

# Effective Remote Teaching



SAIP2021

South-African Institute of Physics Conference

30 June 2021



# Effective Remote Teaching



@eric\_mazur

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South-African Institute of Physics Conference

30 June 2021





Weekend long reads



© Graziano Pantili

Life &amp; Arts

## Yuval Noah Harari: the world after coronavirus

This storm will pass. But the choices we make now could change our lives for years to come

Yuval Noah Harari MARCH 20 2020



Save

Humankind is now facing a global crisis. Perhaps the biggest crisis of our generation. The decisions people and governments take in the next few weeks will shape the world for years to come. They will shape not just our lives but the lives of future generations. We must act





Many short-term emergency measures will become a fixture of life. That is the nature of emergencies. They fast-forward historical processes. Decisions that in normal times could take years of deliberation are passed in a matter of hours. Immature and even dangerous technologies are pressed into service, because the risks of doing nothing are bigger. Entire countries serve as guinea-pigs in large-scale social experiments. What happens when everybody works from home and communicates only at a distance? What happens when entire schools and universities go online? In normal times, governments, businesses and educational boards would never agree to conduct such experiments. But these aren't normal times.







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Yuval Noah Harari MARCH 20 2020

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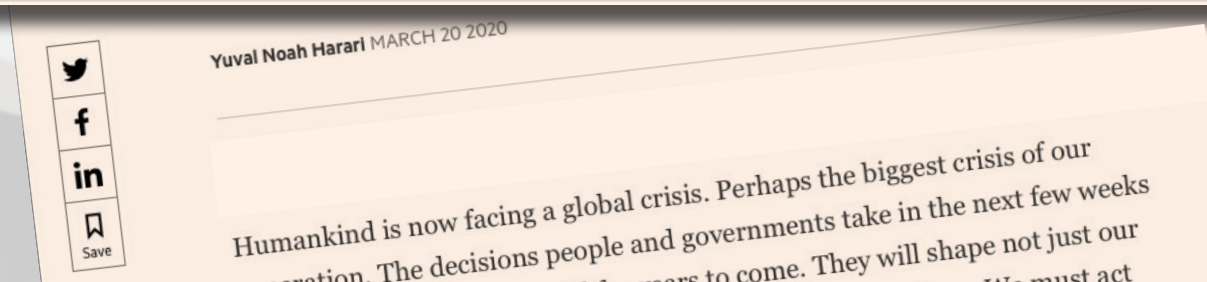


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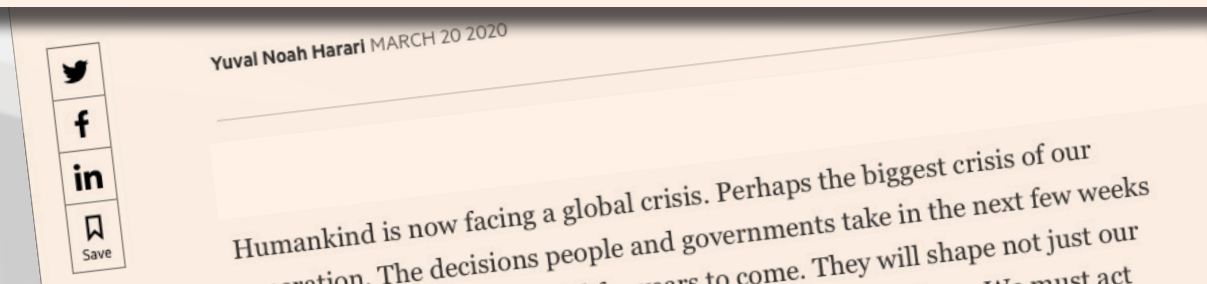




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**Will remote teaching become a fixture of life?**

happens when everybody works from home and communicates only at a distance? What happens when entire schools and universities go online? In normal times, governments, businesses and educational boards would never agree to conduct such experiments. But these aren't normal times.





ng Wing School P.S. 124 who wished not be identified remote teaches on her laptop from her roof on March 24, 2020 in New York City. | Photo by Michael Loccisano/Getty Images

## TEACHING & CLASSROOM

# America's great remote-learning experiment: What surveys of teachers and parents tell us about how it went

By Matt Barnum and Claire Bryan | Jun 26, 2020, 12:18pm EDT



REPUBLIC

Spring America's schools underwent an unprecedented experiment: tens of  
ing into school, and instead began receiving



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EDSCOOP

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HIGHER EDUCATION

# How higher education leaders tried to stave off disaster in 2020



(Getty Images)



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THE WALL STREET JOURNAL.

A photograph of a woman with long brown hair, wearing a green shirt and jeans, sitting on a tan sofa in a living room. She is looking at a laptop. To her left, a boy in a blue shirt and red shorts is sitting on the sofa, looking at a tablet. To her right, a boy in a red and blue plaid shirt and blue shorts is sitting on the sofa, looking at a tablet. In the foreground, a girl in a white dress and blue headband is standing, looking down. Another boy in a red shirt is sitting on the floor in the foreground. The living room has two lamps, a coffee table with a blue tablet and books, and a patterned rug. The text 'EDUCATION' is visible on the coffee table.

# The Results Are In for Remote Learning: It Didn't Work

The pandemic forced schools into a crash course in online education. Problems piled up quickly. 'I find it hectic and stressful'

Lucia Curatolo-Boylan supervises the online schooling of her four children, ages 4 to 10, in Staten Island, N.Y. KEVIN HAGEN FOR THE WALL STREET JOURNAL

by Howard and Lee Hawkins



lkbeat

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Popular

Latest

*The Atlantic*

IDEAS

# Remote Learning Is a Bad Joke

My kid can't handle a virtual education, and neither can I.

AUGUST 18, 2020

**Emily Gould**

Author and essayist



RECOMMEN  
READING

Put Anthony Fauci in  
Dunk Tank

CONOR FRIEDERSDORF

Why Millennials Can  
Up

# Remote learning has been a disaster and it can't continue

**Randy Feldman**

Published 5:30 a.m. ET Jun. 9, 2020

[View Comments](#)



Perspective. Few public policy issues are about one's own personal predisposition to live with risk and uncertainty than how we approach the coronavirus pandemic in the coming months. Scientific facts notwithstanding, how each of us evaluates the probability of contracting or spreading coronavirus





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THE WALL STREET JOURNAL.

# Intelligencer



Remote learning has been a disaster  
and it can't continue

Randy Feldman

October 7, 2020

Remote learning has been a disaster  
and it can't continue

Remote learning has been a disaster  
and it can't continue

THE NATIONAL INTEREST | OCT. 7, 2020

## Remote Learning Is a Catastrophe. Teachers Share the Blame.

By Jonathan Chait

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# Intelligencer



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## Why Emergency Online Learning Got Low Grades From Many College Students

By Robert Ubell (Columnist) Mar 8, 2021





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he Coronavirus Outbreak >

**LIVE** Latest Updates

Maps and Cases

State Reopening Tracker

Vaccine Rollout

Second D

# ***Research Shows Students Falling Months Behind During Virus Disruptions***

The abrupt switch to remote learning wiped out academic gains for many students in America, and widened racial and economic gaps. Catching up in the fall won't be easy.

**Online distance learning for schools and colleges has been a great disaster.**

## *Research Shows Students Falling Months Behind During Virus Disruptions*

The abrupt switch to remote learning wiped out academic gains for many students in America, and widened racial and economic gaps. Catching up in the fall won't be easy.



The background is a collage of various news and education-related elements. At the top left, there's a small 'ikbeat' logo. Next to it are links for 'SUBSCRIBE', 'ABOUT', and 'RSS'. Below these, 'THE WALL STREET JOURNAL' is visible. To the right, the word 'Intelligence' is partially shown in a large, bold font. Further down, the 'EdSurge' logo is present, followed by the words 'News', 'Research', and 'Events'. On the right side, there are snippets of text like 'Vaccine Rollout' and 'Second D'. At the bottom left, a headline about 'the Coronavirus Outbreak' is partially visible. The central focus is a black rectangular box containing the text 'Was it really *that* bad?'.

Was it really *that* bad?

## *Research Shows Students Falling Months Behind During Virus Disruptions*

The abrupt switch to remote learning wiped out academic gains for many students in America, and widened racial and economic gaps. Catching up in the fall won't be easy.



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# March 2020

# AP50

1 before (and just after) pandemic





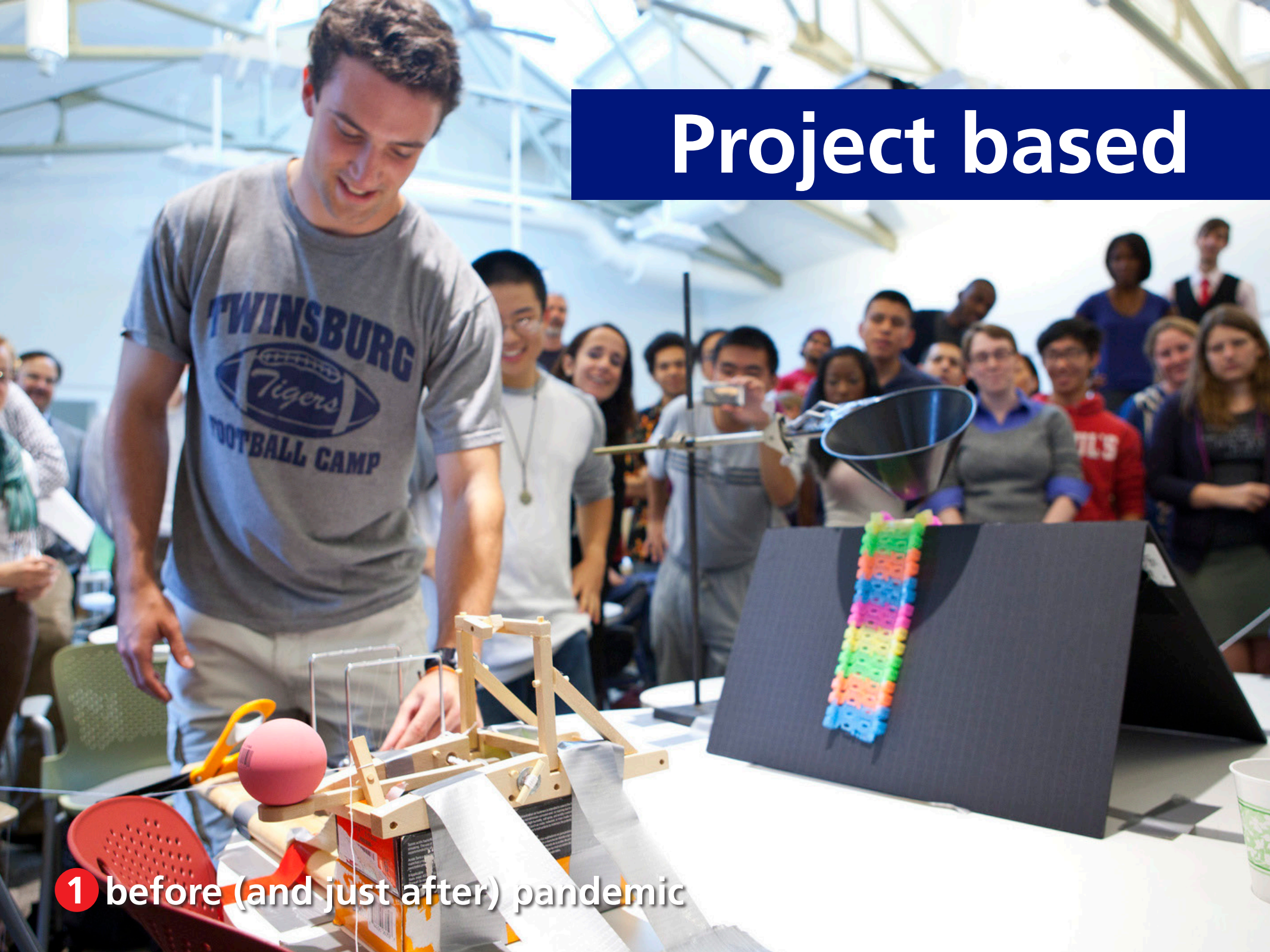
# Team based

1 before (and just after) pandemic



# Project based

1 before (and just after) pandemic





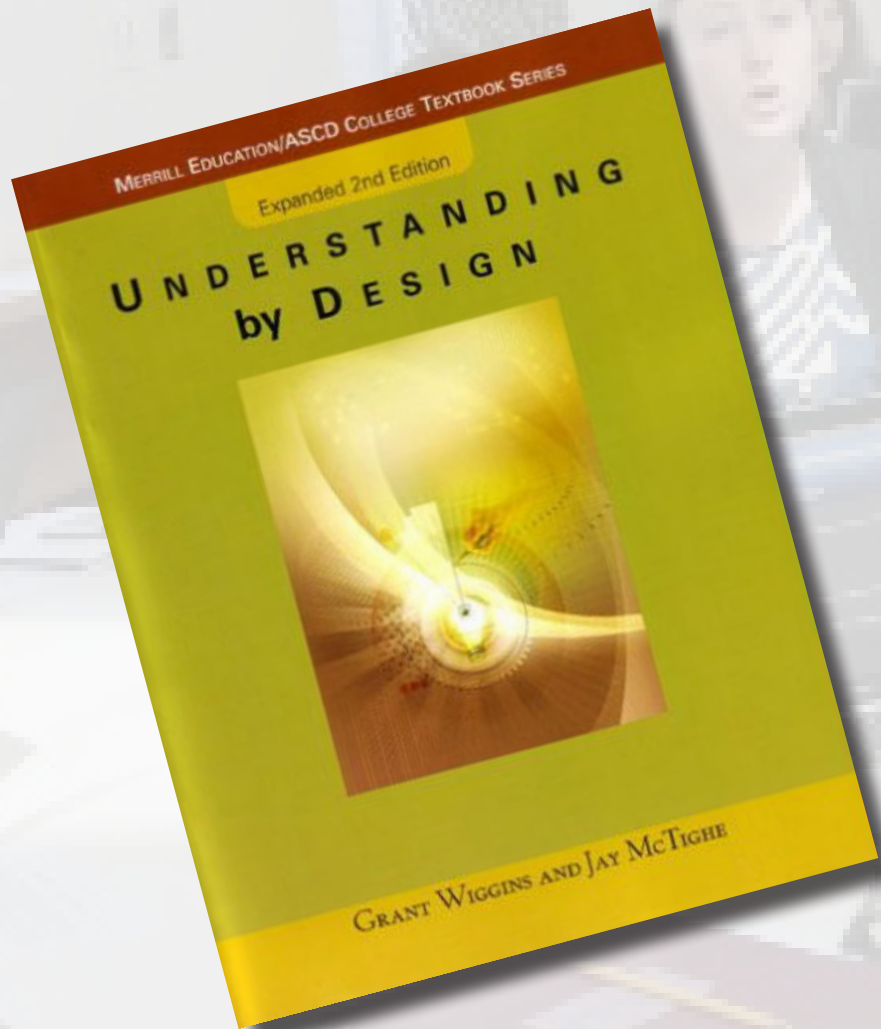


# Intrinsic motivation

1 before (and just after) pandemic



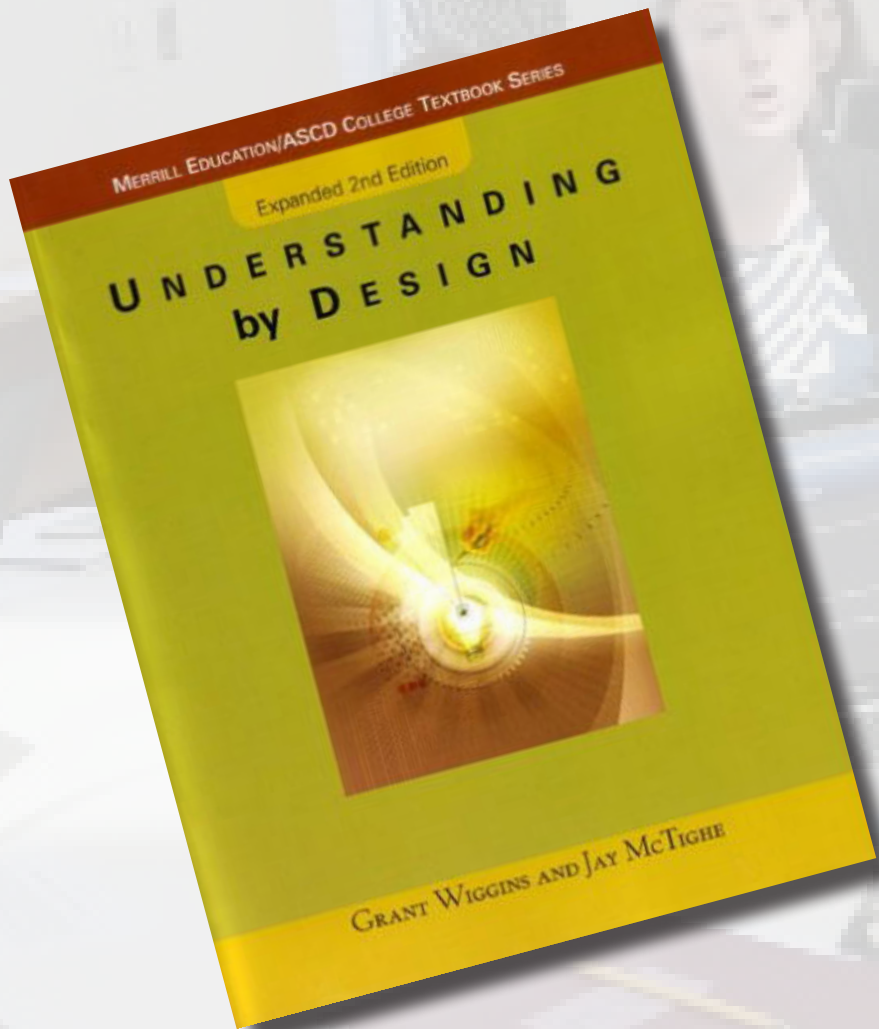
## Setting learning goals



Grant Wiggins and Jay McTighe, *Understanding by Design* (Prentice Hall, 2001)



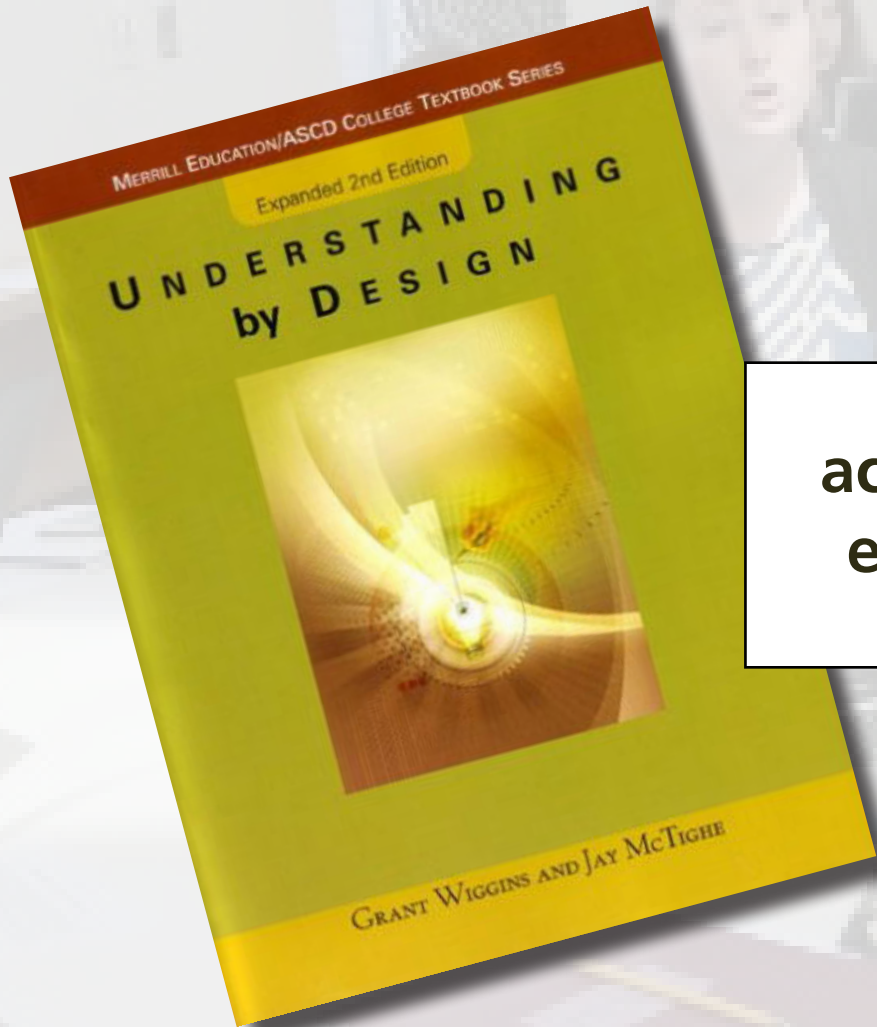
## Backward design



**desired  
outcomes**

Grant Wiggins and Jay McTighe, *Understanding by Design* (Prentice Hall, 2001)

## Backward design



**acceptable  
evidence**

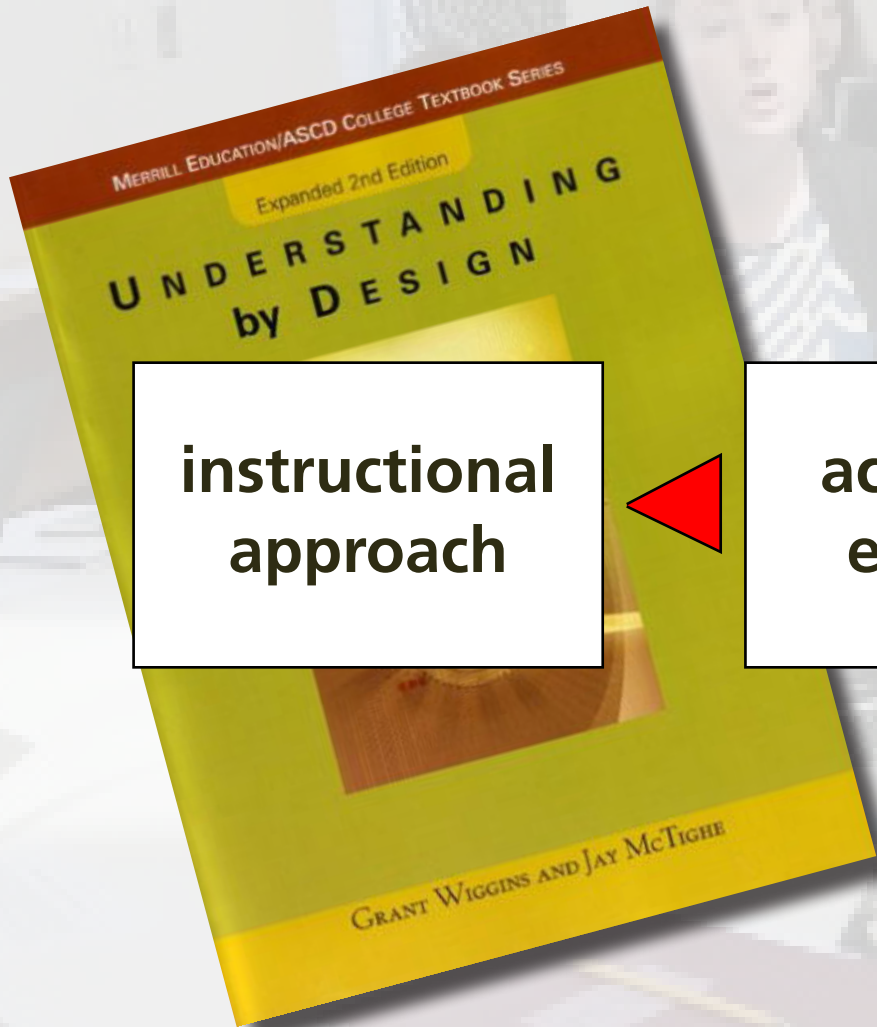


**desired  
outcomes**

Grant Wiggins and Jay McTighe, *Understanding by Design* (Prentice Hall, 2001)



## Backward design



**instructional  
approach**

**acceptable  
evidence**

**desired  
outcomes**

Grant Wiggins and Jay McTighe, *Understanding by Design* (Prentice Hall, 2001)

# Course goals

- self-directed learning
- content mastery
- team work
- professionalism

**1** before (and just after) pandemic





1 before (and just after) pandemic



information transfer

faculty-centered

1 before (and just after) pandemic





1 before (and just after) pandemic




A large, open-plan classroom with a high ceiling and exposed wooden beams. Students are seated at white tables, some using laptops. A teacher is standing and interacting with a group of students. The room has large windows and a bright, airy atmosphere.

# interaction student-centered

1 before (and just after) pandemic

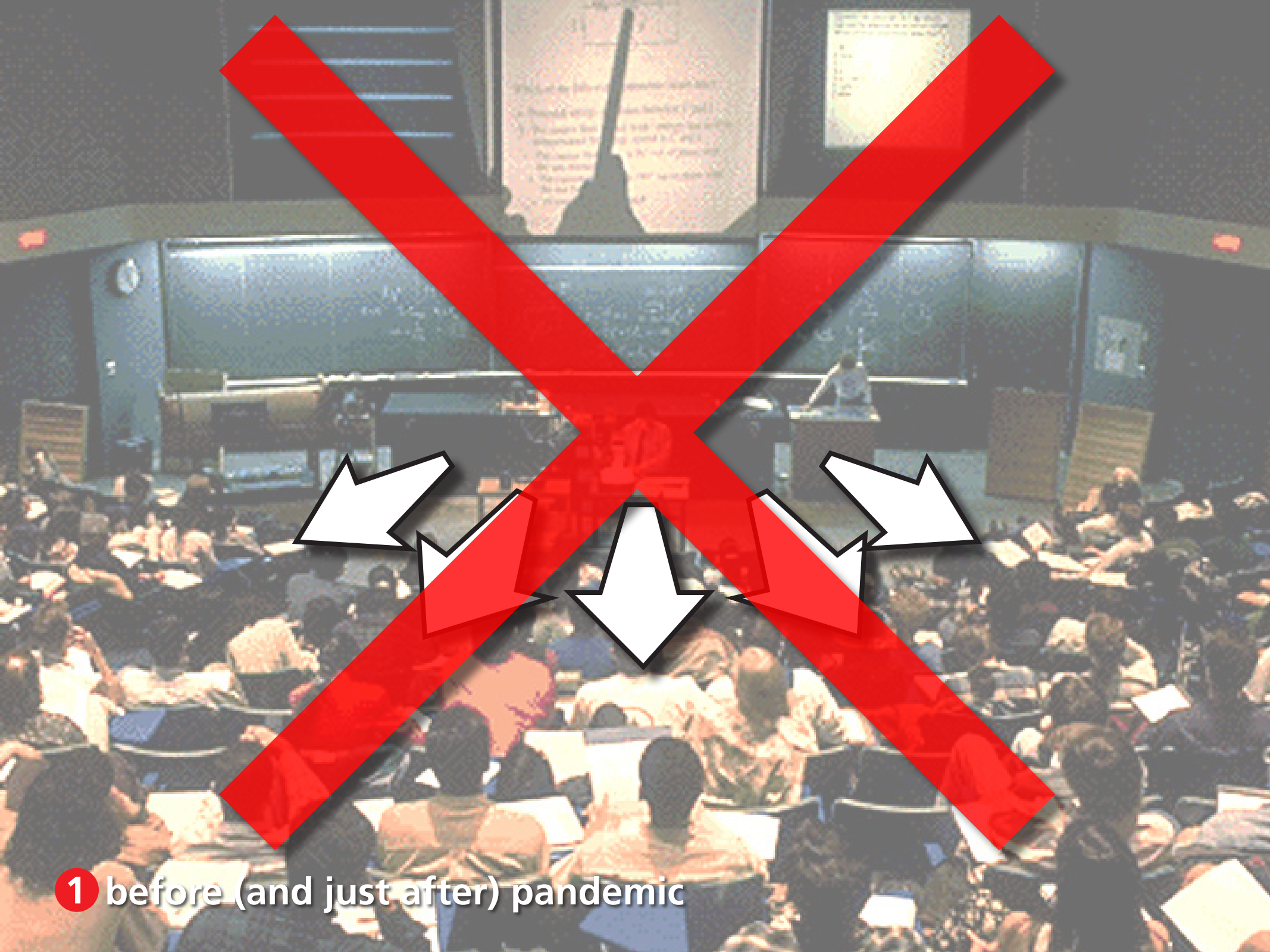




*no lectures*

*no exams*

**1** before (and just after) pandemic



1 before (and just after) pandemic



The background of the slide is a stylized illustration of a classroom. It shows several rows of students sitting at desks. The students are represented by simplified, colorful shapes in shades of yellow, green, blue, purple, and pink. They are all facing forward, and some are holding pens or pencils, suggesting they are in a lecture or study session. The desks are light-colored, and the overall style is clean and modern.

## **Solution**

**turn out-of-class component  
also into a social interaction!**

**1** before (and just after) pandemic

A group of four students are gathered around a wooden box in a classroom. A female student with glasses is pouring liquid from a white cup into the box. Another female student is smiling and looking at the box. A male student in a plaid shirt is standing behind them, also smiling. A female student in a maroon hoodie is sitting in front of the box, looking up at it. The box contains various items, including a blue bowl, a white cup, and some papers. The background shows a classroom setting with desks and chairs.

**what about class activities?**

**1** before (and just after) pandemic



# blend of 6 scaffolded “best practices”

understand

## LC: Learning Catalytics

90 min



Instructor poses question  
Answer alone  
Discuss in team  
Answer again



bring device

## Tutorial

60 min



Work on worksheet with team  
Explore concepts  
Discuss with staff

apply

## EA: Estimation Activity

30 min



Estimate quantities  
Develop individual strategy  
Discuss and solve as team



Conduct experiment with team  
Take measurements  
Analyze data  
Carry out simulations



bring device

evaluate

## Problem Set & Reflection

90 min



Work problems alone BEFORE class  
Discuss with team, mark up  
Self-assess & turn in

## RAA: Readiness Assurance Activity

90 min



Part 1: solve problems alone  
Open book, open internet  
Part 2: solve with team



bring device

**1** before (and just after) pandemic

A group of four students are gathered around a wooden box containing a project. A female student with glasses is pouring liquid from a white cup into a grey tube. Another female student is smiling and looking at the project. A male student in a plaid shirt is standing and smiling. A female student in a maroon hoodie is sitting and smiling. The box contains various components, including a circuit board with many small lights, a blue bowl, and some wires. The background shows a classroom setting with other students and equipment.

[bit.ly/ap50class](https://bit.ly/ap50class)

**1** before (and just after) pandemic





March 13, 2020

1 before (and just after) pandemic



**instructional continuity between first and second half?**

**1** before (and just after) pandemic





**instructional continuity between first and second half?**

**86% agreed**

**1** before (and just after) pandemic



**Summer 2020**



# Moving online

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

# Moving online

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



# Moving online

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

# 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)



## **Changes implemented**

- **Minimize sync/instructor-paced**
- **Personalize instruction**

## **Changes implemented**

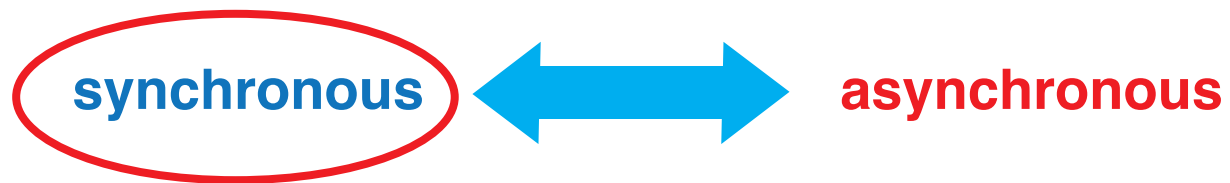
- **Minimize sync/instructor-paced**
- **Personalize instruction**
- **Specifications Grading**



# Minimize sync/instructor-paced

synchronous ↔ asynchronous

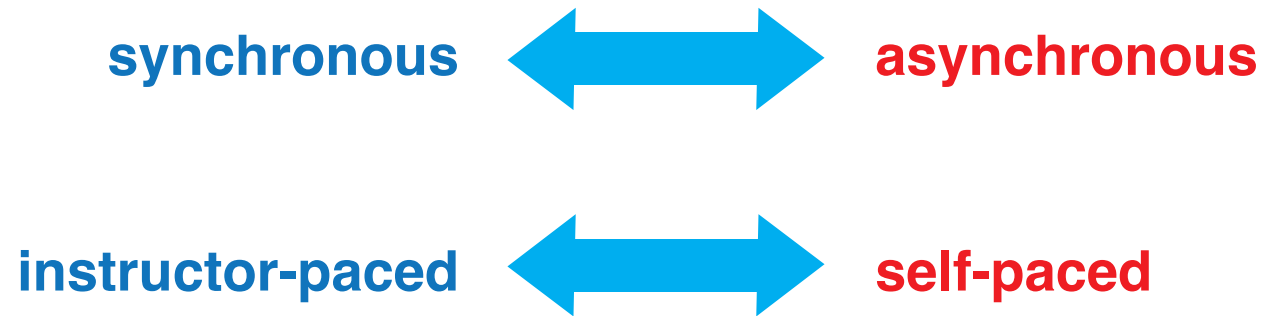
# Minimize sync/instructor-paced



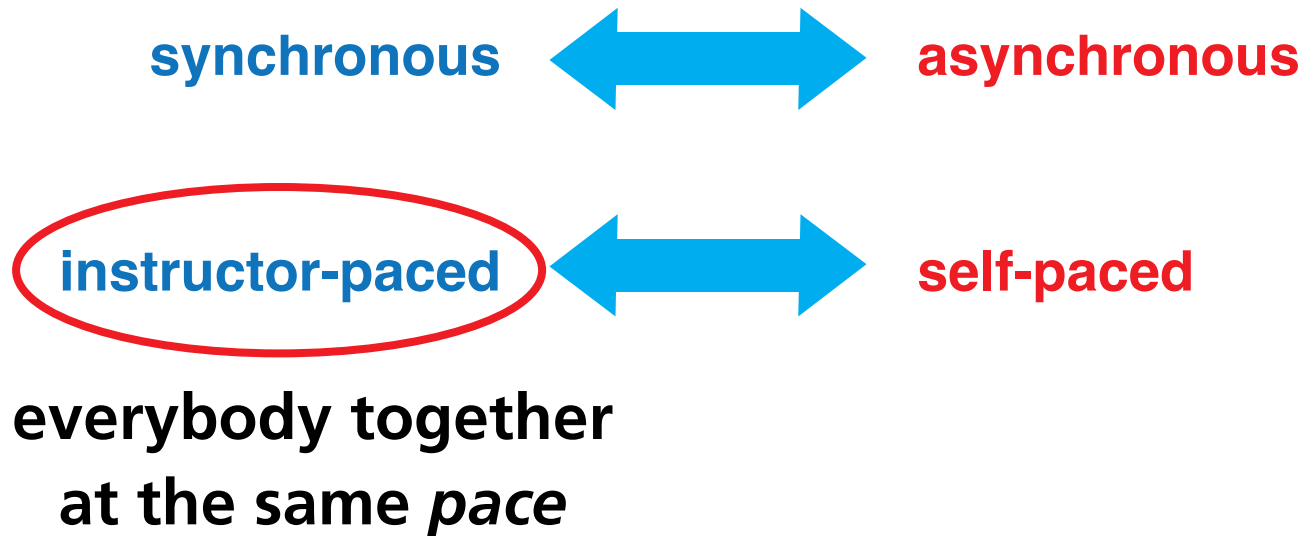
everybody together  
at the same *time*



# Minimize sync/instructor-paced

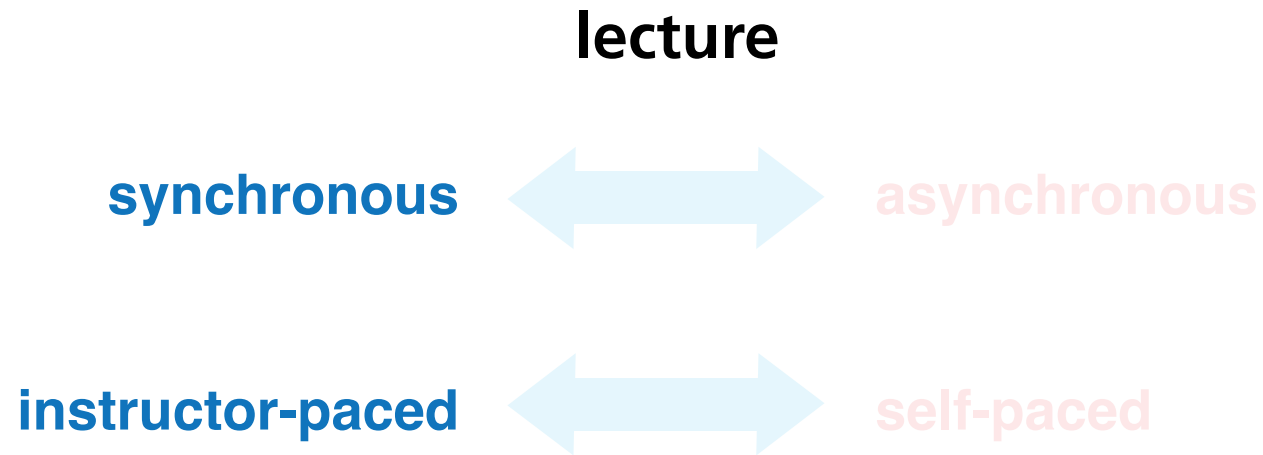


# Minimize sync/instructor-paced





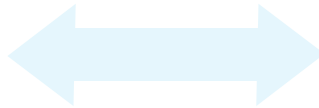
# Minimize sync/instructor-paced



# Minimize sync/instructor-paced

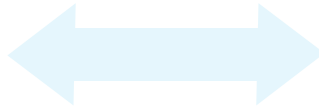
recorded lecture

synchronous



asynchronous

instructor-paced

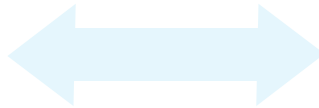


self-paced

# Minimize sync/instructor-paced

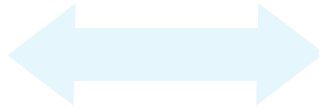
recorded lecture

synchronous



asynchronous

instructor-paced

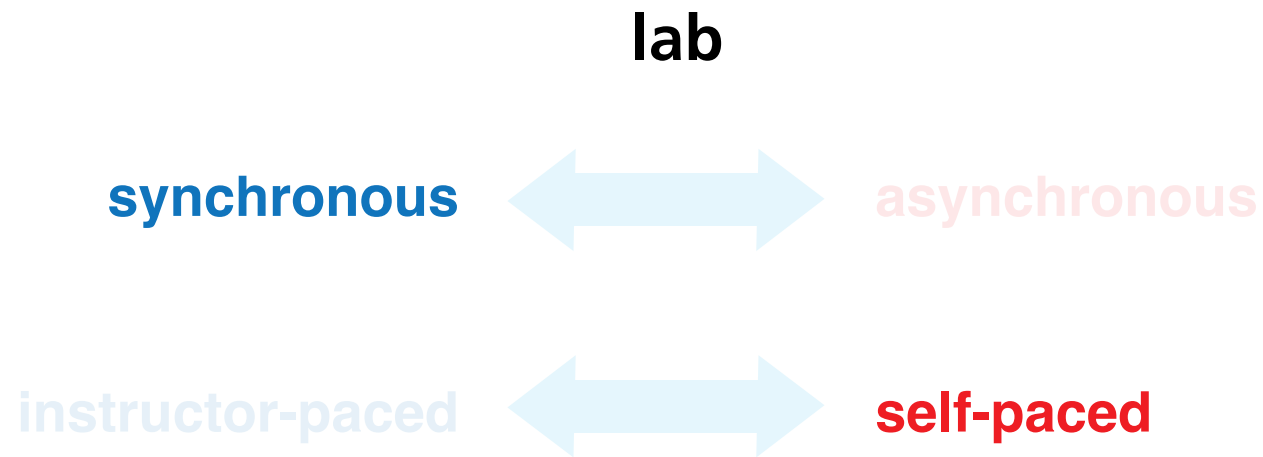


self-paced

**1.5x!**



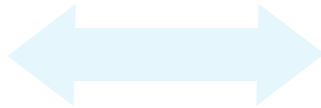
# Minimize sync/instructor-paced



# Minimize sync/instructor-paced

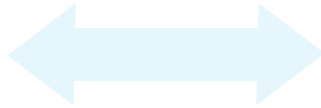
homework/study

synchronous



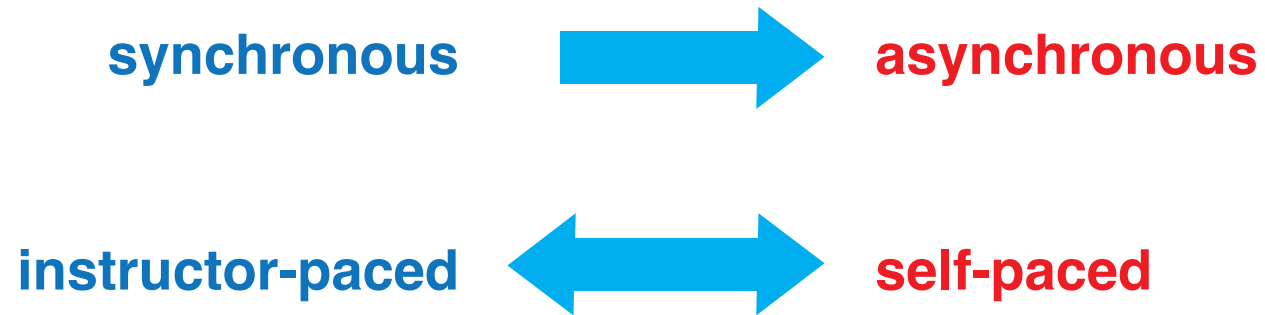
asynchronous

instructor-paced



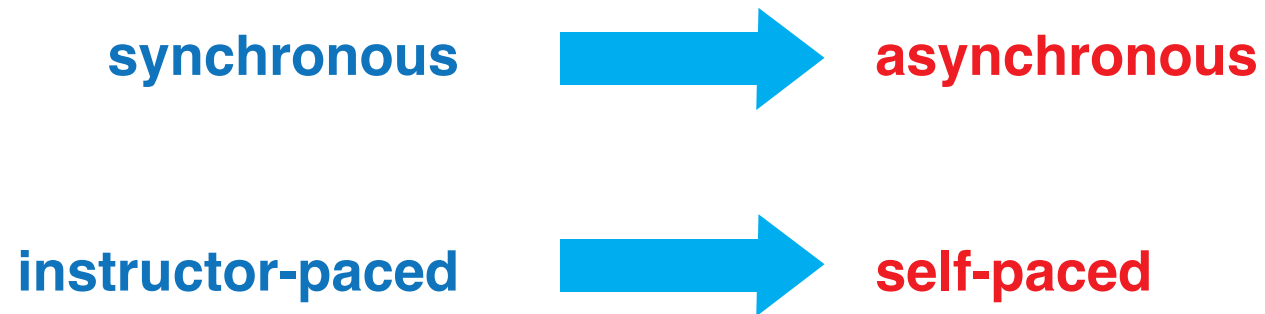
self-paced

# Minimize sync/instructor-paced

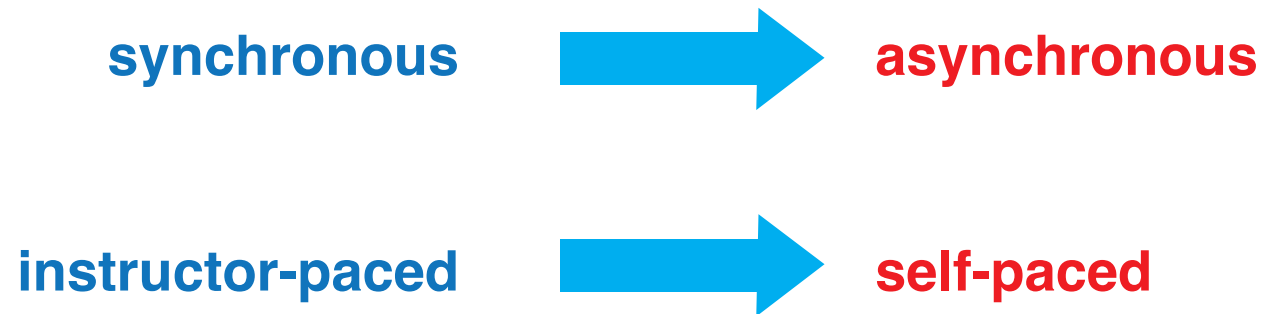




# Minimize sync/instructor-paced



# Minimize sync/instructor-paced



**more time to help students  
where it really matters!**

A background image of a modern classroom or meeting space. Several students are seated around a large, light-colored circular table. They are using laptops and looking at each other, suggesting a collaborative learning environment. The room has large windows in the background, letting in natural light. The overall tone is professional and educational.

# **Personalize instruction**

**instead of all students coming to instructor's room...**



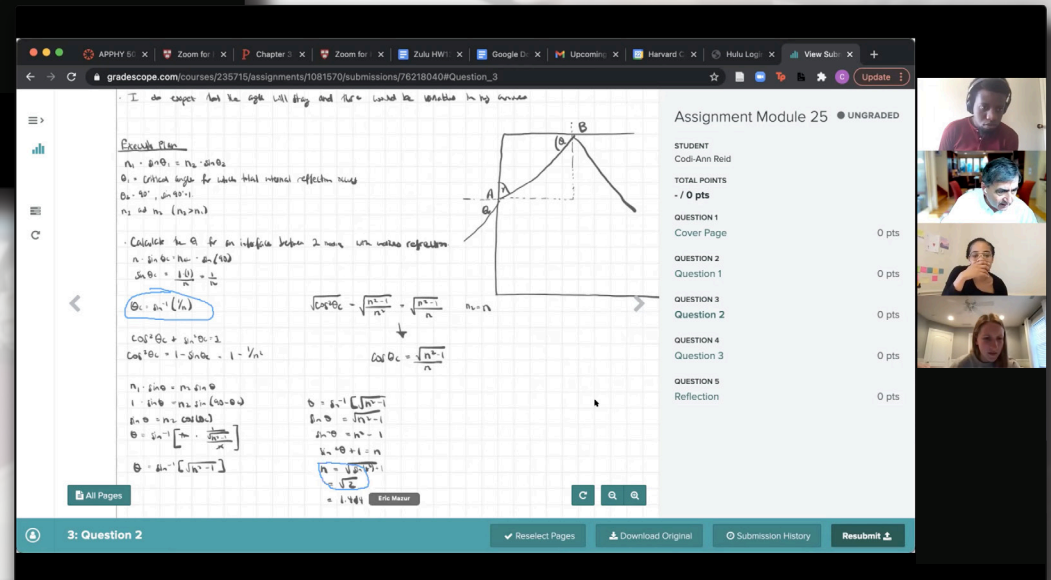
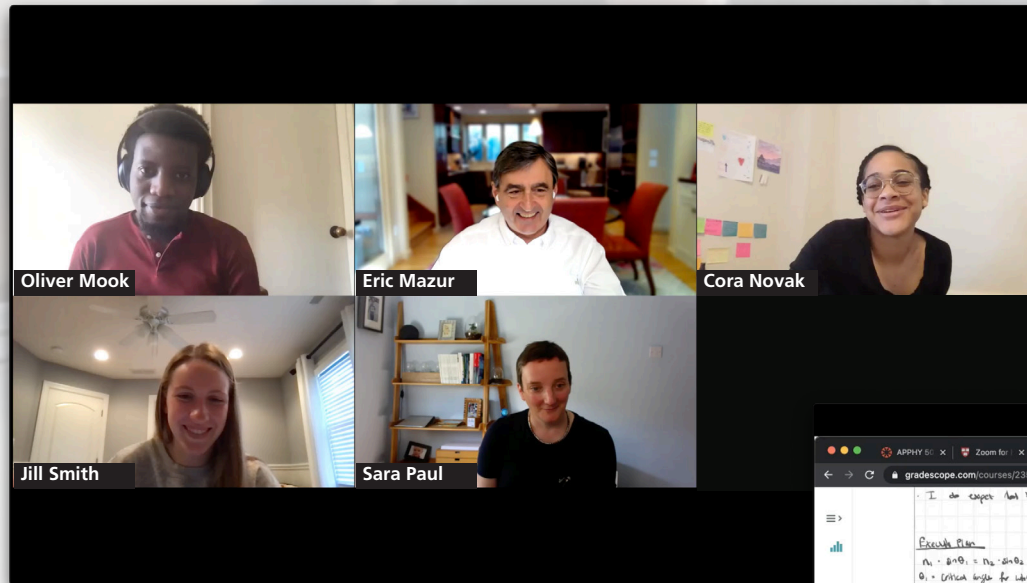
# **Personalize instruction**

**instead of all students coming to instructor's room...**

**...instructional staff visits each team's own room**

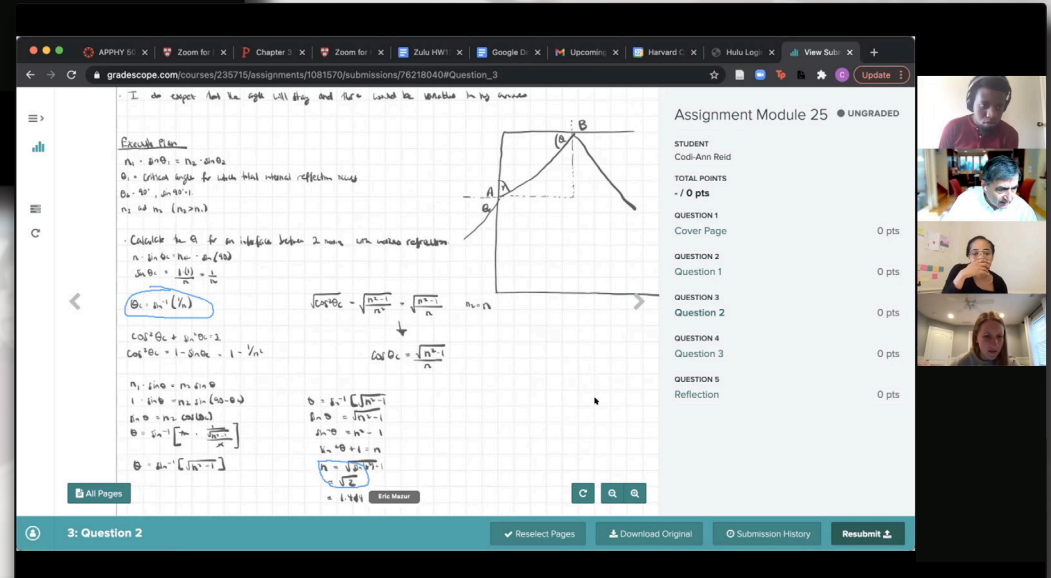
# Personalize instruction

80 students in one room → 20 rooms with 4 students





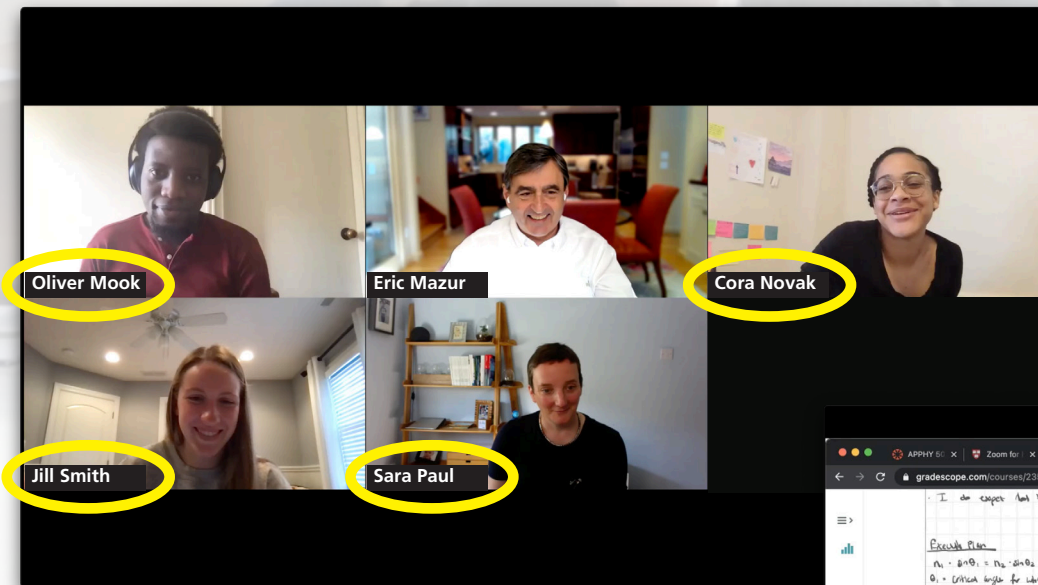
**every student on front row**





# Personalize instruction

every student on front row & address each by their name



gradescope.com/courses/235715/assignments/1081570/submissions/76218040/Question\_3

Assignment Module 25 • UNGRADED

STUDENT: Codi-Ann Reid

TOTAL POINTS: - / 0 pts

QUESTION 1: Cover Page (0 pts)

QUESTION 2: Question 1 (0 pts)

QUESTION 3: Question 2 (0 pts)

QUESTION 4: Question 3 (0 pts)

QUESTION 5: Reflection (0 pts)

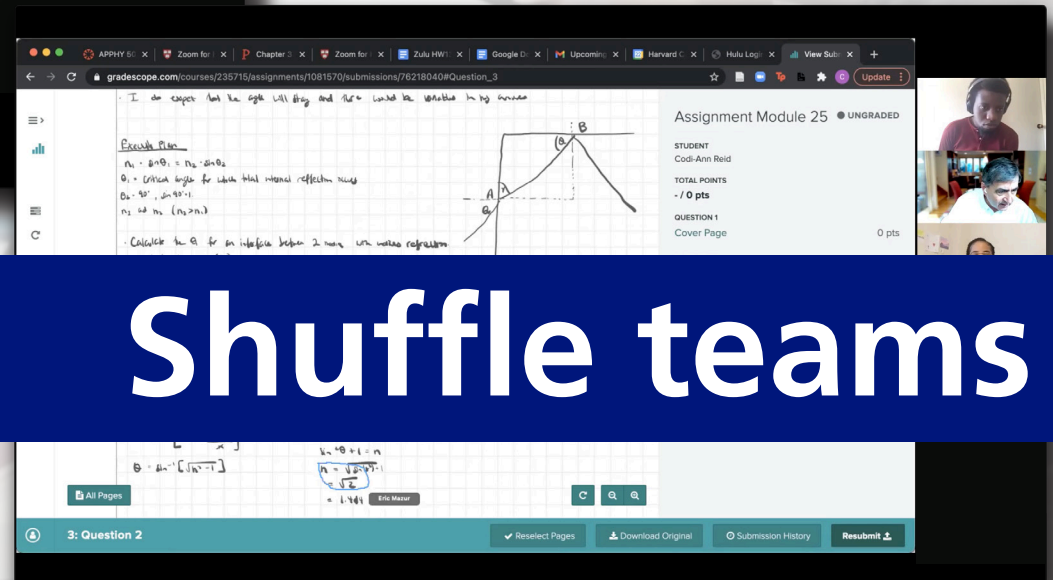
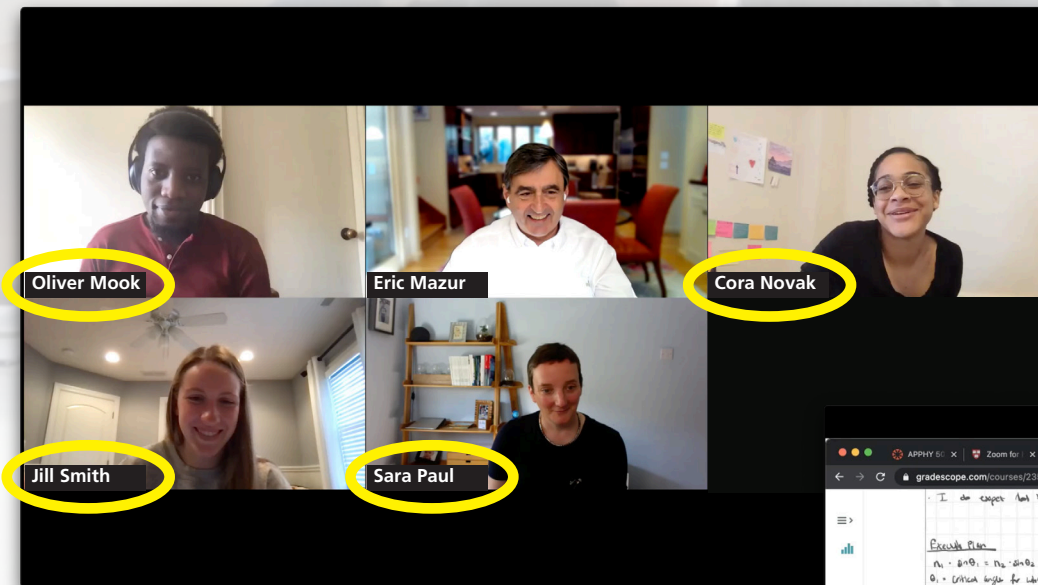
3: Question 2

Reselect Pages Download Original Submission History Resubmit

2 reimagining course

# Personalize instruction

every student on front row & address each by their name

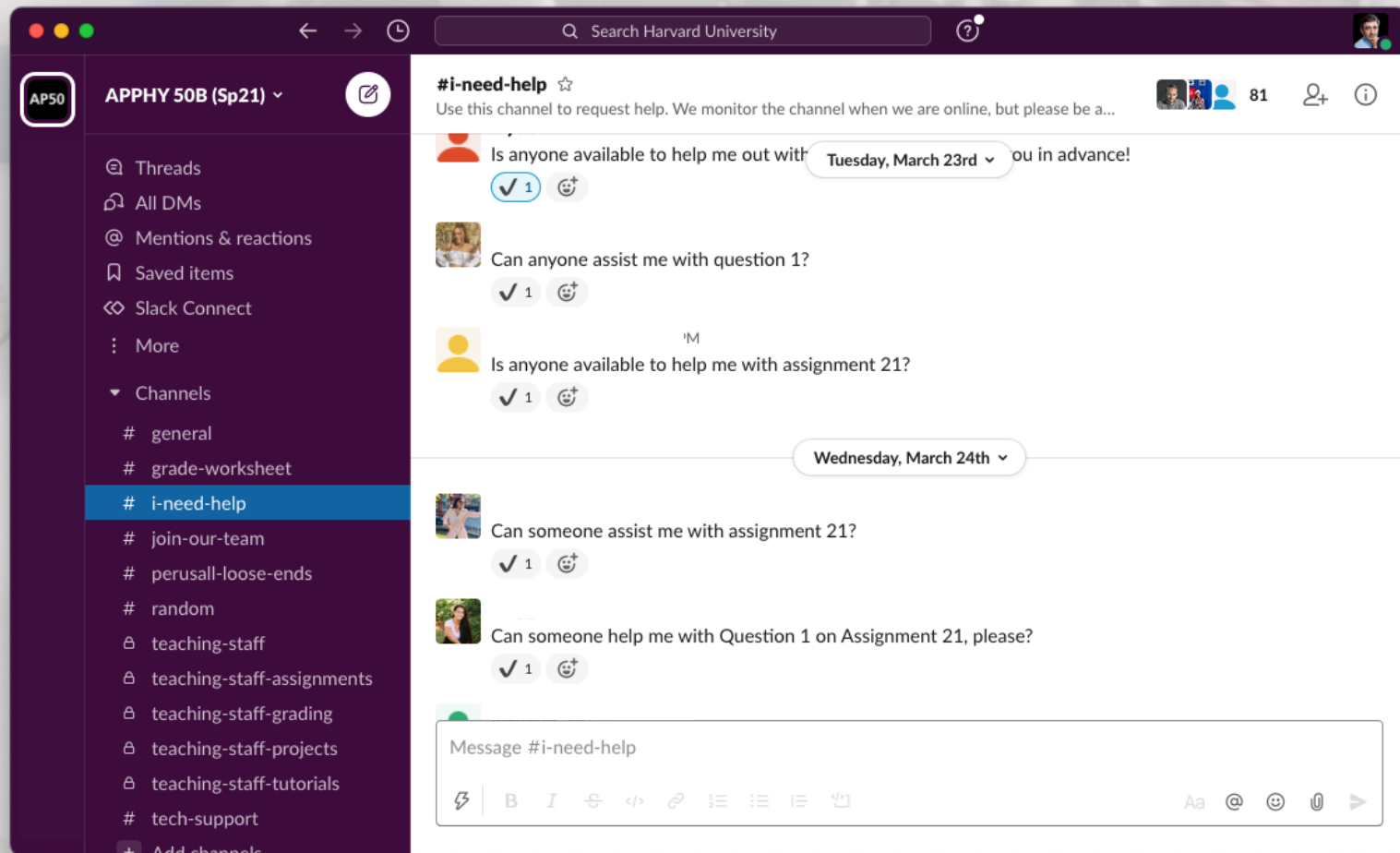


# Shuffle teams

2 reimagining course

# Personalize instruction

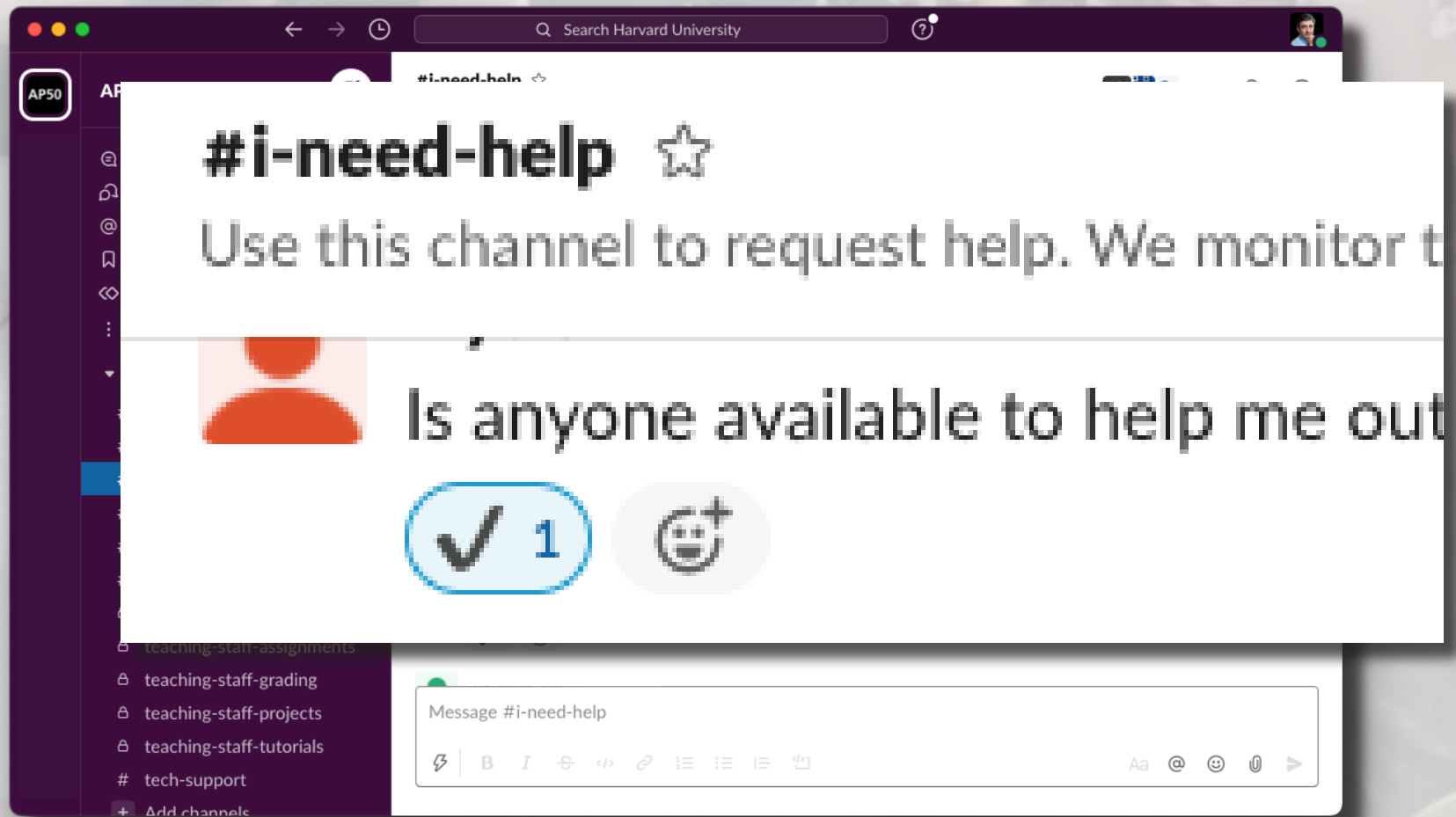
Use Slack to provide (nearly) continuous support





# Personalize instruction

Use Slack to provide (nearly) continuous support

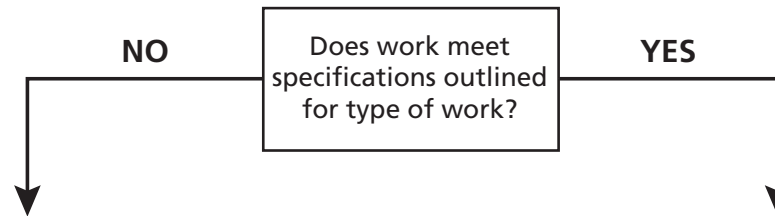


# Specifications grading

***Inside Higher Ed, Yes, Virginia, there is a better way to grade***

**2** reimagining course

# Specifications grading

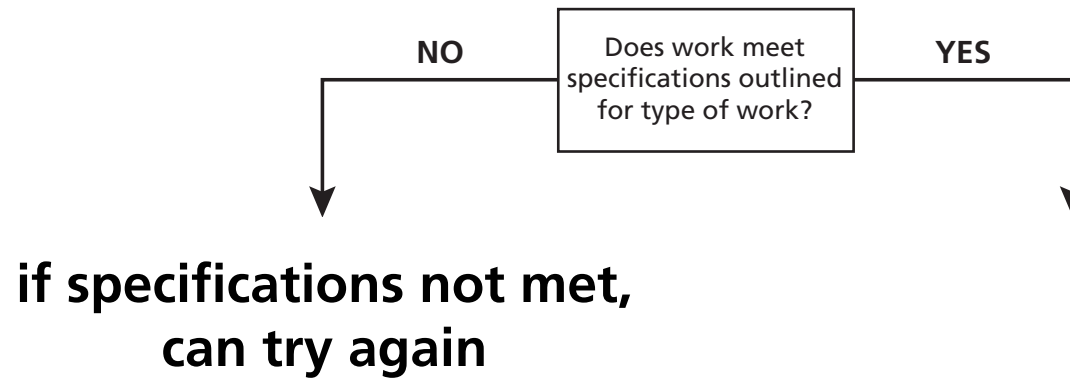


**Inside Higher Ed, *Yes, Virginia, there is a better way to grade***

**2** reimagining course

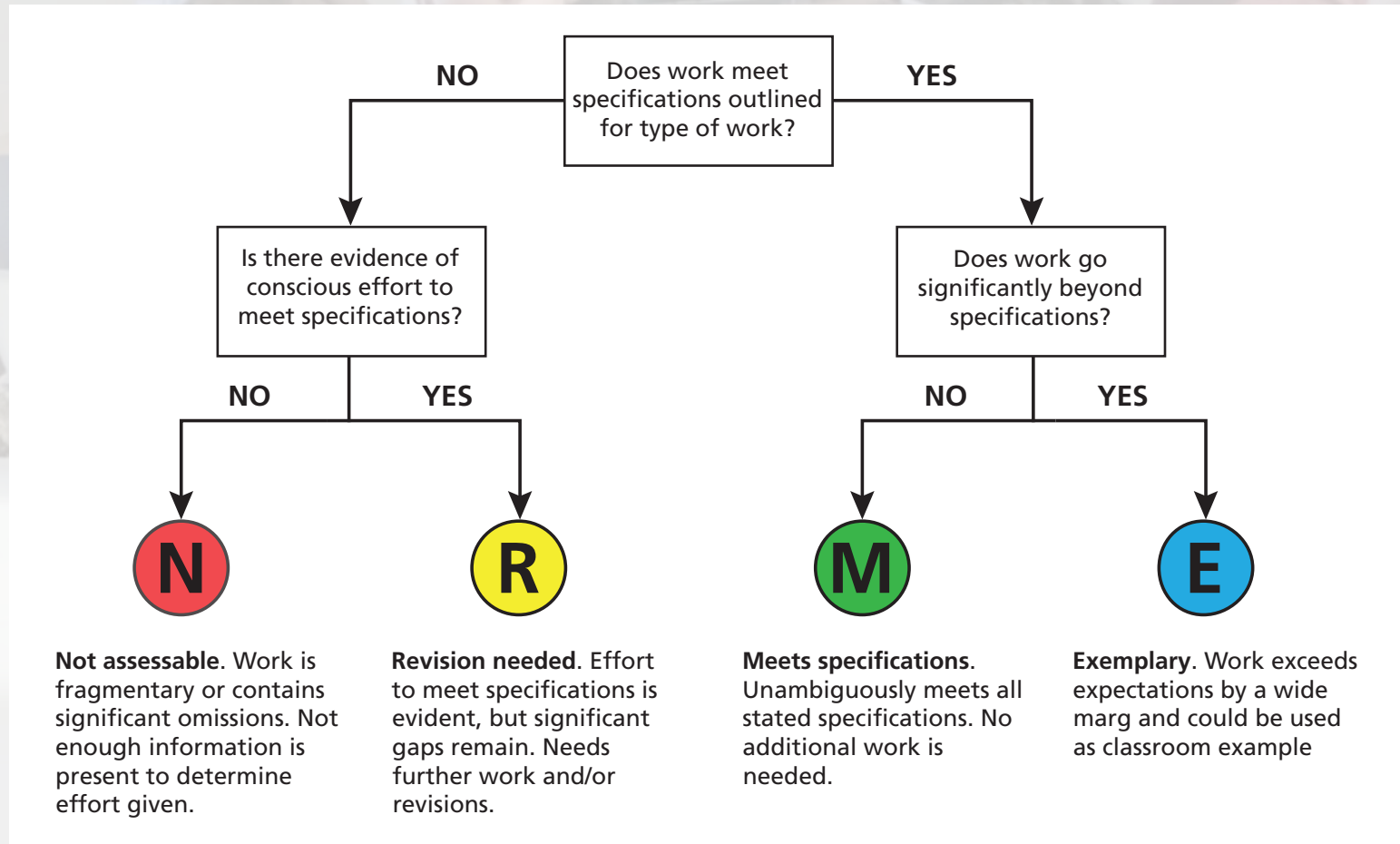


# Specifications grading



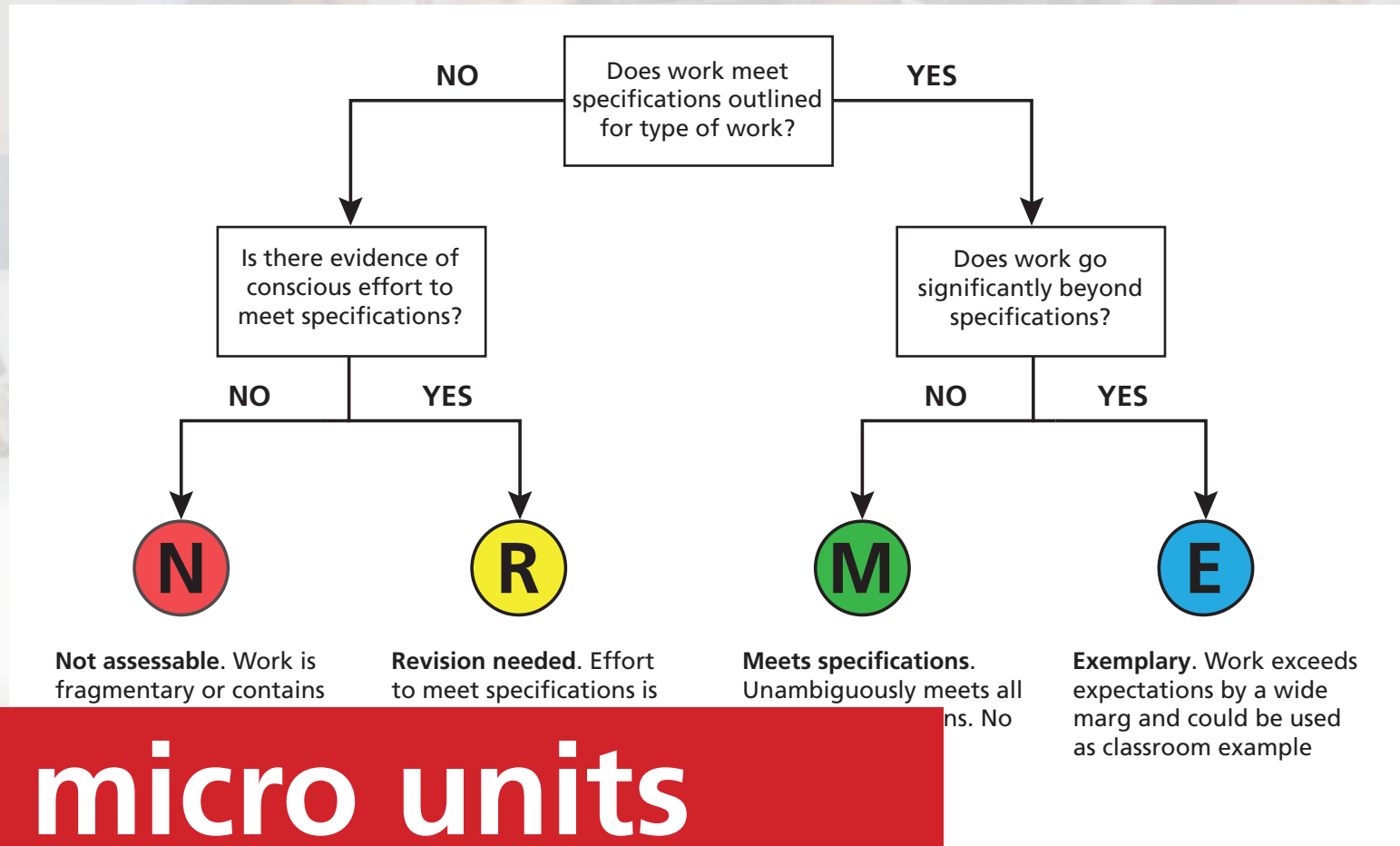
**Inside Higher Ed, *Yes, Virginia, there is a better way to grade***

# Specifications grading



**Inside Higher Ed, Yes, Virginia, there is a better way to grade**

# Specifications grading



## 68 micro units

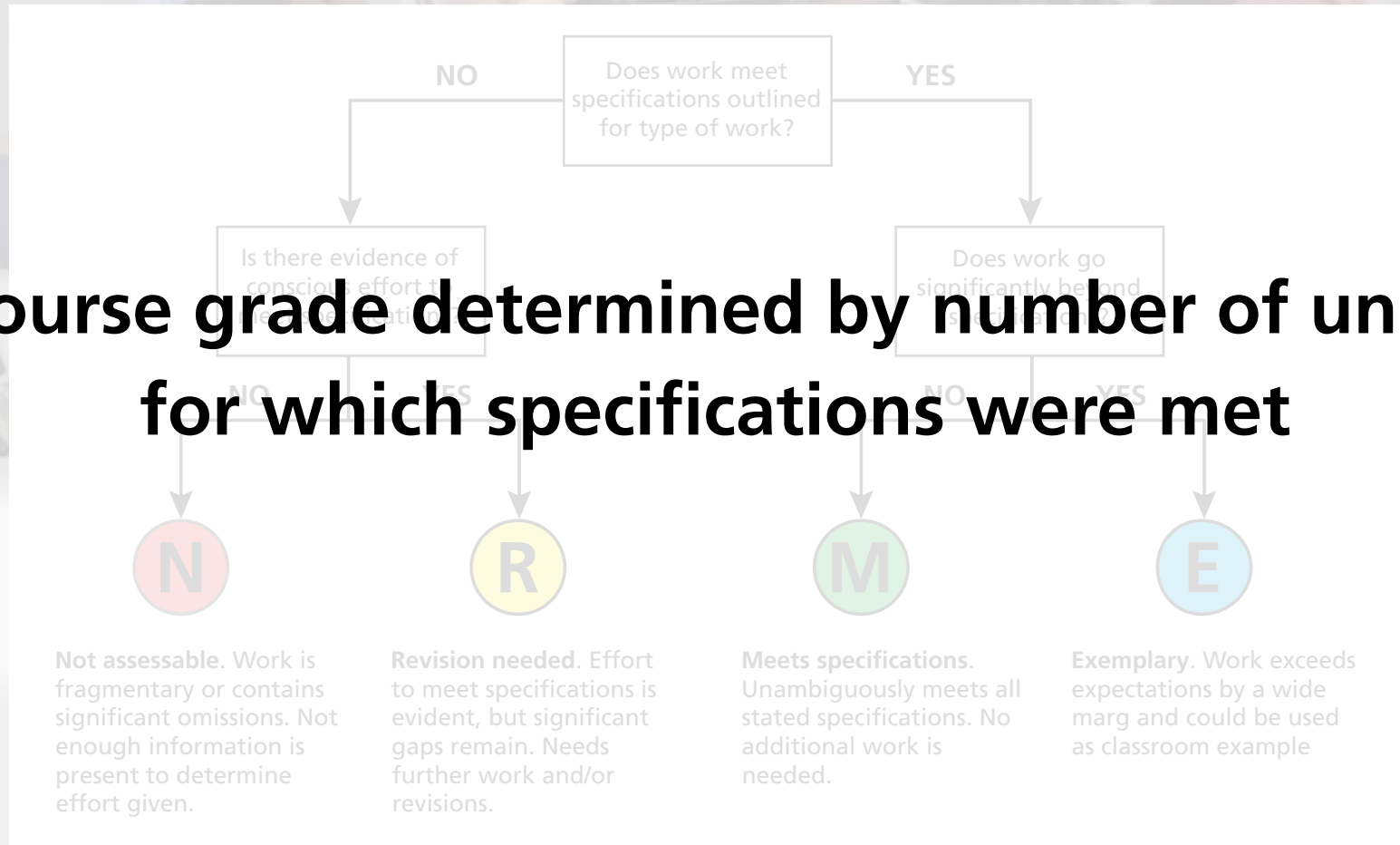
*Inside Higher Ed, Yes, Virginia, there is a better way to grade*

**2** reimagining course



# Specifications grading

course grade determined by number of units for which specifications were met

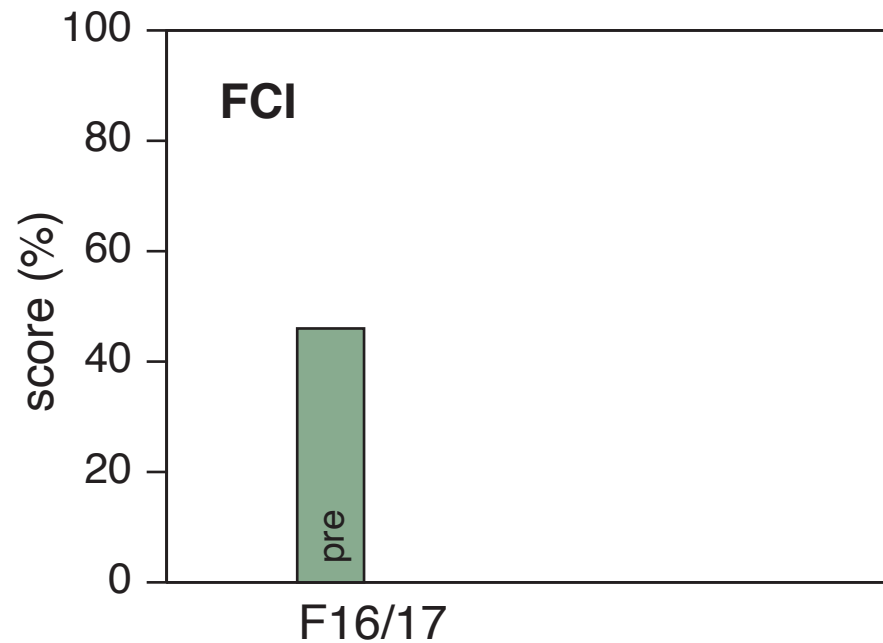


**Inside Higher Ed, Yes, Virginia, there is a better way to grade**



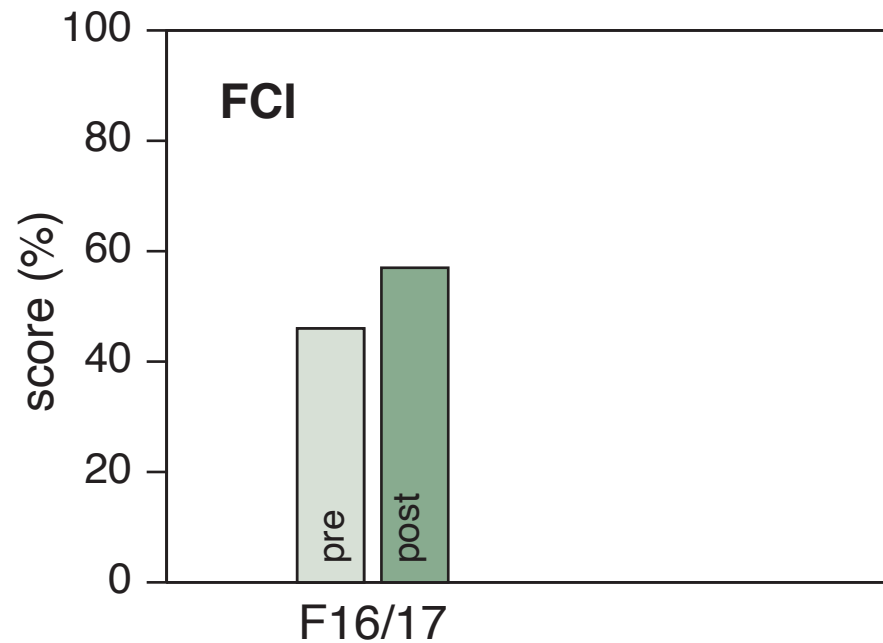
**Did it work?**

# Fall Content Learning Gain

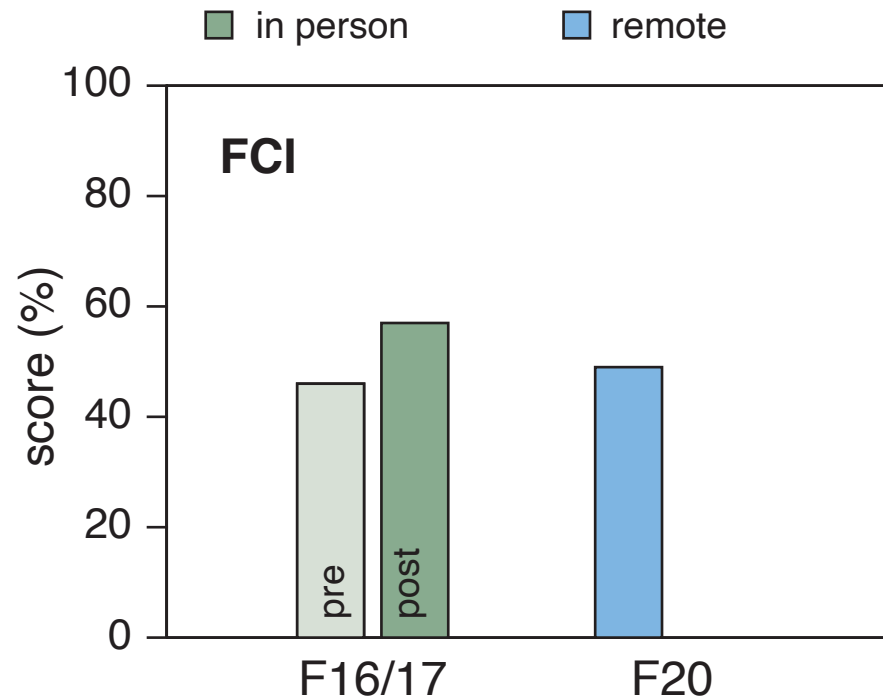




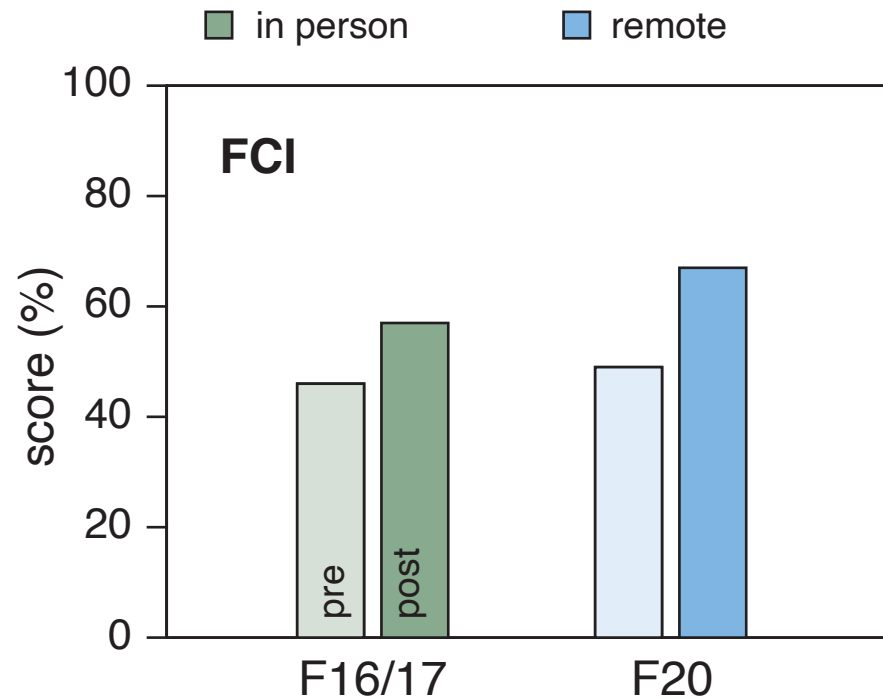
# Fall Content Learning Gain



# Fall Content Learning Gain

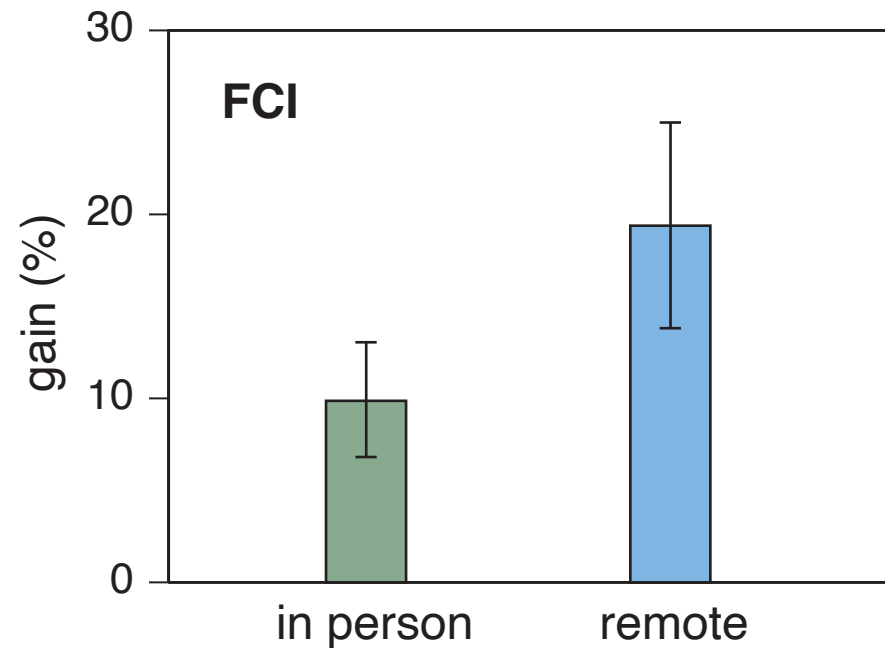


# Fall Content Learning Gain

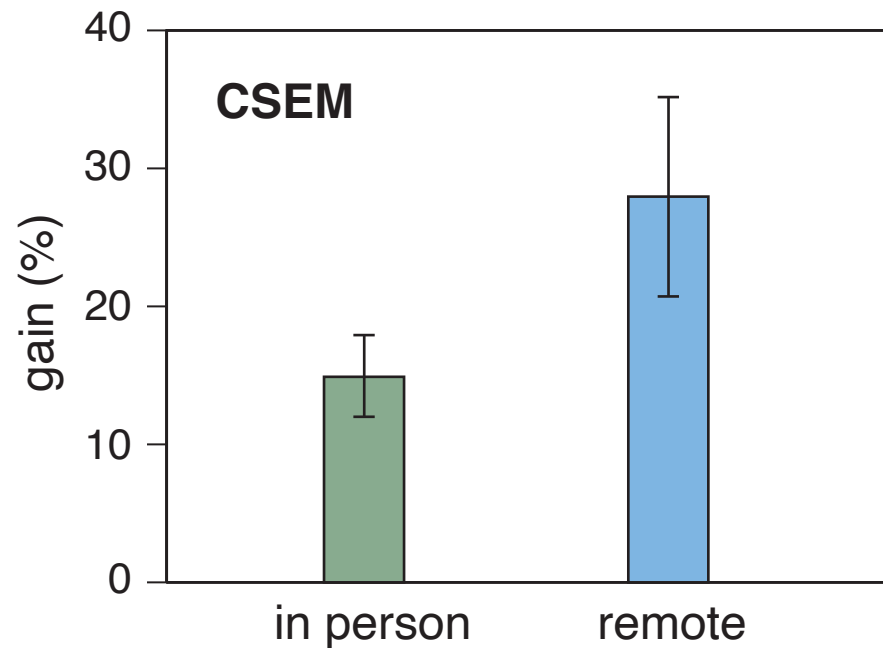




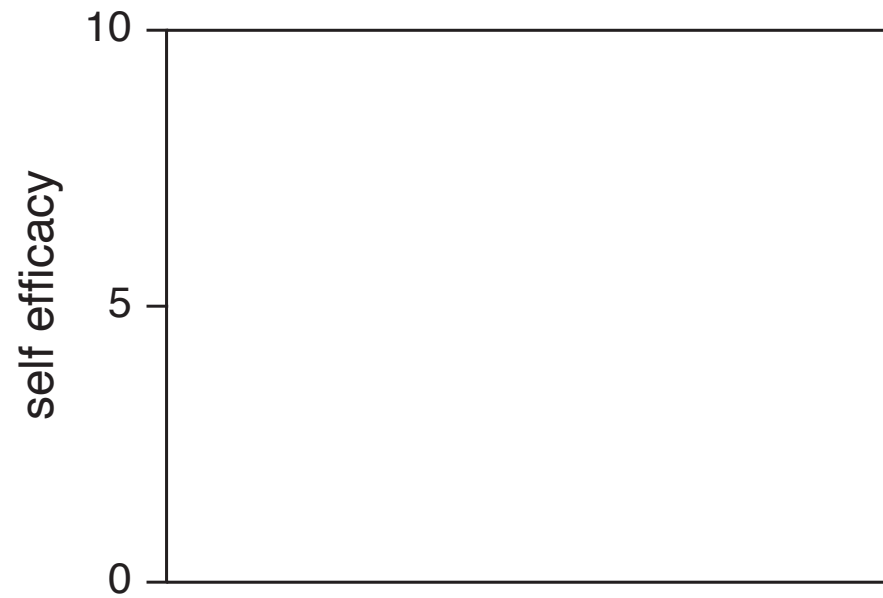
# Fall Content Learning Gain



# Spring Content Learning Gain



# Self Efficacy

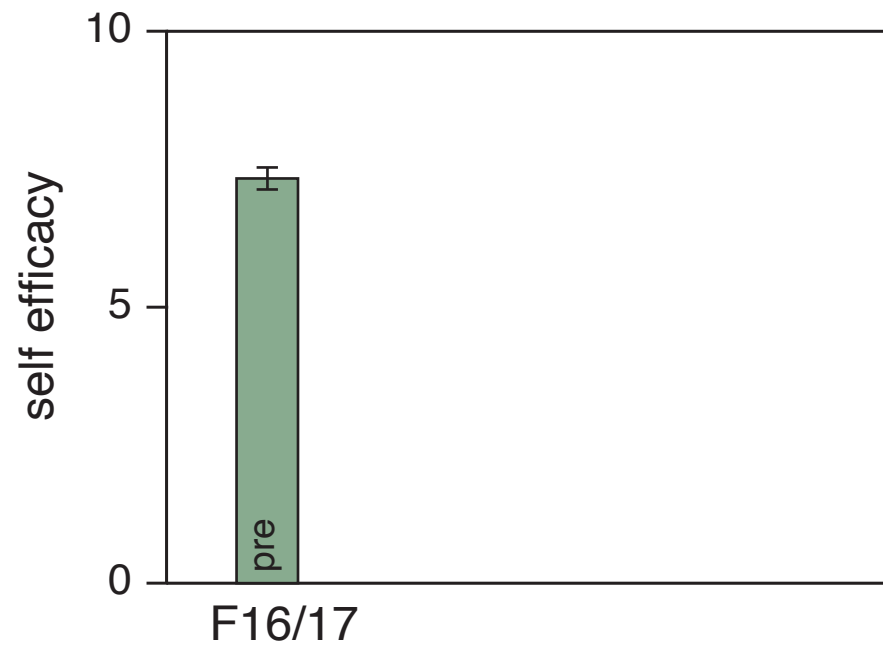




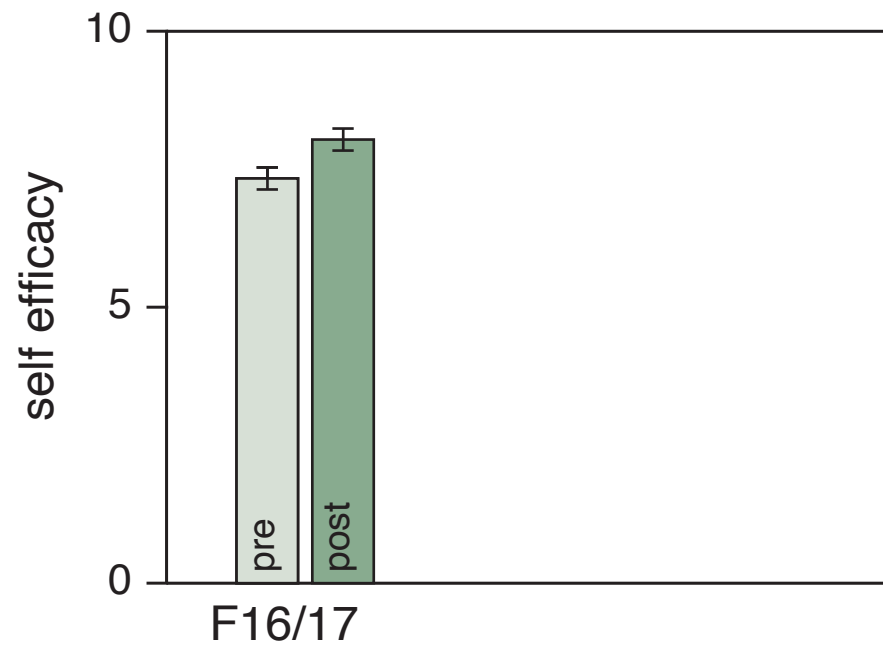
# Self Efficacy

**belief in ability to succeed in a certain domain**

# Self Efficacy



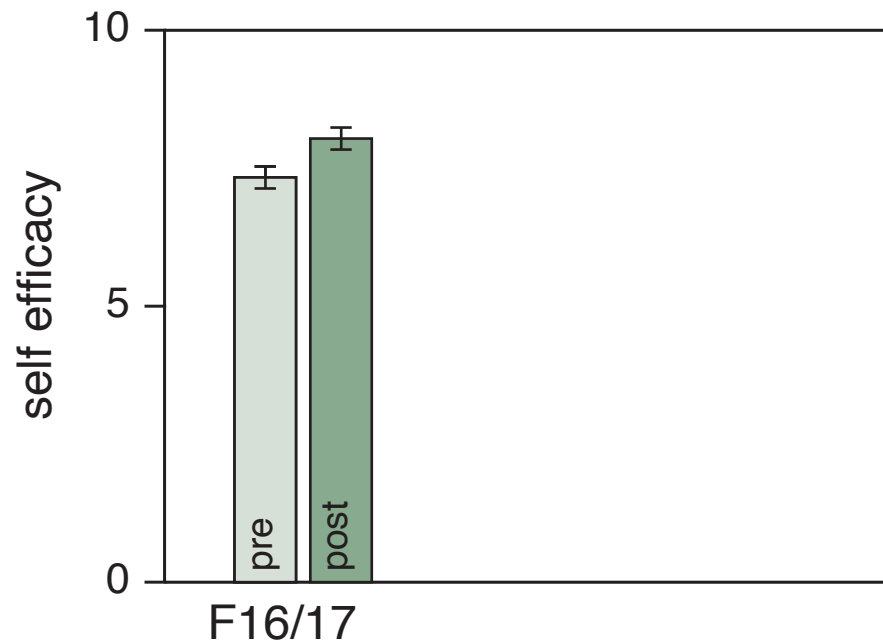
# Self Efficacy



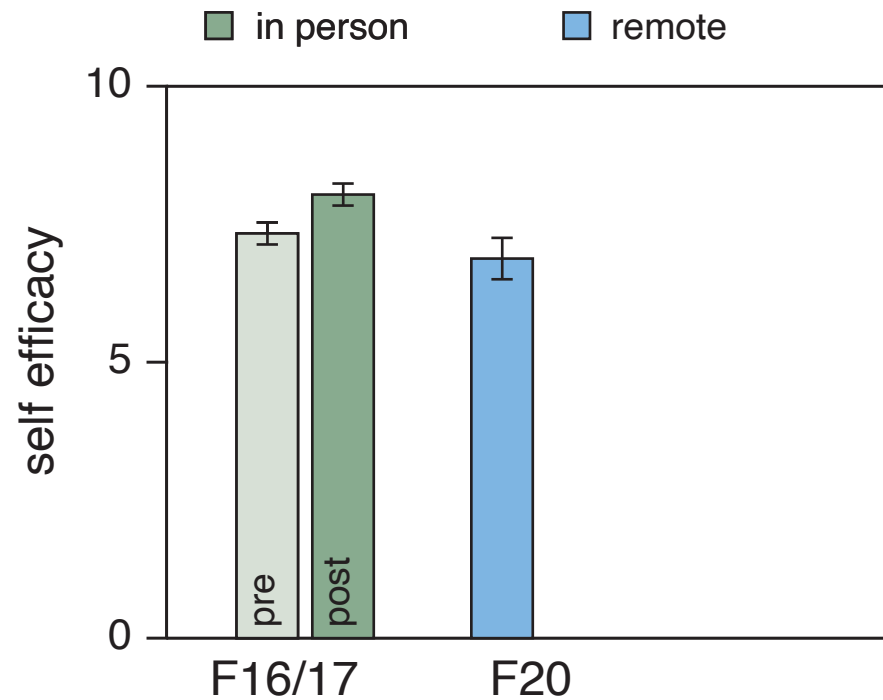


## Self Efficacy

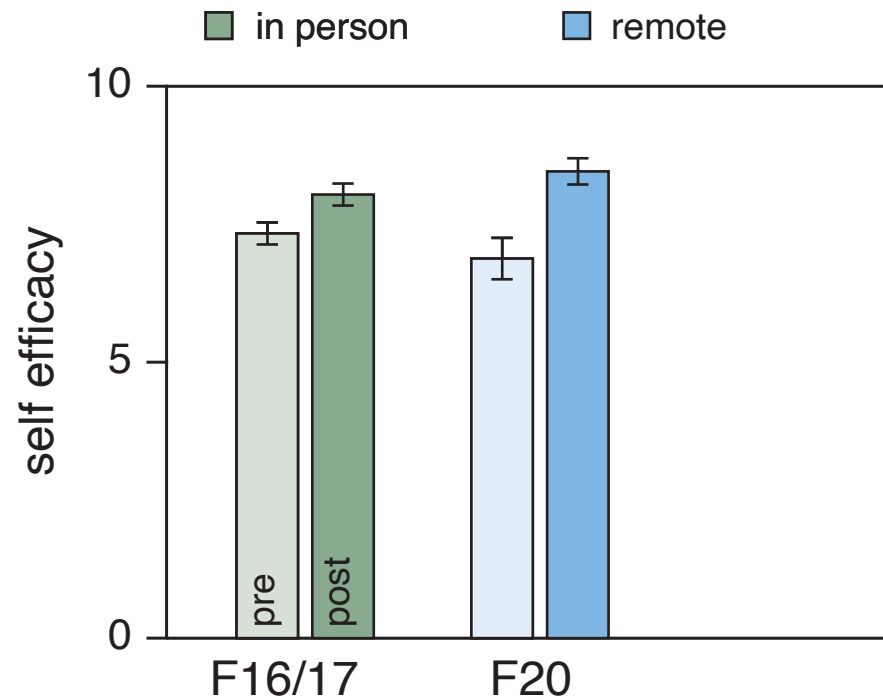
***SE down* in lecture courses!**



# Self Efficacy

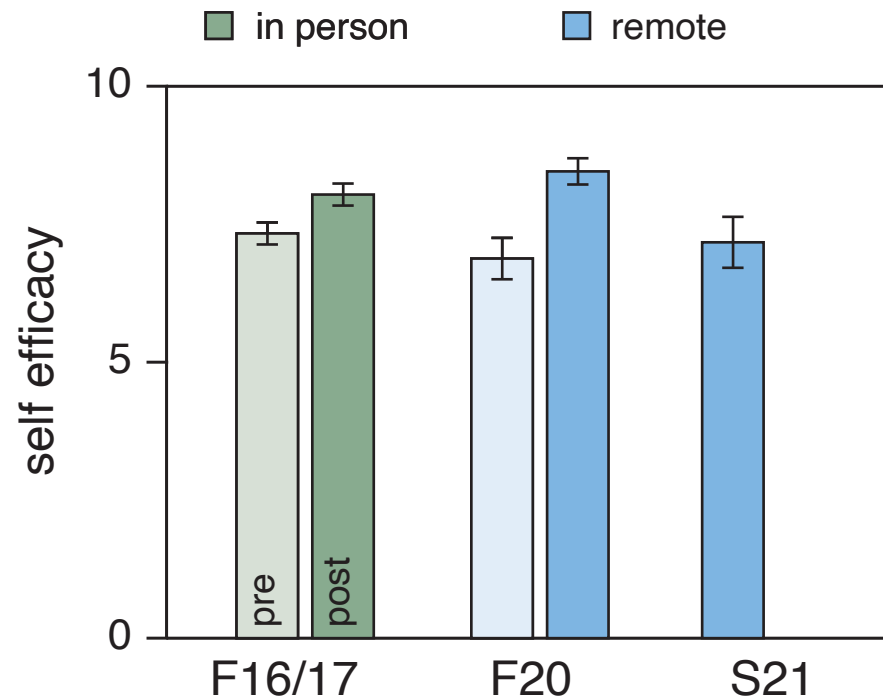


# Self Efficacy

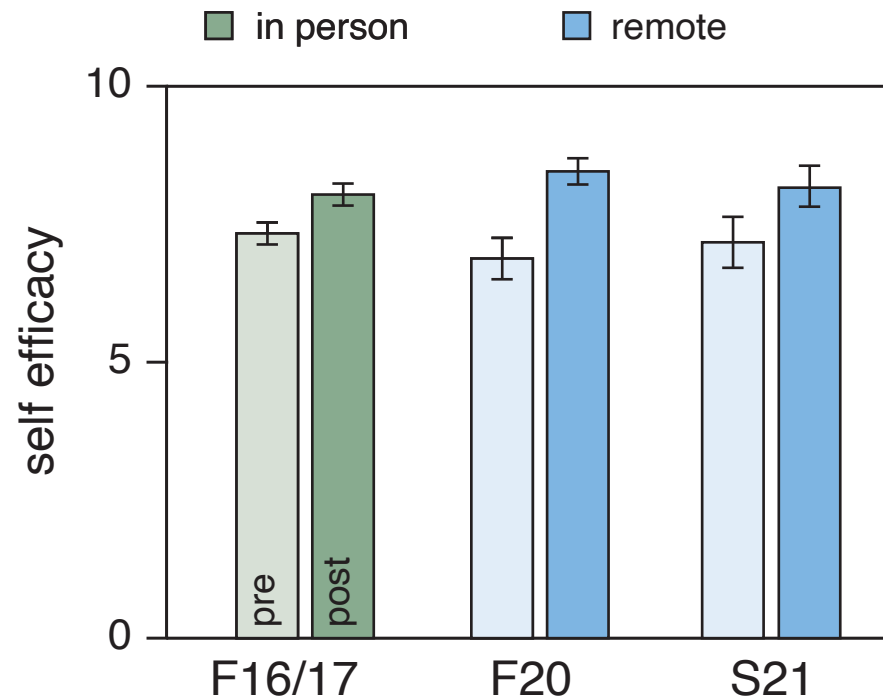




# Self Efficacy



# Self Efficacy



## Doubling of

- content learning gains
- physics self-efficacy gains

### *Research Shows Students Falling Months Behind During Virus Disruptions*

The abrupt switch to remote learning wiped out academic gains for many students in America, and widened racial and economic gaps. Catching up in the fall won't be easy.





# What do students say?

## *Research Shows Students Falling Months Behind During Virus Disruptions*

The abrupt switch to remote learning wiped out academic gains for many students in America, and widened racial and economic gaps. Catching up in the fall won't be easy.

**3** results

# **Agile Feedback Survey (Talbert)**

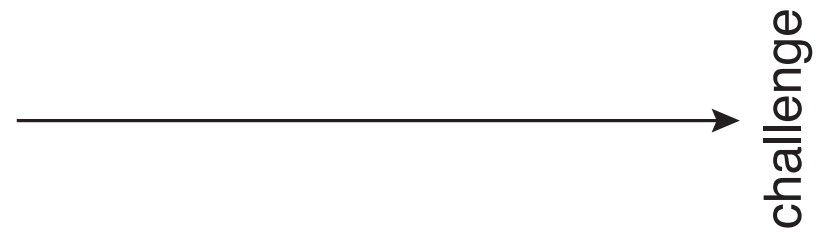
- 1. I was challenged intellectually**
- 2. I had plenty of support**
- 3. I am closer to mastering the ideas of the course now**
- 4. I made progress because of my own efforts and choices**
- 5. I felt I was part of a community of learners**

# Agile Feedback Survey (Talbert)

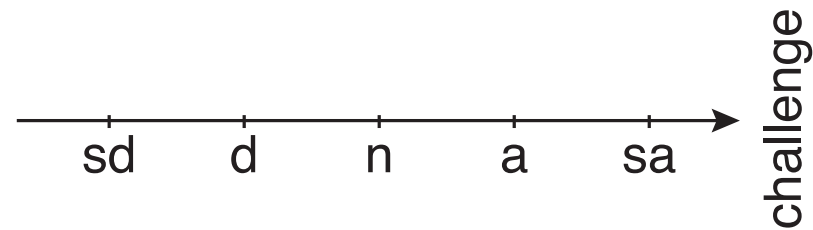
- 1. I was challenged intellectually (challenge)**
- 2. I had plenty of support (support)**
3. I am closer to mastering the ideas of the course now
4. I made progress because of my own efforts and choices
5. I felt I was part of a community of learners



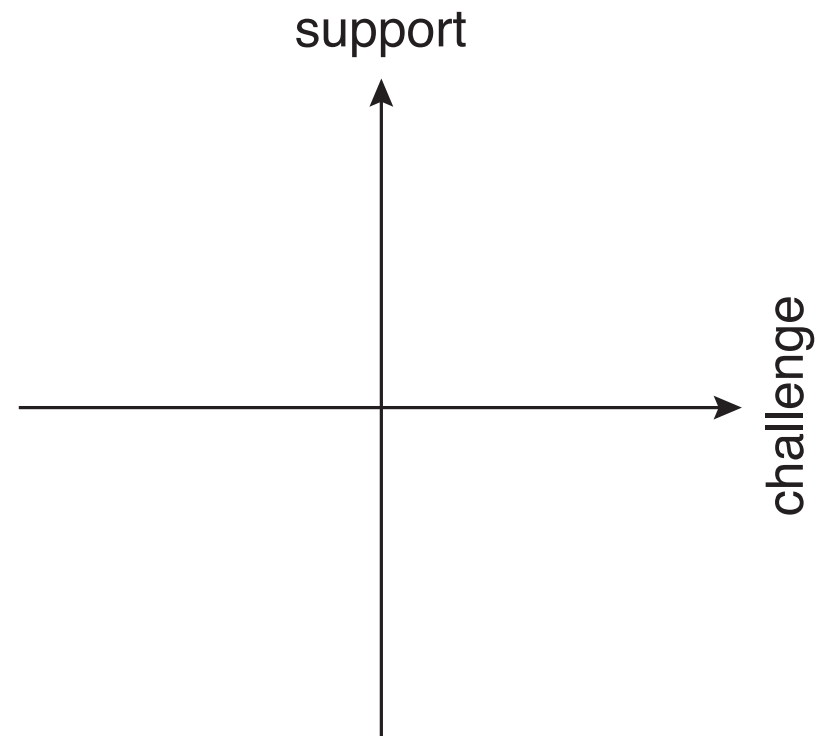
# challenge vs. support



# challenge vs. support

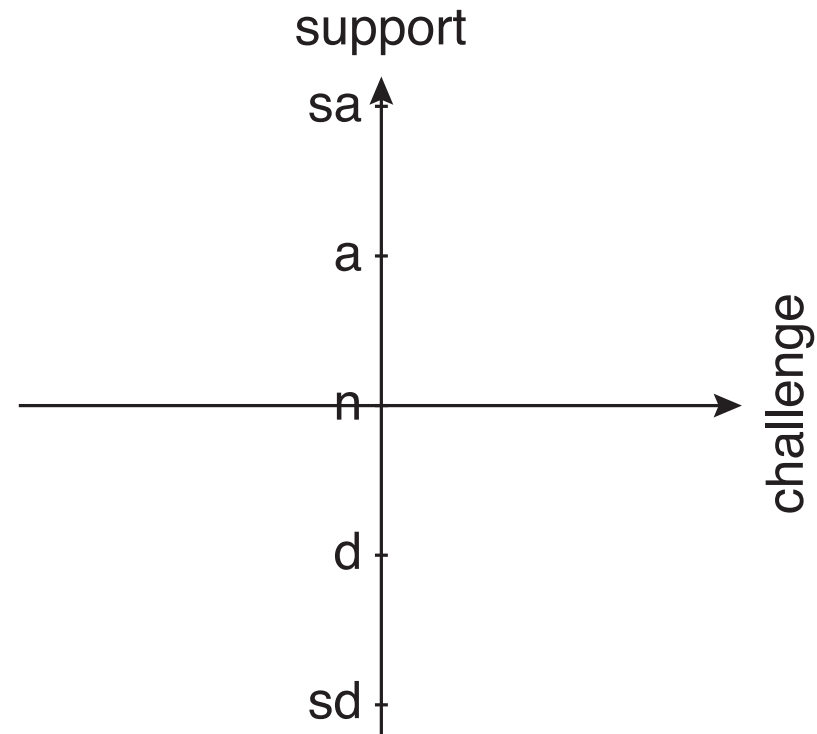


# challenge vs. support

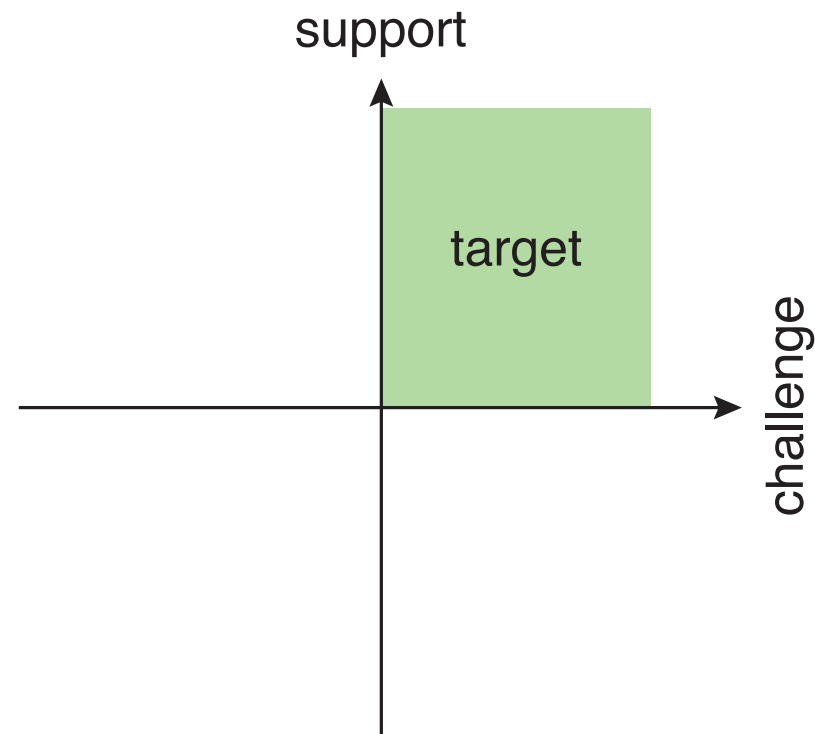




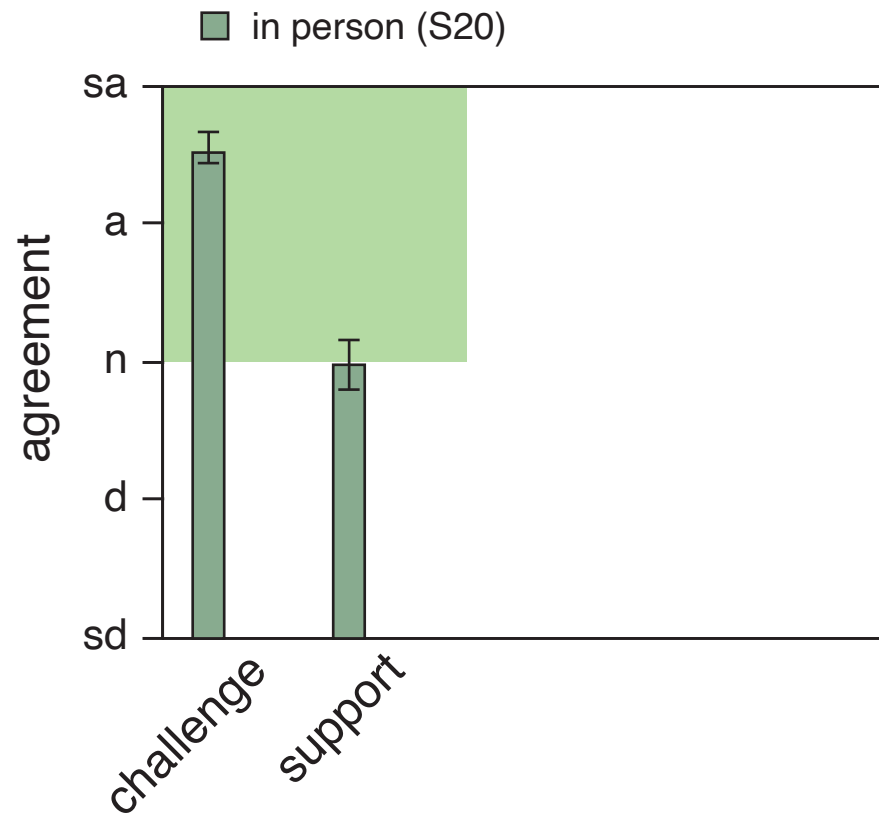
# challenge vs. support



# challenge vs. support

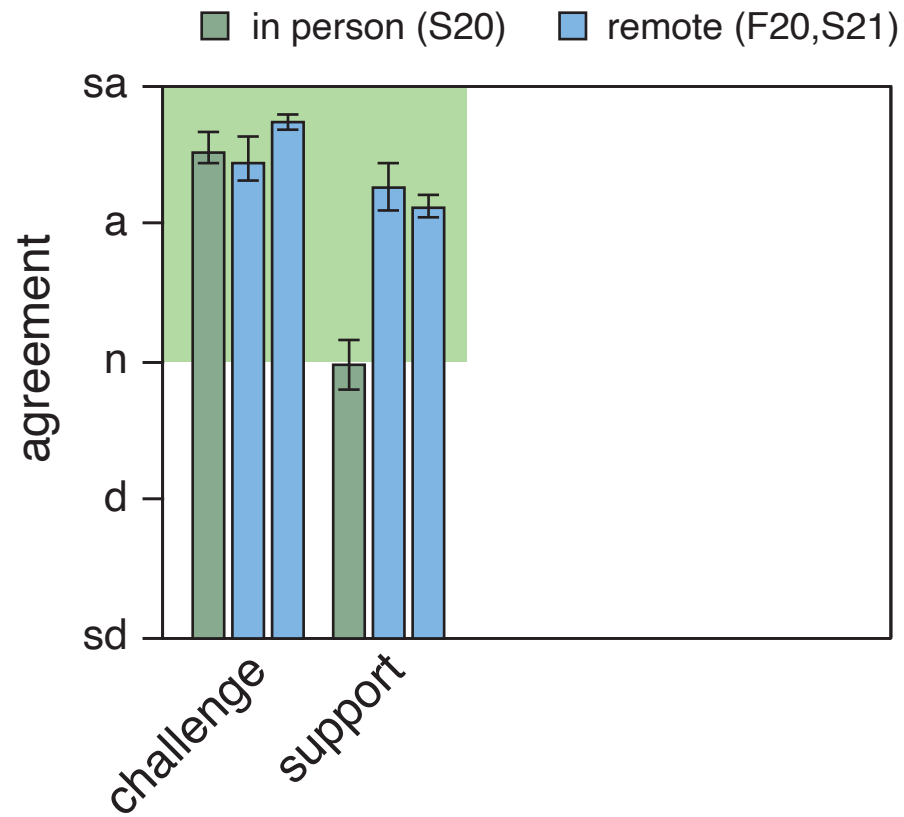


# challenge vs. support





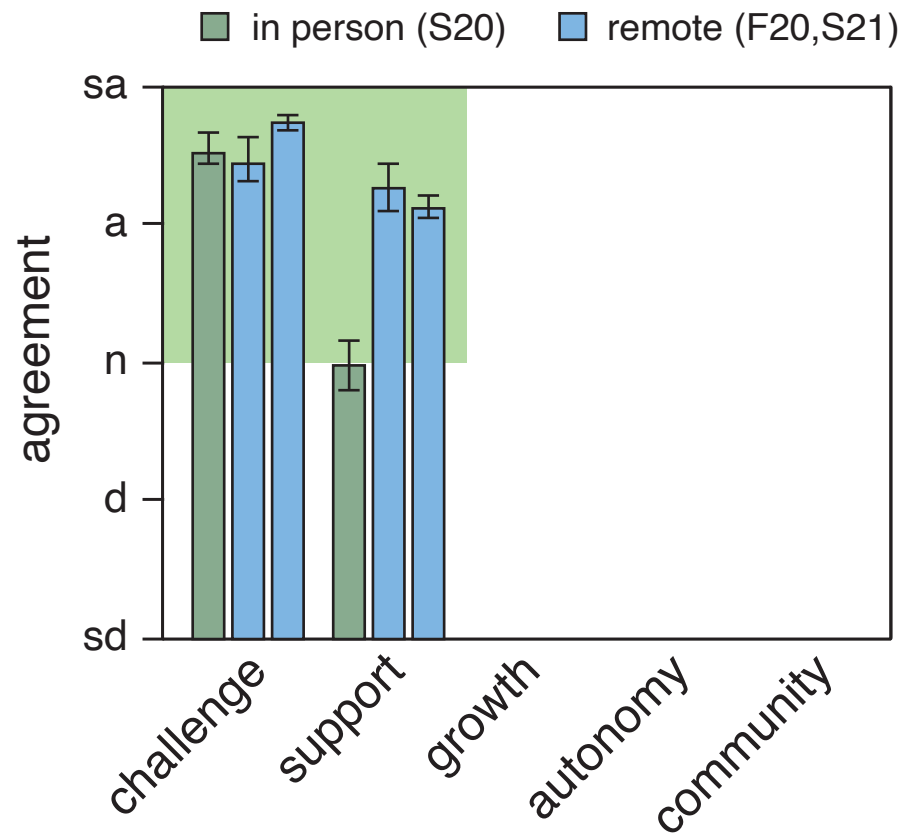
# challenge vs. support



# self-determination

1. I was challenged intellectually (challenge)
2. I had plenty of support (support)
- 3. I am closer to mastering the ideas of the course now (growth)**
- 4. I made progress because of my own efforts and choices (auton.)**
- 5. I felt I was part of a community of learners (relatedness)**

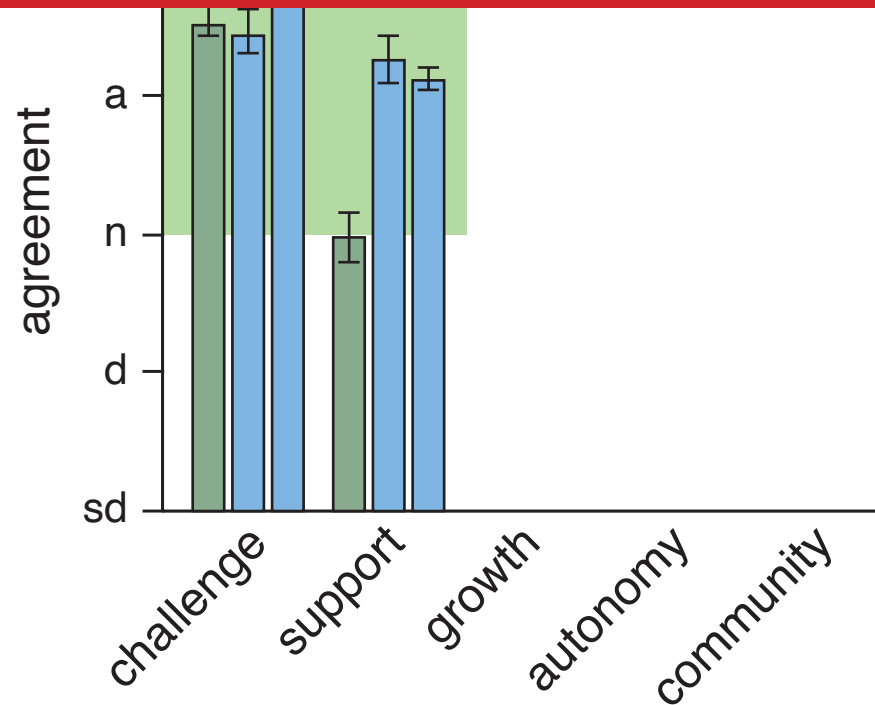
# self-determination



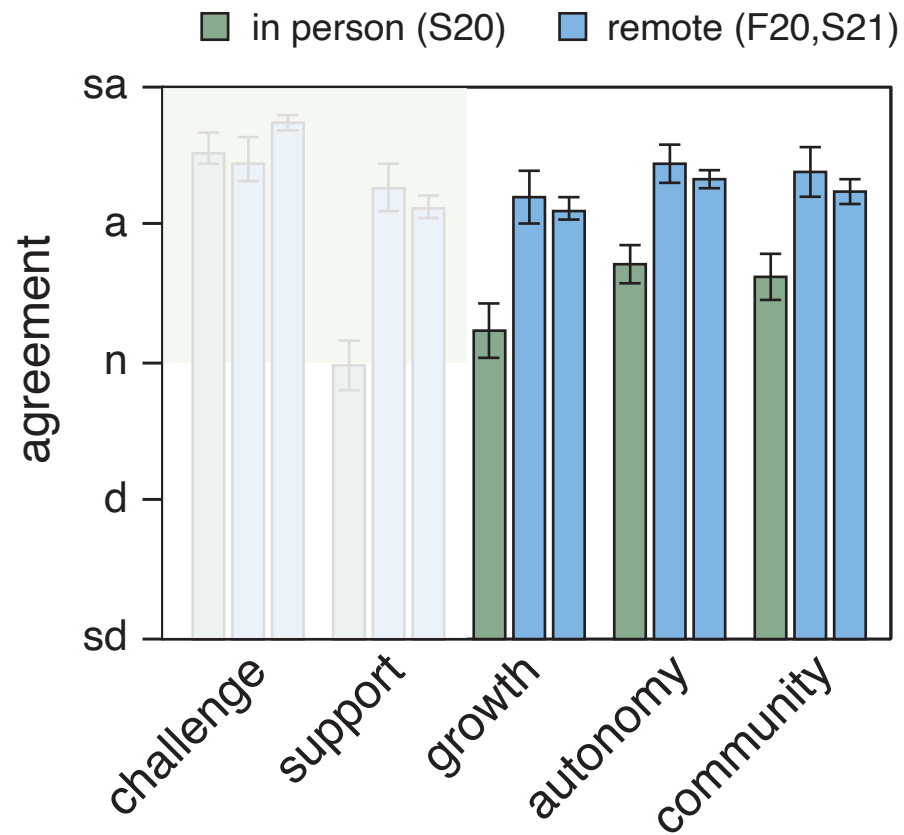


## self-determination

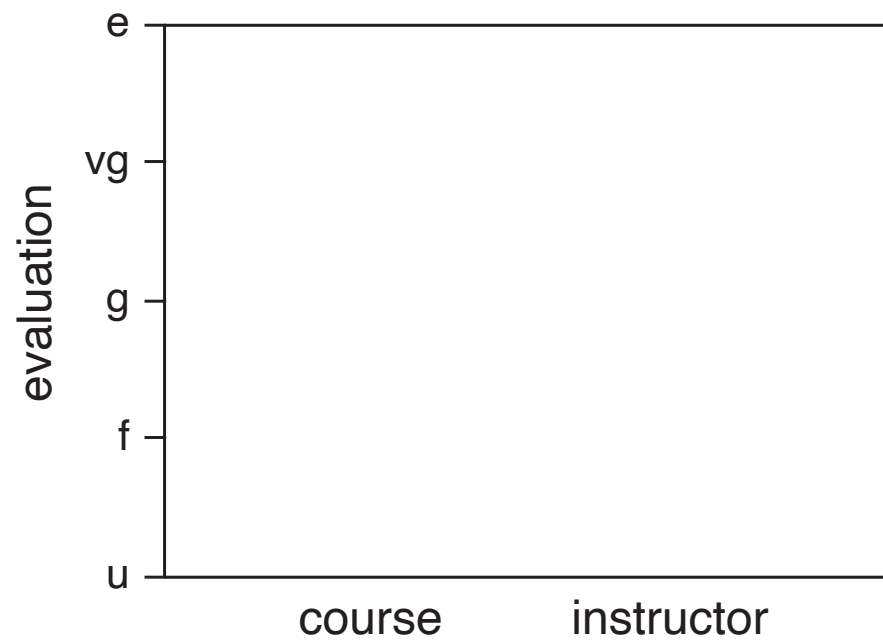
# What do you predict?



# self-determination

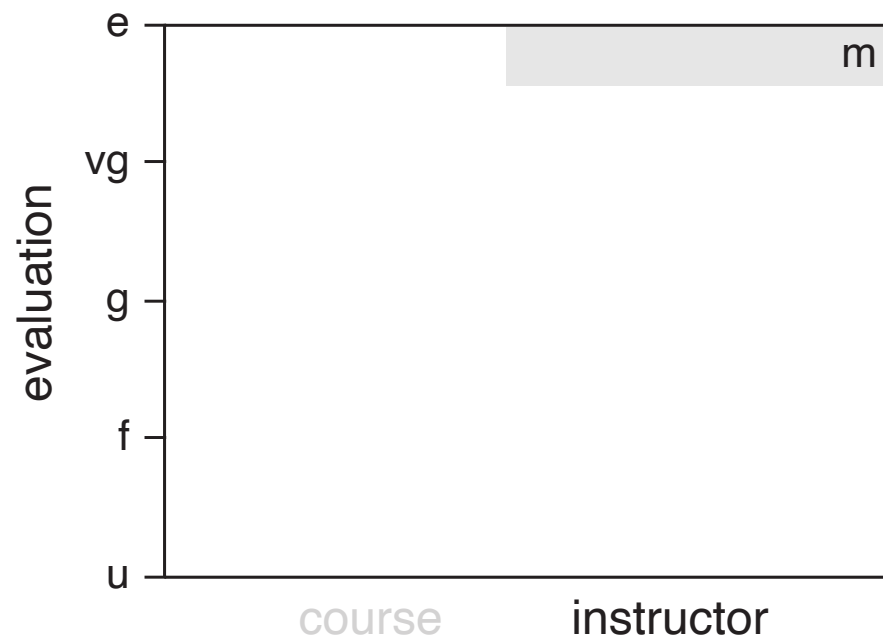


# course evaluation

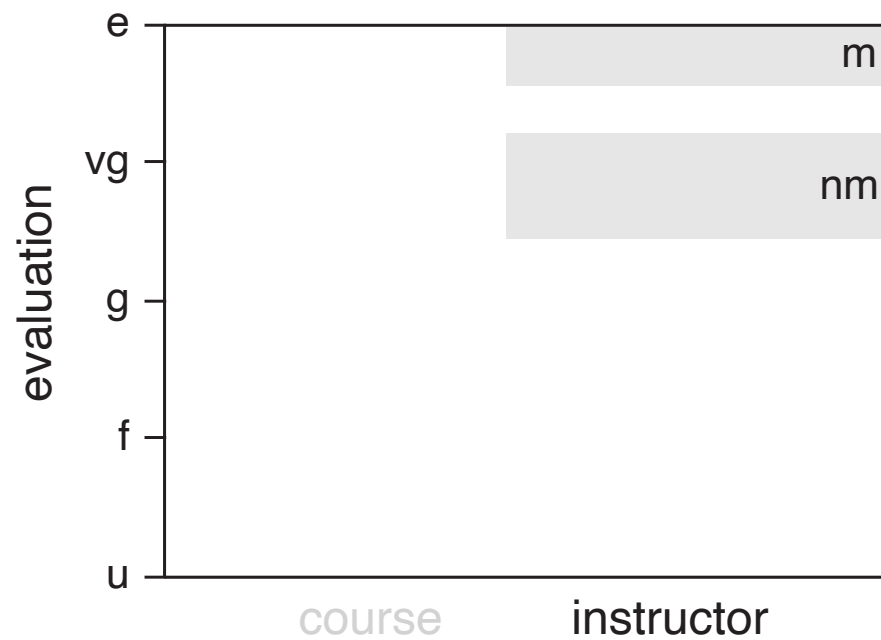




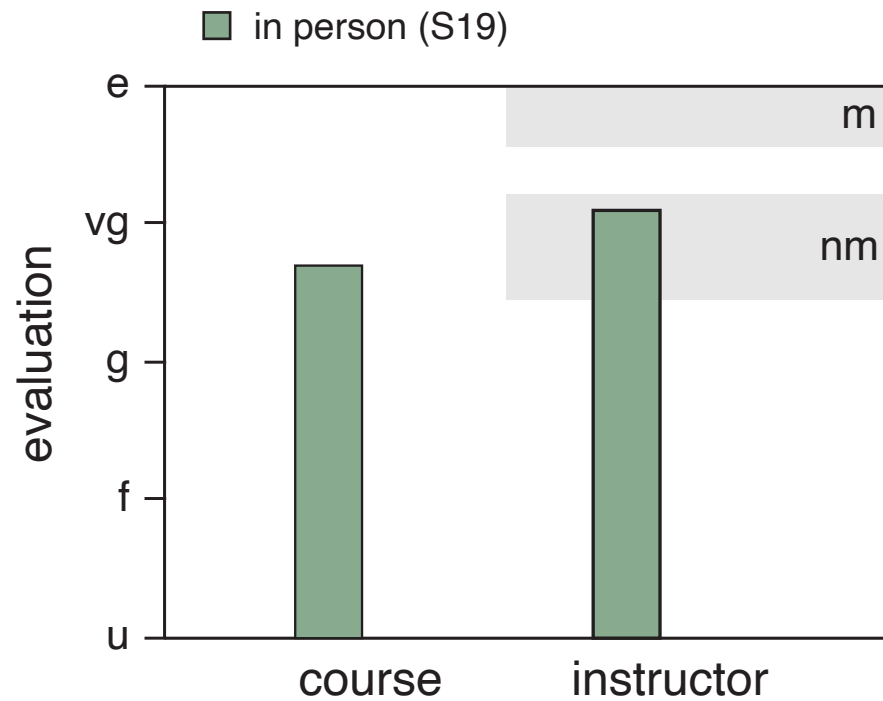
# course evaluation



# course evaluation

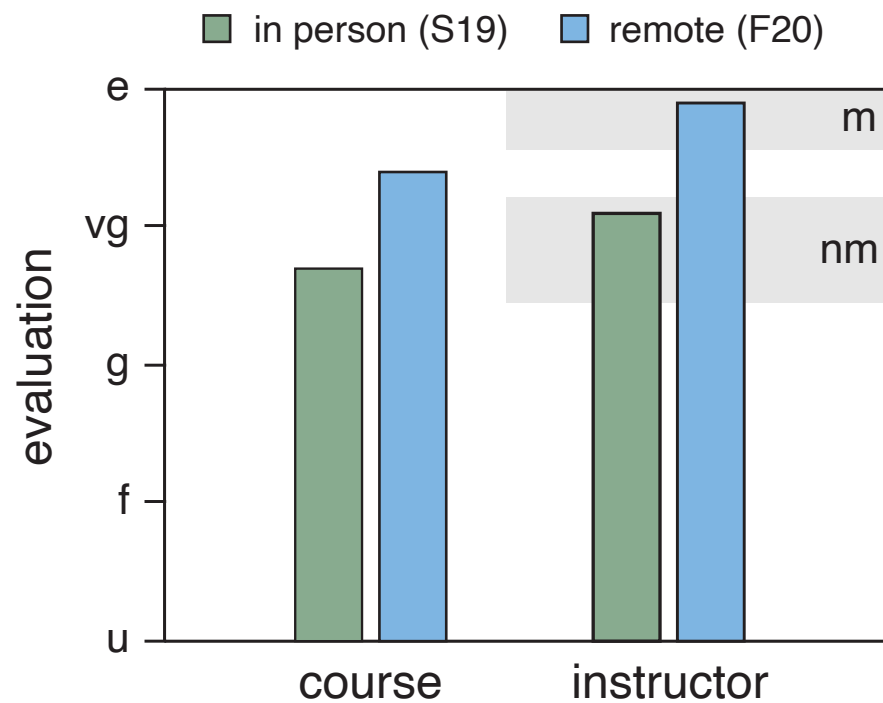


# course evaluation





# course evaluation



## Improved

- sense of growth and autonomy
- sense of support and community
- course evaluation

## Improved

- sense of growth and autonomy
- sense of support and community
- course evaluation

**It worked for students too!**





Remote/online can be *better!*

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**3** results



**I did my best teaching ever remotely!**

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**3** results



**I did my best teaching ever remotely!**

**So, now what?**



# Building together







# Project Fairs





Revert back?





Many short-term emergency measures will become a fixture of life. That is the nature of emergencies. They fast-forward historical processes. Decisions that in normal times could take years of deliberation are passed in a matter of hours. Immature and even dangerous technologies are

pres  
tire

**Remote teaching may well become a fixture of life**

happens when everybody works from home and communicates only at a distance? What happens when entire schools and universities go online? In normal times, governments, businesses and educational boards would never agree to conduct such experiments. But these aren't normal times.



Yuval Noah Harari MARCH 20 2020

Humankind is now facing a global crisis. Perhaps the biggest crisis of our  
eration. The decisions people and governments take in the next few weeks  
ers to come. They will shape not just our  
We must act

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