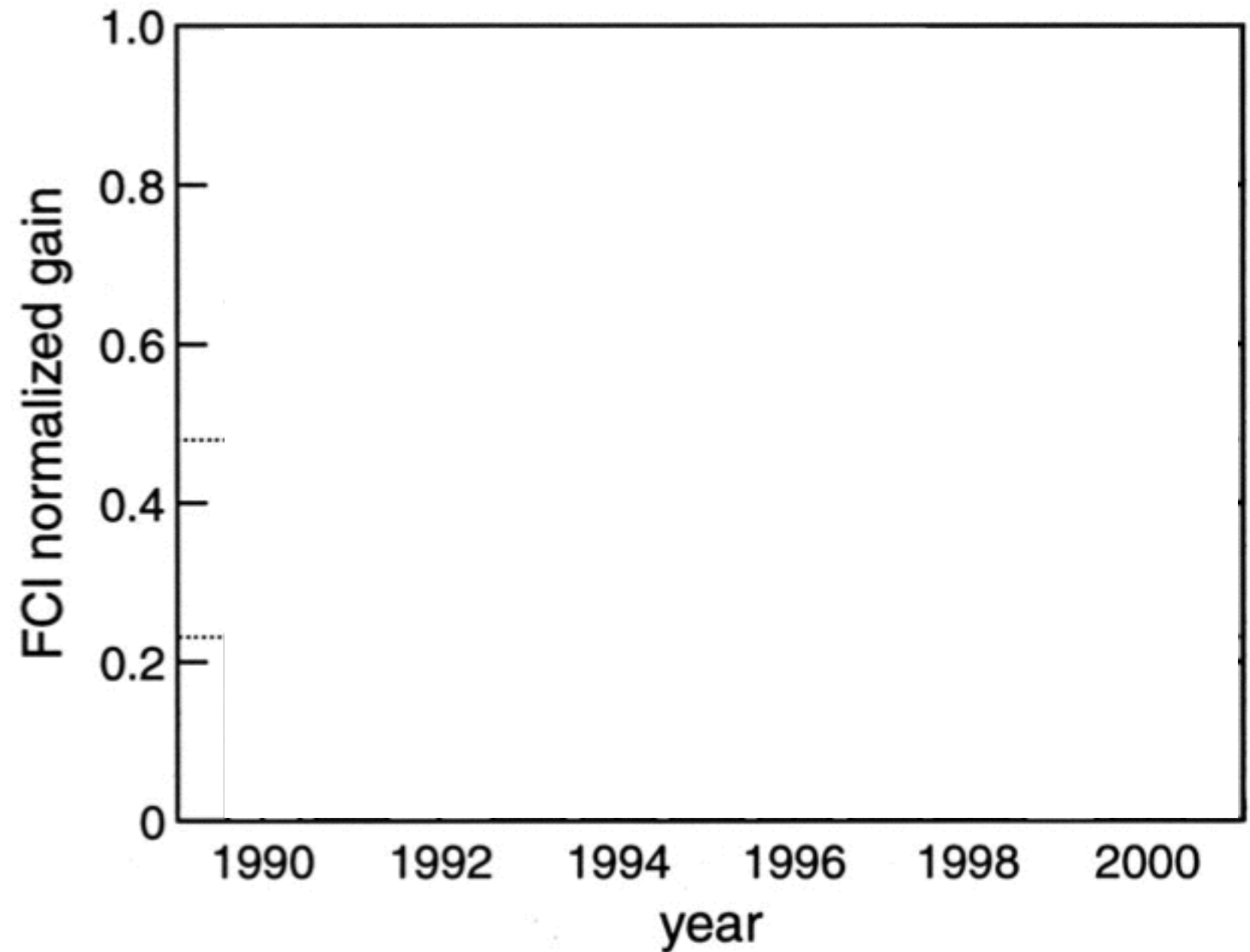
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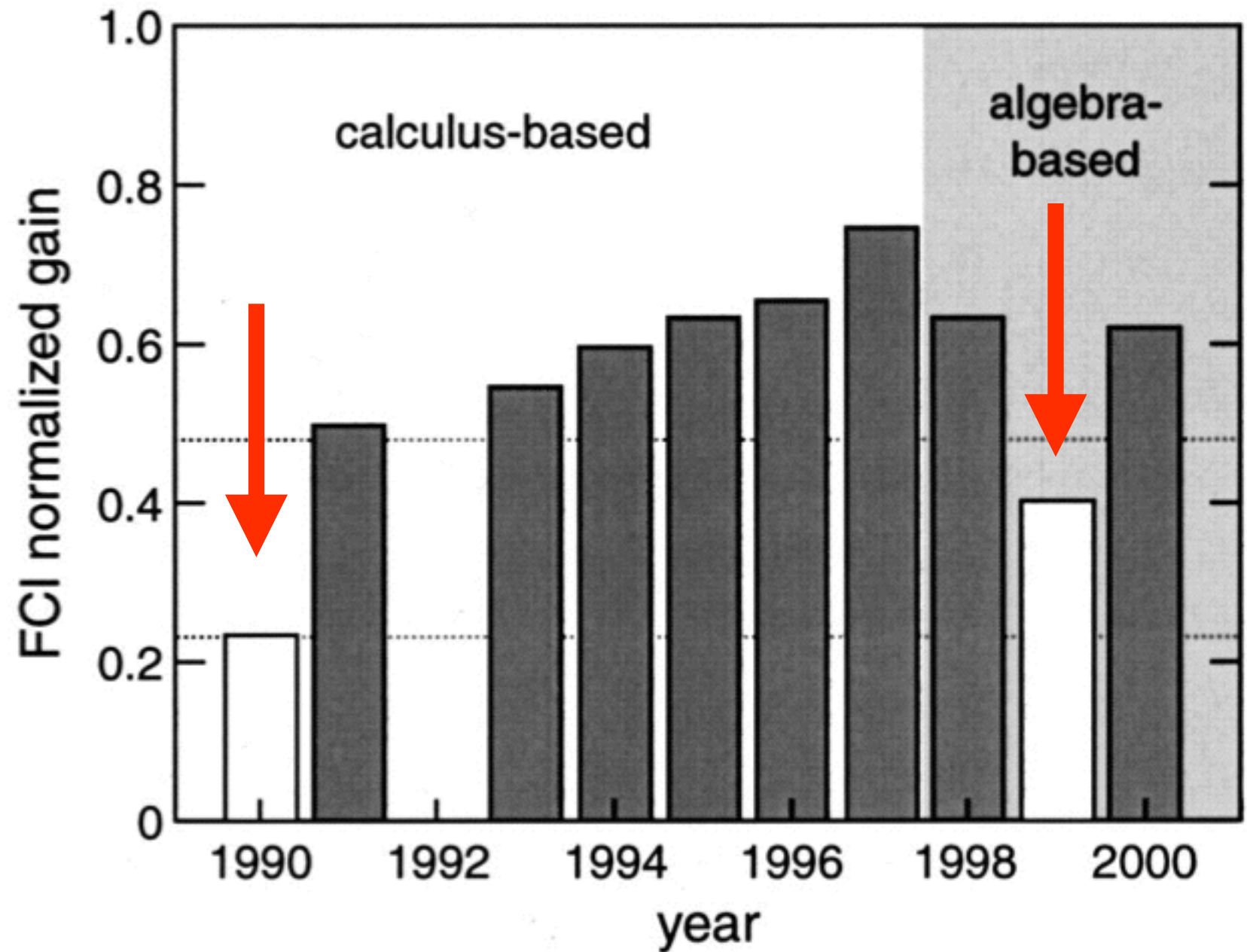
WHAT HAPPENS TO THE DIAMETER OF THE HOLE AS THE PLATE IS HEATED UNIFORMLY?



PEER INSTRUCTION WORKS!



PEER INSTRUCTION WORKS!



WHY PEER INSTRUCTION WORKS

INSPIRATION

- you're **invested**
- you're getting **feedback**

SKILLS

- you're

CONTENT KNOWLEDGE

WHY PEER INSTRUCTION WORKS

INSPIRATION

- you're
- you're getting

SKILLS

- you're

CONTENT KNOWLEDGE

- you're getting to **elicit, confront, resolve**
-

WHY PEER INSTRUCTION WORKS: ELICIT, CONFRONT, RESOLVE



WHY PEER INSTRUCTION WORKS

INSPIRATION

- you're
- you're getting

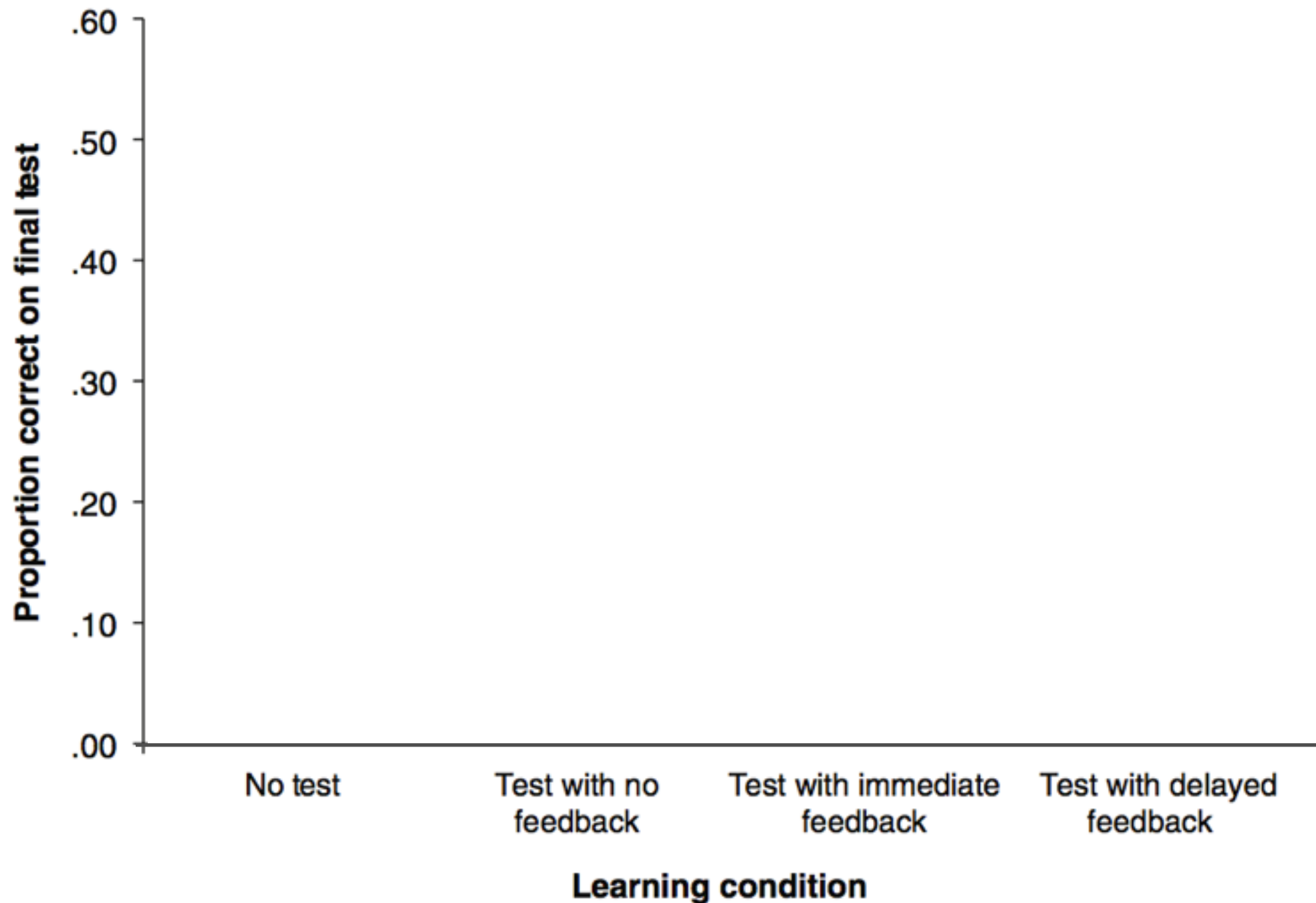
SKILLS

- you're

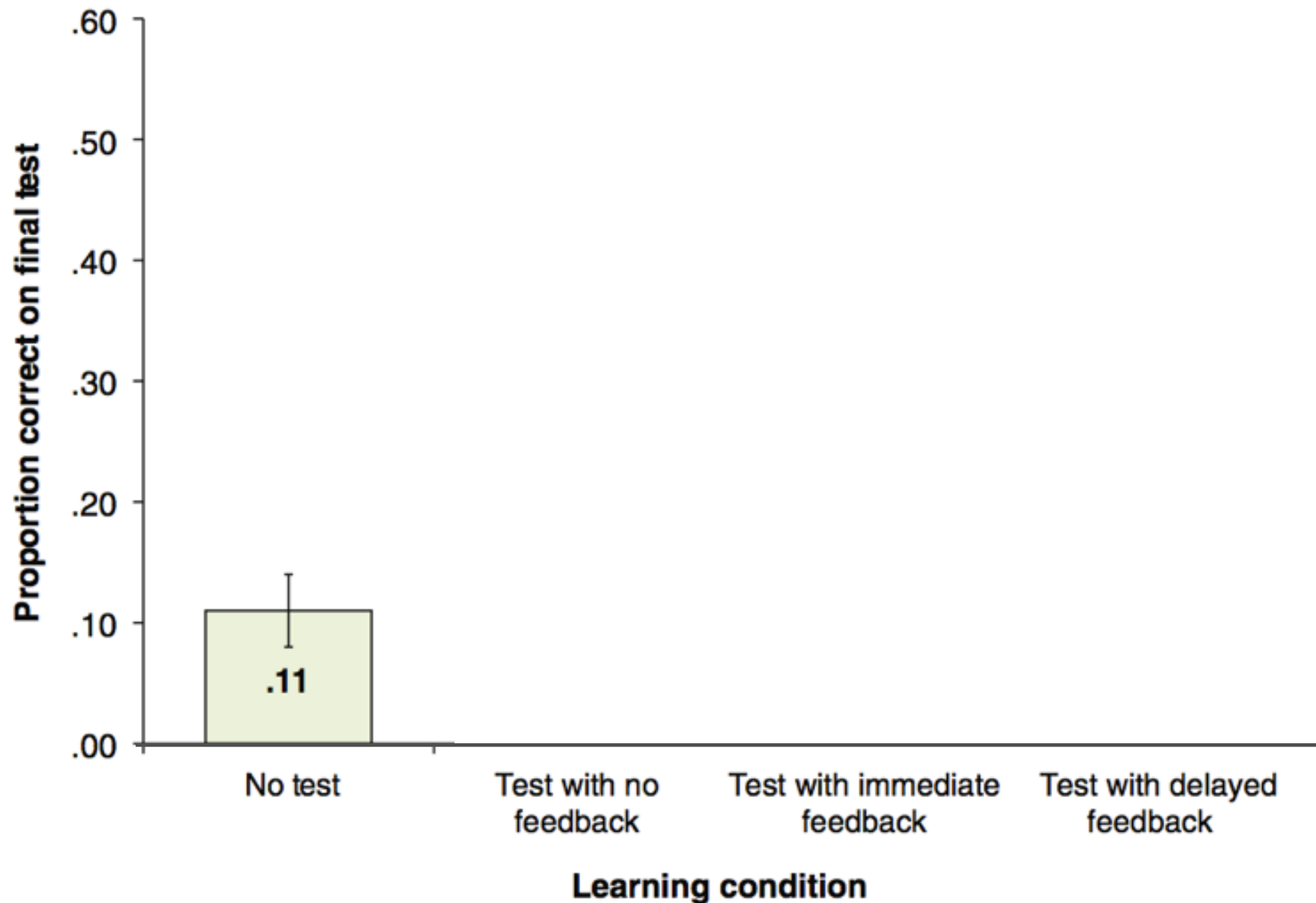
CONTENT KNOWLEDGE

- you're getting to **elicit, confront, resolve**
- you're being **tested**

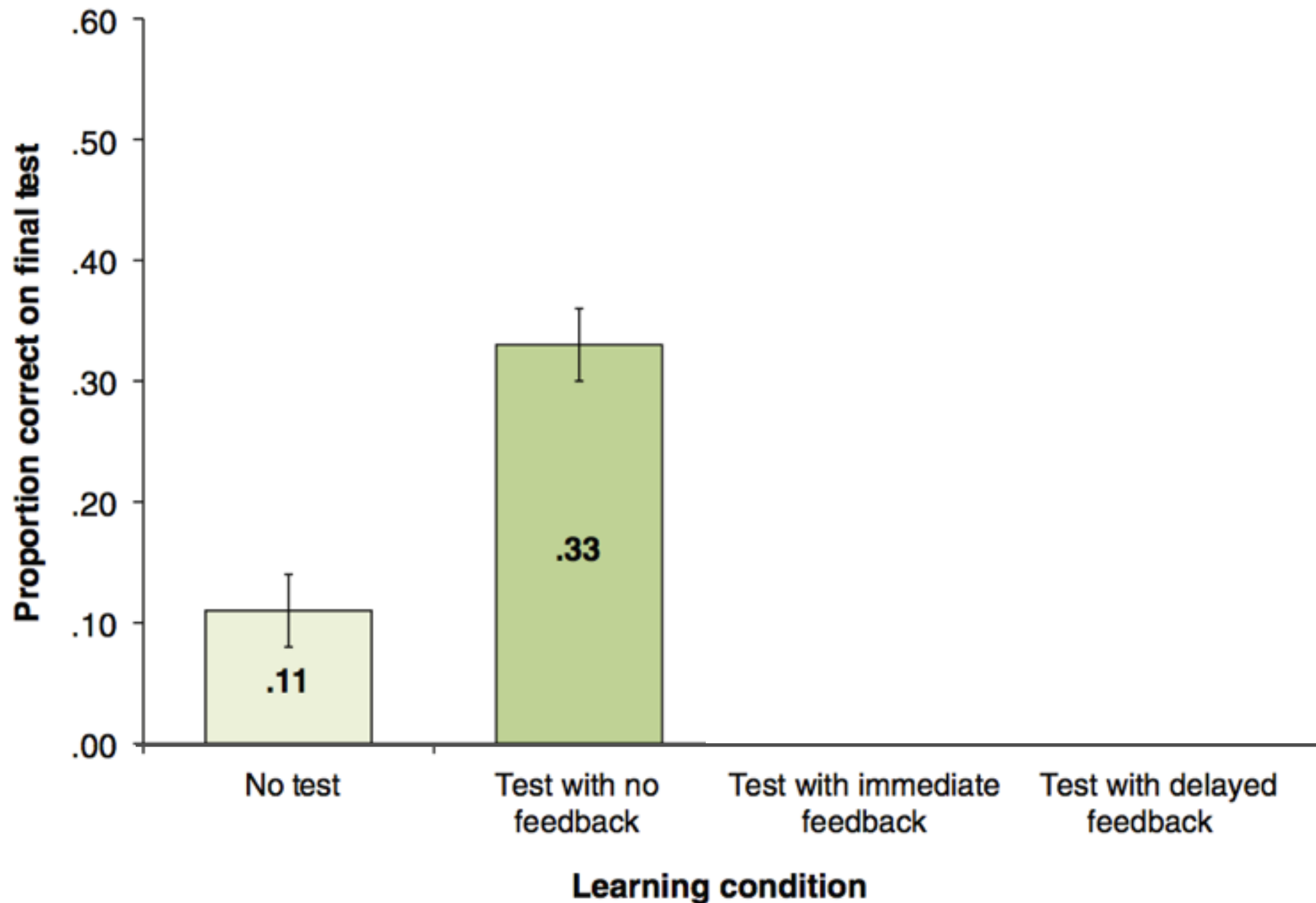
WHY PEER INSTRUCTION WORKS: TESTING



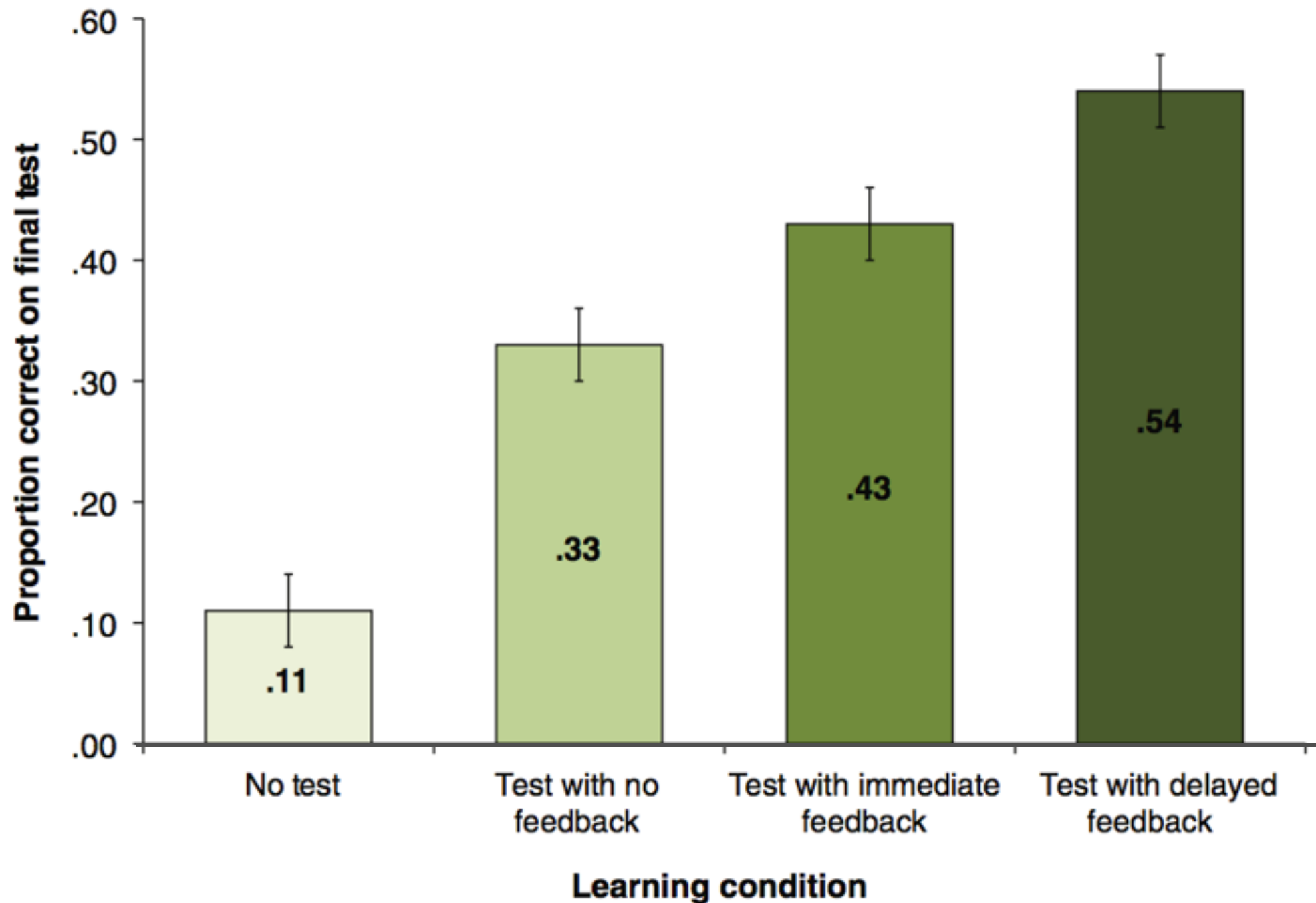
WHY PEER INSTRUCTION WORKS: TESTING



WHY PEER INSTRUCTION WORKS: TESTING



WHY PEER INSTRUCTION WORKS: TESTING



WHAT QUESTIONS DO I ASK?

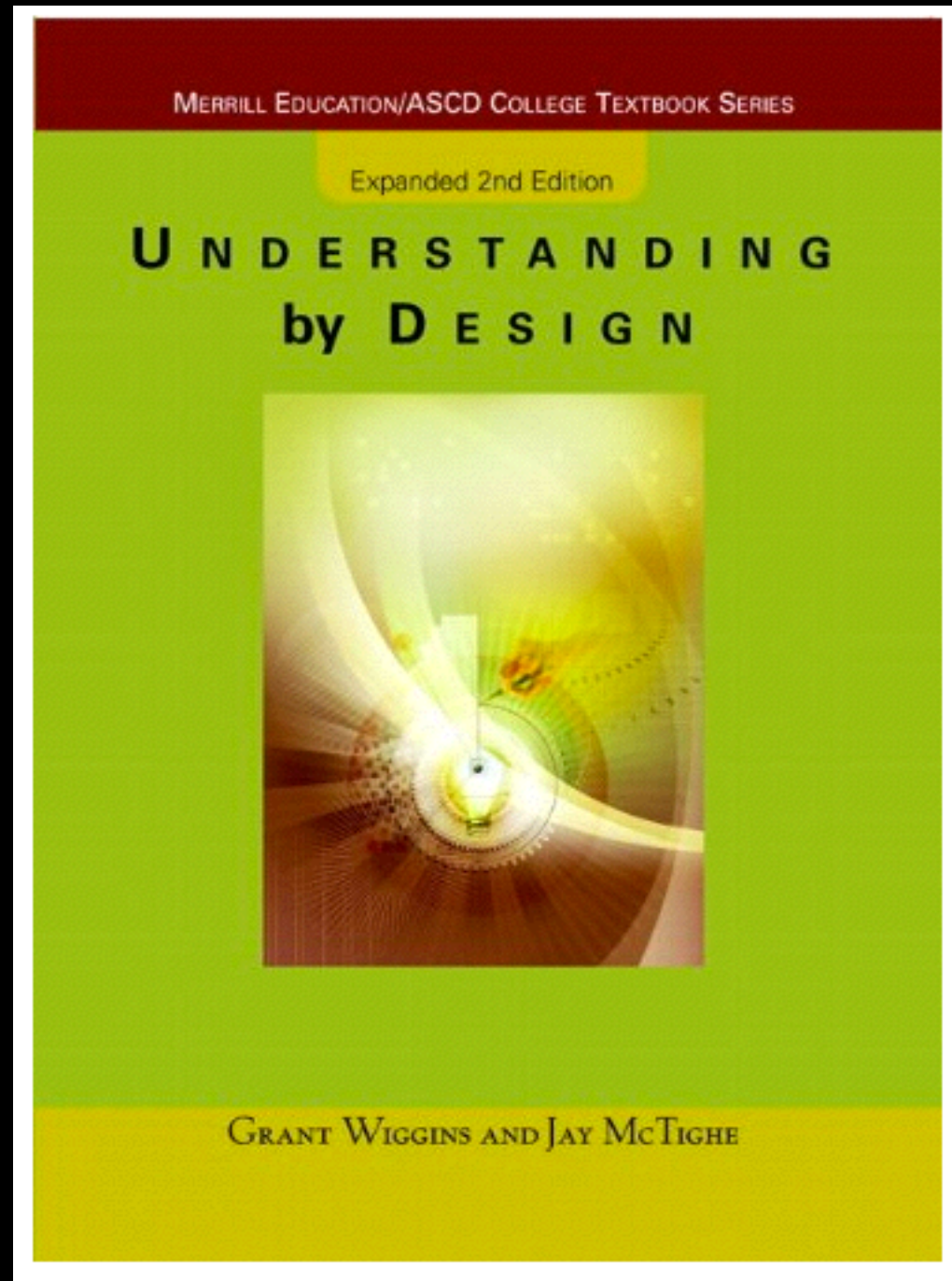
CURRICULUM

1.

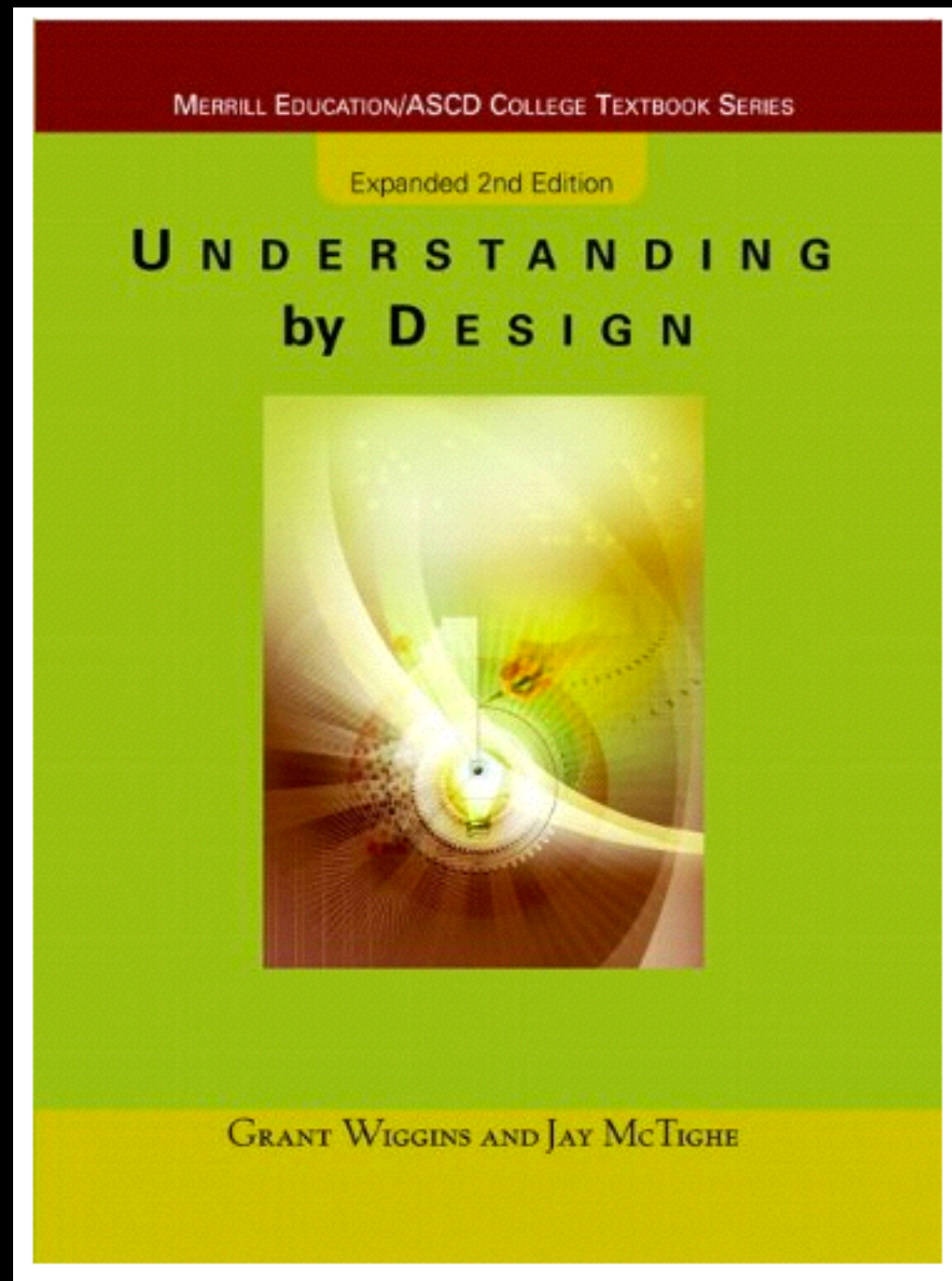
2.

3.

CURRICULUM: BACKWARD DESIGN



CURRICULUM: BACKWARD DESIGN

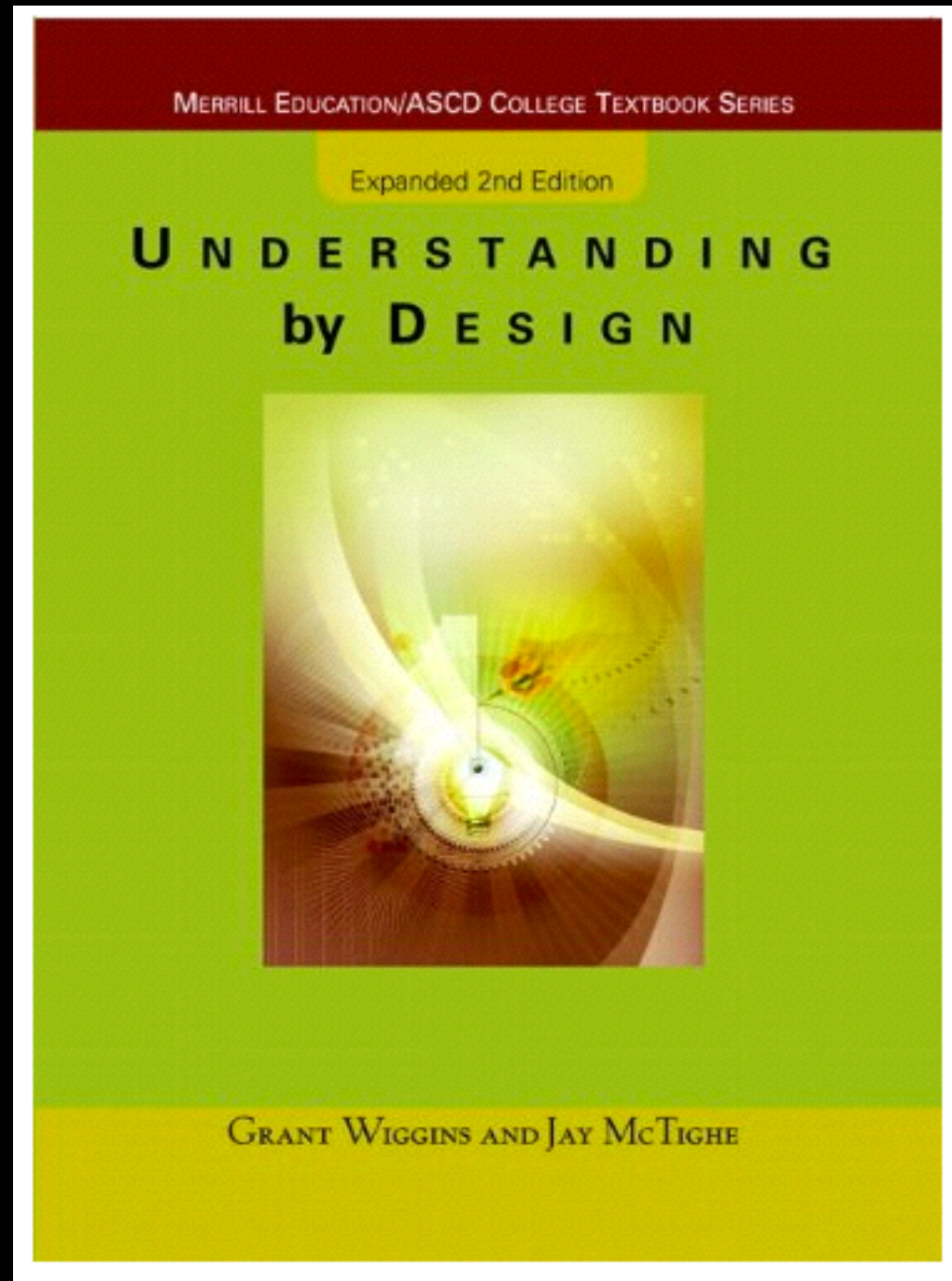


DEFINE
YOUR
COURSE

BY
LEARNING
GOALS

NOT
CONTENT

CURRICULUM: BACKWARD DESIGN



ASSIGNMENTS

ACTIVITIES

ASSESSMENT

ASPECTS OF CURRICULUM DESIGN

1. backward design

LET'S DO ANOTHER QUESTION

WHAT IS $-2-3$? (SUBTRACT 3 FROM -2)

A. 1

B. -1

C. 5

D. -5

E. 6

WHAT IS $-2-3$? (SUBTRACT 3 FROM -2)

A. 1

B. -1

C. 5

D. -5

E. 6

What's wrong with this question?

ASPECTS OF CURRICULUM DESIGN

1. backward design
2. find out what's hard, but achievable

WHICH OF THE FOLLOWING AIRLINES TRIES TO SAVE FUEL
BY SUGGESTING THAT ITS PASSENGERS USE THE
BATHROOM BEFORE BOARDING?

A. Aeroflot

B. All Nippon

C. Delta

D. Lufthansa

E. Are you kidding me? None of the above.

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How were your discussions?

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What's wrong with this question?

ASPECTS OF CURRICULUM DESIGN

1. backward design
2. find out what's hard, but achievable
3. elicit, confront, resolve

ASPECTS OF CURRICULUM DESIGN

1. backward design
2. find out what's hard, but achievable
3. elicit, confront, resolve
4. assess

HIGH-TECH IMPLEMENTATIONS

HIGH-TECH IMPLEMENTATIONS



The image is a screenshot of the Socrative website homepage. At the top, the browser address bar shows "www.socrative.com". The navigation bar includes three buttons: "Student Log In", "Teacher Log In", and "Teacher Sign Up". The Socrative logo is prominently displayed on the left. To the right of the logo is a navigation menu with links: "Home", "How it Works", "Contact Us", and "Support Materials".

The main content area features a large heading "Engage the class". Below this heading is a paragraph describing Socrative as a smart student response system that empowers teachers to engage their classrooms through educational exercises and games via smartphones, laptops, and tablets. Below the paragraph are two links: "Watch the video" and "Learn more". A large blue button labeled "Get started now!" is positioned below the links.

To the right of the text is a large image of a laptop displaying the Socrative logo on its screen. Below the laptop image, there are three columns of text: "Super Easy To Use", "Use on All Web-Enabled Devices", and "Teacher Testimonials". The "Teacher Testimonials" column includes a quote: "I never had such a reaction from the".

On the left side of the main content area, there is a Facebook "Like" button and a social media widget showing "5,053 people like this. Be the first of your friends." Below this, there are two buttons: "1k" and "8+1".

HIGH-TECH IMPLEMENTATIONS

The image displays the Learning Catalytics website and its mobile application. The website header features the URL <https://learningcatalytics.com> and the logo "learning | catalytics". Navigation links include Product, Tour, Stories, Pricing, About Us, Create instructor account, Create student account, and Log in. The main text describes it as a "bring your own device" student engagement, assessment, and classroom intelligence system, with a button for "Instructors: Get started now".

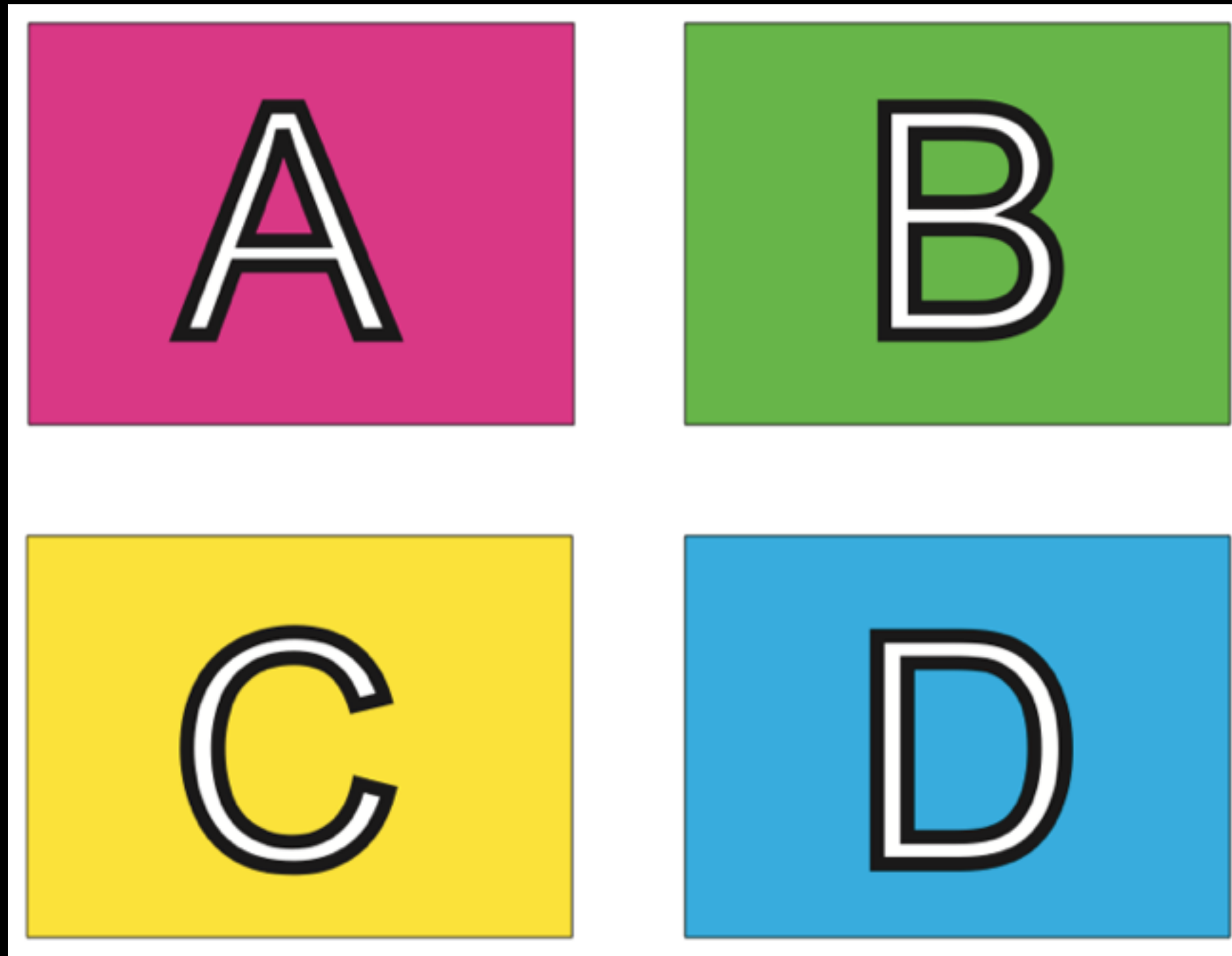
The mobile app interface, shown on a smartphone, displays the same Learning Catalytics logo and navigation links. It also shows a "Session 508125" with a "Logout" button. The app interface includes a "direction question" with a diagram of two perpendicular mirrors and a question about the direction of light after reflection. The app also shows a "Round 1" section with "22 responses, 59% correct" and a diagram of light rays reflecting off two mirrors.

HIGH-TECH IMPLEMENTATIONS



LOW-TECH IMPLEMENTATION

LOW-TECH IMPLEMENTATION



<http://bit.ly/1fv3bDP>

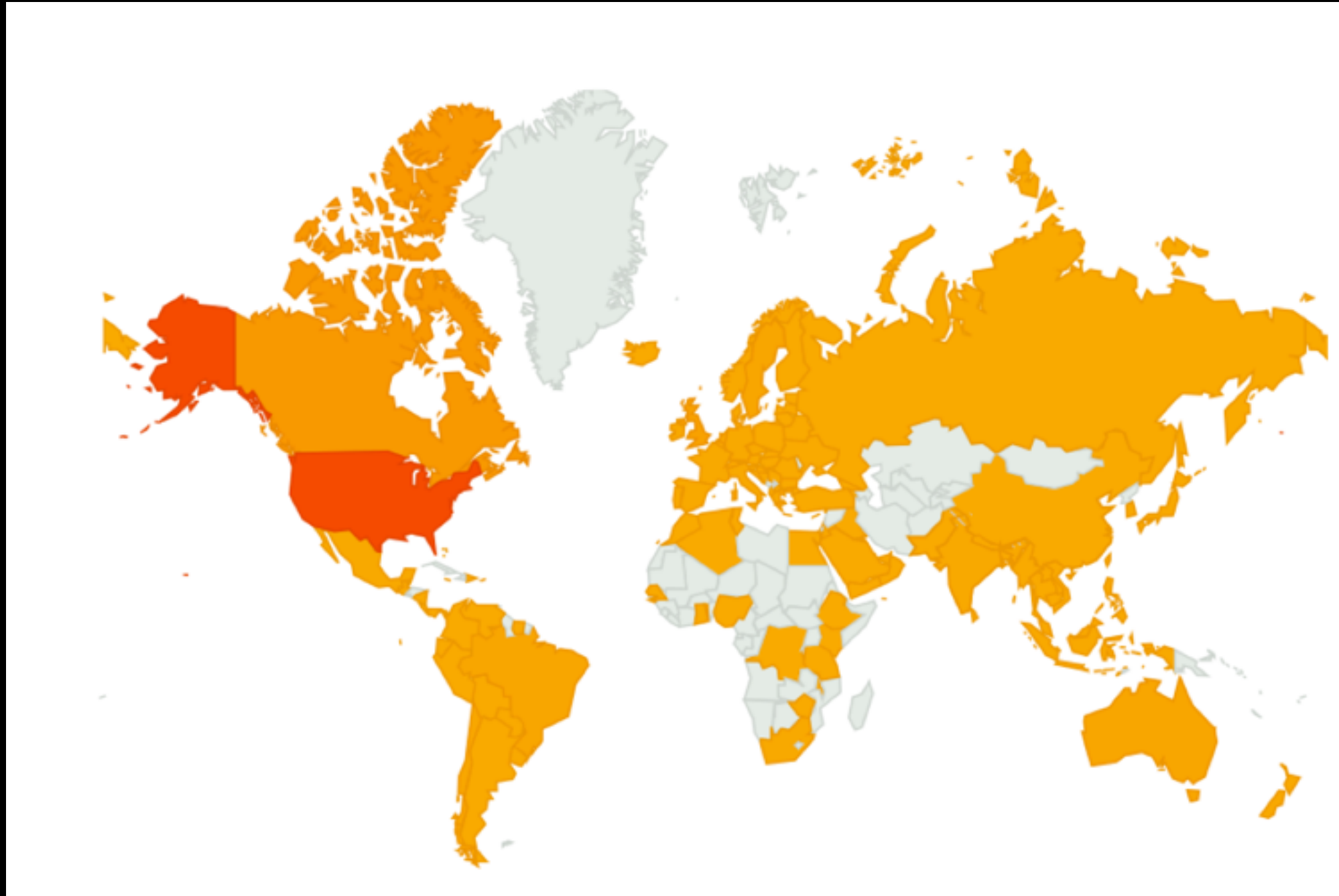
LOW-TECH IMPLEMENTATION



SUMMARY SO FAR

- Limit lecture. 5-15 minutes.
- Use Peer Instruction during class
- Choose or write ConcepTests that
 - are backward designed
 - focus on what's hard, but achievable
 - elicit, confront, resolve
- Go high-tech or low-tech

PEER INSTRUCTION AROUND THE WORLD





www.peerinstruction.net

Member Profile



PI Member since:
06/05/2012

Course or Subject Area:

[Mechanics,](#)
[Electromagnetism](#)



Eric Mazur

eric@learningcatalytics.com

Physics

Cambridge, MA
United States

Harvard University

PI User? Expert

Show Eric's ConcepTests on Learning Catalytics

What should the PI community know about me?

Physicist, educator, author, lecturer, Harvard professor, founder SiOnyx & Learning Catalytics, developer of Peer Instruction, early adopter of new technologies

Other Information:

I teach:

Introductory Undergraduates
Intermediate Undergraduates
Faculty (e.g. Workshops)
Other Audiences

Professional Role:

Primarily research, some instruction, some admin

Class (or Audience) Size:


Small (1-25)
Medium (26-75)
Large (76-200)
Extra-Large (201-500)
Mega (500+)

SEARCH BY DISCIPLINE AND LOCATION



PeerInstruction.net
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SEARCH | ABOUT | BLOG

Member Profile



Eric Mazur



 eric@learningcatalytics.com **Physics**

 **Cambridge, MA**
United States

Harvard University

PI Member since:
06/05/2012

Course or Subject Area:
[Mechanics](#),
[Electromagnetism](#)

PI User? Expert

Show Eric's ConcepTests on Learning Catalytics

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CHECK OUT THE BLOG FOR FAQ

Turn to Your Neighbor

The Official Peer Instruction Blog

Home

How do I get my students to prepare before coming to a flipped class?

April 20, 2012 · Best Practices, ConcepTests, Flipped classroom, Implementation, Just-in-Time-Teaching, Peer Instruction

 Print Post

 Email

 Tweet

Authors

Julie Schell

In 2 wildly popular blog posts [1](#) and [2](#) on the flipped classroom, “notable advocates of the flipped classroom” clarify what is meant by the term. They include Jonathan Bergmann and Aaron Sams, who are credited with developing the most prevalent implementation of the flip. In the first post, the 8 advocates write: “In most Flipped Classrooms, there is an active and intentional transfer of some of the information delivery to outside of the classroom with the goal of freeing up time to make better use of the face-to-face interaction in school.”

The eight flipped classroom gurus also write, “This can look very different from classroom to classroom and we recognize no two Flipped Classrooms look exactly the same, just as no two traditional classrooms look alike. The Flipped Classroom is a pedagogy-first approach that strives to meet the needs of the learners in our individual schools and communities. It is much more an ideology than it is a specific methodology...there is no prescribed set of rules to follow or model to fit...Practitioners of the various flipped classroom models are constantly tweaking, changing, rejecting, adding to, and generally trying to improve the model through direct experience with how effective it is for kids.”

We want to be clear, for ourselves and our readers, about what those most famous for the flip mean by the term. We think it’s a wonderful model and a great way to describe some of the core features of Peer Instruction, despite many differences.

Top Post

ENCOURAGE INFORMATION TRANSFER BEFORE CLASS

1. in-class quizzes

ENCOURAGE INFORMATION TRANSFER BEFORE CLASS: IN-CLASS QUIZZES

Which of the following topics were not part of last night's reading?

- momentum
- energy
- radiation
- Kelvin

ENCOURAGE INFORMATION TRANSFER BEFORE CLASS

1. in-class quizzes
2. JiTT

ENCOURAGE INFORMATION TRANSFER
BEFORE CLASS: JITT

READING/COVERAGE

ENCOURAGE INFORMATION TRANSFER BEFORE CLASS: JITT

READING/COVERAGE

ONLINE ASSIGNMENT:

2 CONCEPTUAL QUESTIONS

1 FEEDBACK QUESTION

ENCOURAGE INFORMATION TRANSFER BEFORE CLASS: JITT

READING/COVERAGE

ONLINE ASSIGNMENT:

2 CONCEPTUAL QUESTIONS

1 FEEDBACK QUESTION

WHAT SINGLE POINT IN THE MATERIAL
WAS MOST CHALLENGING?

ENCOURAGE INFORMATION TRANSFER BEFORE CLASS: JITT

READING/COVERAGE

ONLINE ASSIGNMENT:

2 CONCEPTUAL QUESTIONS

1 FEEDBACK QUESTION

WHAT SINGLE POINT IN THE MATERIAL
WAS MOST CHALLENGING?

REVIEW FEEDBACK

ENCOURAGE INFORMATION TRANSFER BEFORE CLASS: JITT

READING/COVERAGE

ONLINE ASSIGNMENT:

2 CONCEPTUAL QUESTIONS

1 FEEDBACK QUESTION

WHAT SINGLE POINT IN THE MATERIAL
WAS MOST CHALLENGING?

REVIEW FEEDBACK

ADDRESS DIFFICULTIES IN CLASS

ENCOURAGE INFORMATION TRANSFER BEFORE CLASS

1. in-class quizzes
2. JiTT
3. homework: one-paragraph summary of main points

ENCOURAGE INFORMATION TRANSFER BEFORE CLASS

1. in-class quizzes
2. JiTT
3. homework: one-paragraph summary of main points
4. discussion forum

SUMMARY

- Limit lecture. 5-15 minutes.
- Use Peer Instruction during class
- Choose or write ConcepTests that
 - are backward designed
 - focus on what's hard, but achievable
 - elicit, confront, resolve
- Go high-tech or low-tech
- **Encourage information transfer before class**

THANK YOU! QUESTIONS?

D-LAB, MIT, 2014. LAURA TUCKER.

PEER INSTRUCTION



IMAGE CREDITS



- http://fc01.deviantart.net/fs71/i/2012/054/8/9/reach_for_the_stars_by_pridescrossing-d4qp4co.jpg




- <http://smithsystem.com/wp-content/uploads/2012/06/classrooms.jpeg>



- <http://www.hobomom.com/wp-content/uploads/2012/05/Wrong-Feet.jpg>

CITATION CREDITS

- youtube: "five minute university" 
- Limit lecturing time. Middendorf, J., & Kalish, A. (1996). The "change-up" in lectures. In Natl. Teach. Learn. Forum (Vol. 5, pp. 1–5). Wiley Online Library. Retrieved from <http://onlinelibrary.wiley.com/doi/10.1002/ntlf.10026/abstract> (and references therein)
- Elicit, confront, resolve. McDermott, L. C., Shaffer, P. S., & Constantinou, C. P. (2000). Preparing teachers to teach physics and physical science by inquiry. *Physics Education*, 35(6), 411–416.
- Testing effects. Roediger, H. L., & Butler, A. C. (2011). The critical role of retrieval practice in long-term retention. *Trends in Cognitive Sciences*, 15(1), 20–27. doi:10.1016/j.tics.2010.09.003 (and references therein)
- <http://www.amazon.com/Understanding-Design-Expanded-2nd-Edition/dp/0131950843>

