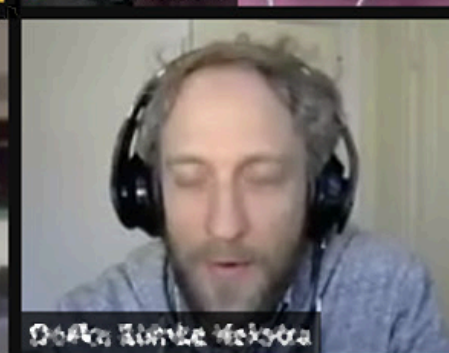
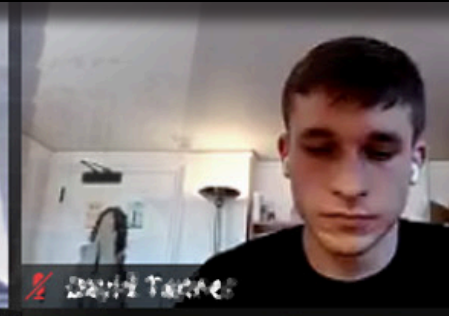
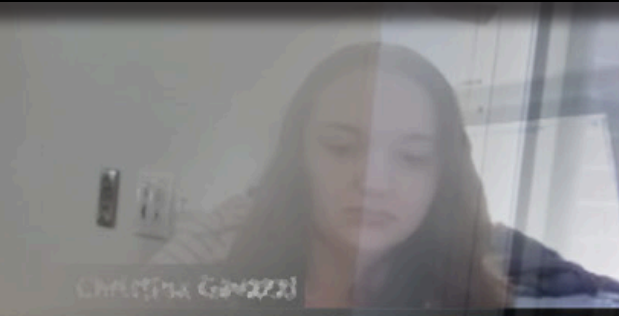


Setting Learning Free: Lessons from online teaching during the pandemic



TEP 2022 Alumni Webinar
Teaching Excellence Program
Melbourne, Australia, 22 February 2023



/// Matt Jenkins

Setting Learning Free: Lessons from online teaching during the pandemic



TEP 2022 Alumni Webinar
Teaching Excellence Program
Melbourne, Australia, 22 February 2023



@eric_mazur

Weekend long reads



© Graziano Panfili

Life & 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

-
-
-
-

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 years to come. They will shape not just our lives but the world we live in. 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.



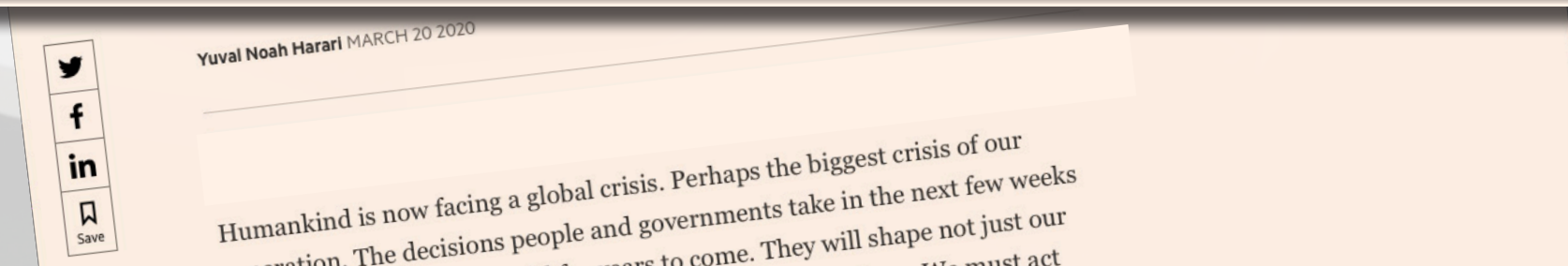


Many short-term emergency measures will become a fixture of life. That is the nature of emergencies. They fast-forward historical processes. Decisions that in normal times could take years of deliberation are passed in a matter of hours. Immature and even dangerous technologies are pressed into service,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

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.



March 2020

AP50

1 before (and just after) pandemic



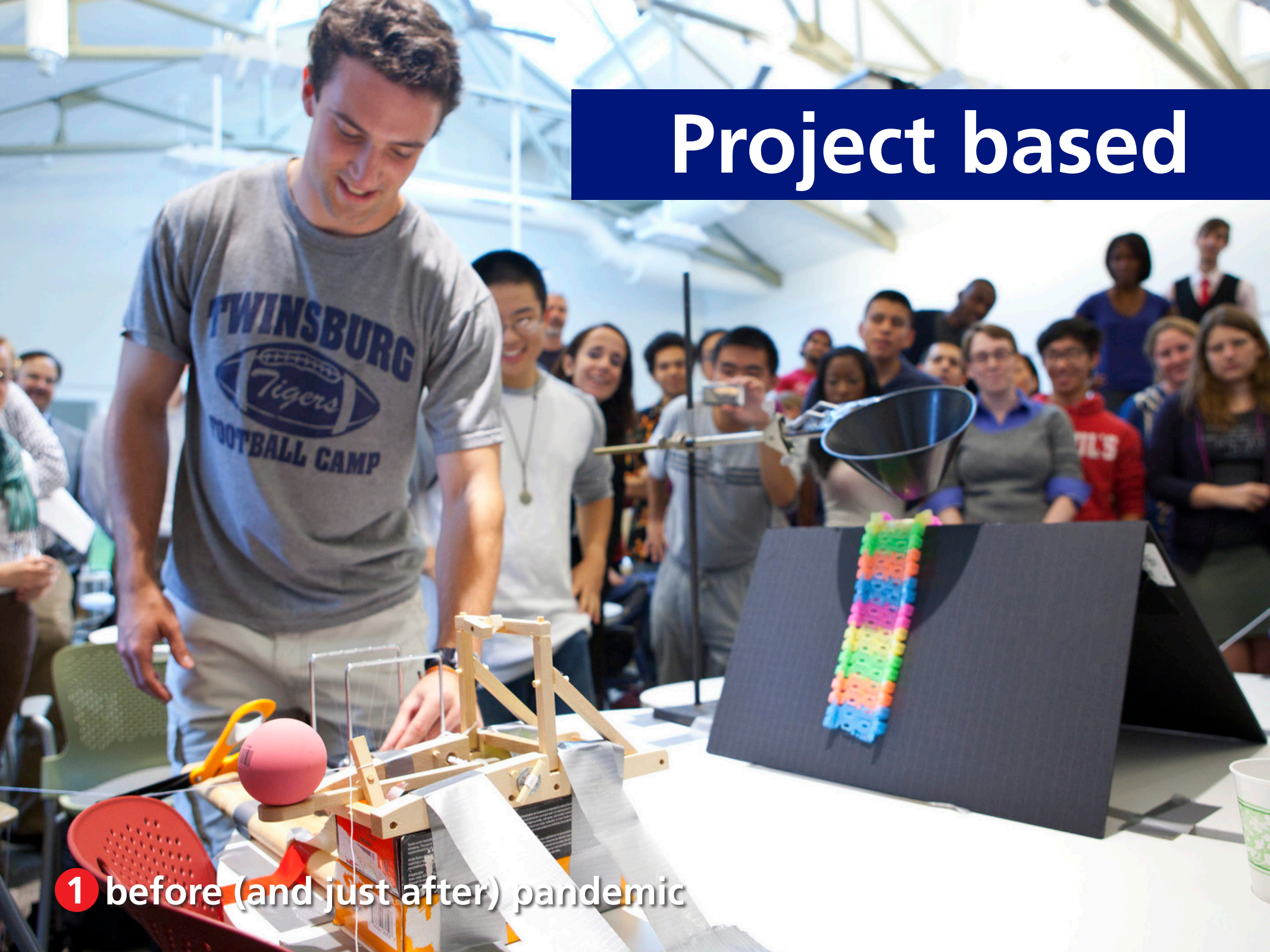


Team based

1 before (and just after) pandemic

Project based

1 before (and just after) pandemic






Intrinsic motivation

1 before (and just after) pandemic



1 before (and just after) pandemic

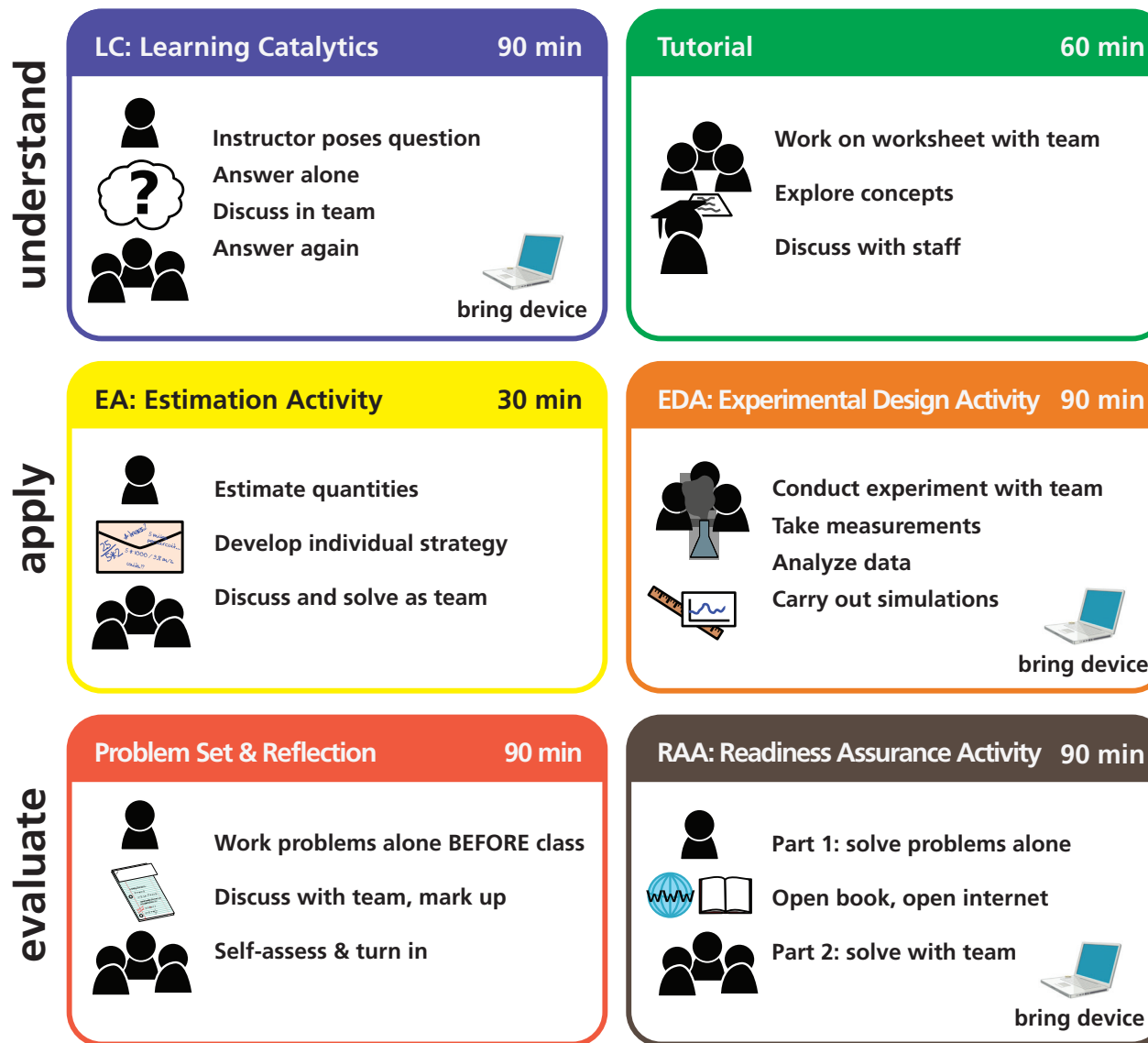


no lectures

no exams

1 before (and just after) pandemic

blend of 6 scaffolded "best practices"



1 before (and just after) pandemic

A group of four students are gathered around a wooden box containing a complex electronic circuit board. One student is using a soldering iron on the board. They are all smiling and appear to be engaged in a collaborative learning activity. The background shows a typical classroom or lab environment with windows and other people.

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)

2 reimagining course

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

- **Optimize face-to-face time**

Changes implemented

- **Optimize face-to-face time**
- **Personalize instruction**

Changes implemented

- **Optimize face-to-face time**
- **Personalize instruction**
- **Establish continuous accountability**

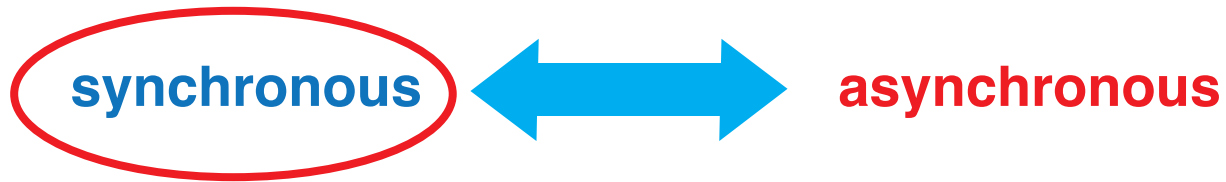
Optimize face-to-face time

- **instructional face-to-face time**
- **team face-to-face time**

Optimize instructional face-to-face time

synchronous  asynchronous

Optimize instructional face-to-face time



everybody together
at the same *time*

Optimize instructional face-to-face time

synchronous



asynchronous

instructor-paced



self-paced

Optimize instructional face-to-face time

synchronous



asynchronous

instructor-paced



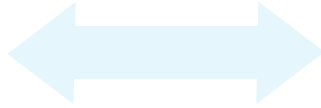
self-paced

everybody together
at the same *pace*

Optimize instructional face-to-face time

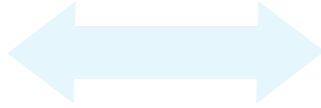
lecture

synchronous



asynchronous

instructor-paced

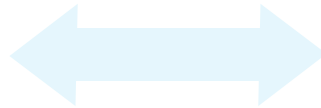


self-paced

Optimize instructional face-to-face time

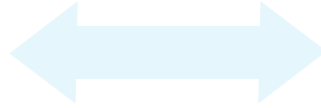
recorded lecture

synchronous



asynchronous

instructor-paced

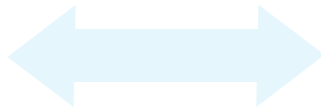


self-paced

Optimize instructional face-to-face time

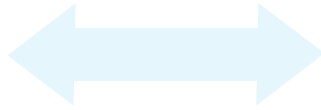
recorded lecture

synchronous



asynchronous

instructor-paced



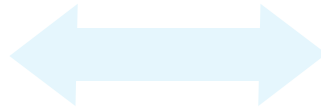
self-paced

1.5x!

Optimize instructional face-to-face time

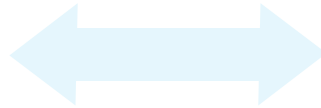
lab

synchronous



asynchronous

instructor-paced

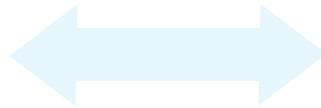


self-paced

Optimize instructional face-to-face time

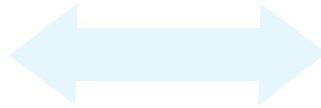
homework/study

synchronous



asynchronous

instructor-paced



self-paced

Optimize instructional face-to-face time

synchronous



asynchronous

instructor-paced



self-paced

Optimize instructional face-to-face time

synchronous



asynchronous

instructor-paced



self-paced

Optimize instructional face-to-face time

synchronous



asynchronous

instructor-paced



self-paced

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

Optimize team face-to-face time

synchronous

collaborative work

Optimize team face-to-face time

synchronous

collaborative work

- not all students engaged
- inefficient team work
- poor use of staff time
- no quality control

Optimize team face-to-face time

synchronous

collaborative work

- not all students engaged
- inefficient team work
- poor use of staff time
- no quality control

asynchronous

**individual
work**

Optimize team face-to-face time

synchronous

collaborative work

- not all students engaged
- inefficient team work
- poor use of staff time
- no quality control

asynchronous

**individual
work**



synchronous

**team
work**

Optimize team face-to-face time

synchronous

collaborative work

- not all students engaged
- inefficient team work
- poor use of staff time
- no quality control

asynchronous

**individual
work**



synchronous

**team
work**



**team
check**

Optimize team face-to-face time

synchronous

collaborative work

- not all students engaged
- inefficient team work
- poor use of staff time
- no quality control

asynchronous

**individual
work**

all engaged



**team
work**

efficient team



**team
check**

quality control

synchronous

Personalize instruction

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

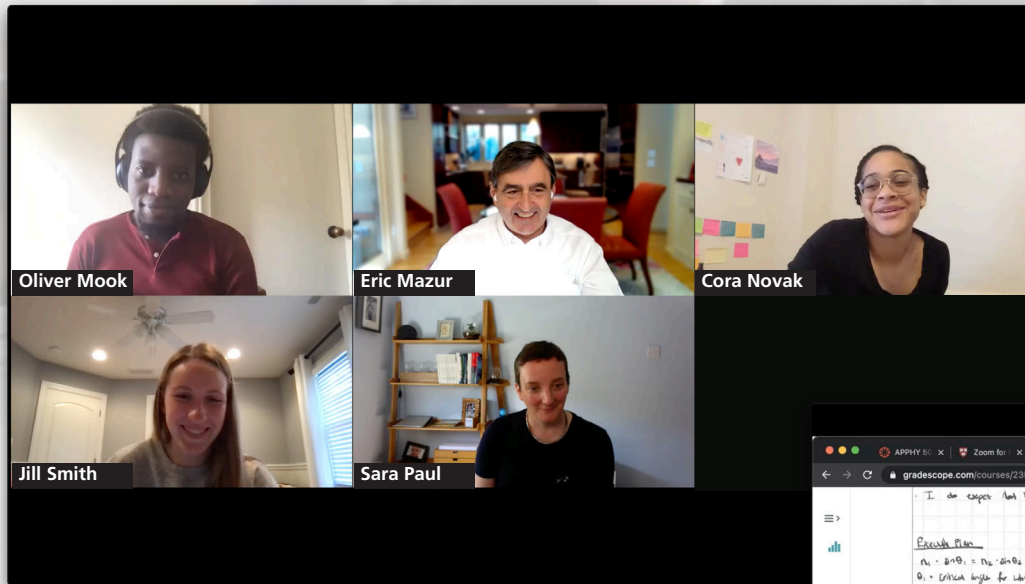
Personalize instruction

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



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)

Handwritten work on a grid background:

Example 1
 $n_1 \sin \theta_1 = n_2 \sin \theta_2$
 $\theta_1 = \text{critical angle for which total internal reflection occurs}$
 $\theta_1 = 90^\circ, \sin 90^\circ = 1$
 $n_2 \sin \theta_2 = n_1$ ($n_2 > n_1$)

Calculate the θ_c for an interface between 2 media with indices of refraction
 $n_1 \sin \theta_c = n_2 \sin 90^\circ$
 $\sin \theta_c = \frac{n_2}{n_1}$
 $\theta_c = \sin^{-1}(\frac{n_2}{n_1})$

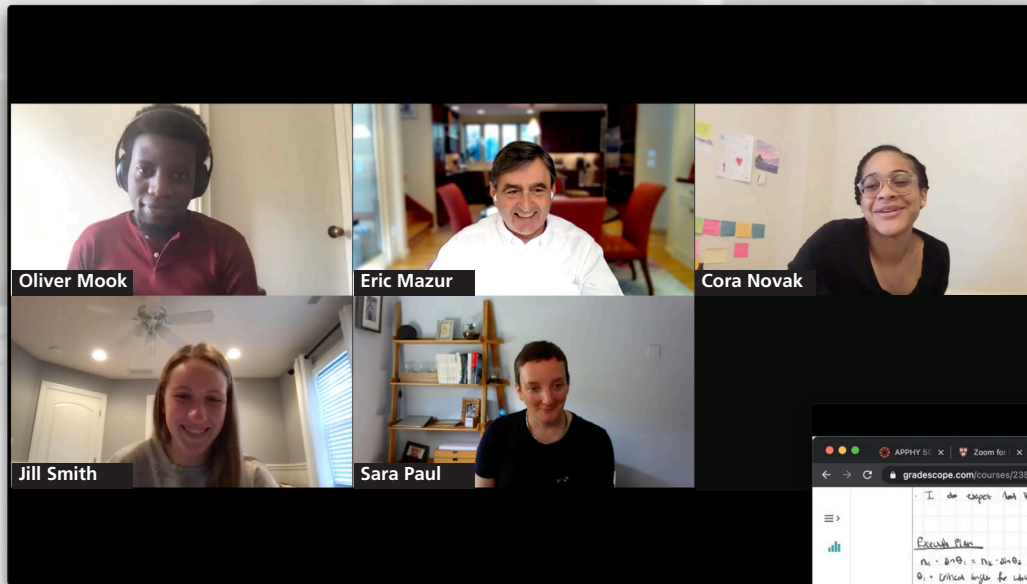
$\cos^2 \theta_c + \sin^2 \theta_c = 1$
 $\cos^2 \theta_c = 1 - \sin^2 \theta_c = 1 - \frac{n_2^2}{n_1^2}$
 $\cos \theta_c = \sqrt{1 - \frac{n_2^2}{n_1^2}}$

$n_1 \sin \theta = n_2 \sin \theta$
 $1 \cdot \sin \theta = n_2 \sin \theta$
 $\sin \theta = n_2 \sin \theta$
 $\theta = \sin^{-1}(\frac{n_2}{n_1})$
 $\theta = \sin^{-1}(\frac{\sqrt{1 - \frac{n_2^2}{n_1^2}}}{\sqrt{1 - \frac{n_2^2}{n_1^2}}})$
 $\theta = \sin^{-1}(1) = 90^\circ$

Graph showing a wave incident on a boundary at angle θ_1 and refracted at angle θ_2 . Points A and B are marked on the wavefronts.

Personalize instruction

every student on front row



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)

Handwritten work on a grid background includes:

Example 1: $n_1 \sin \theta_1 = n_2 \sin \theta_2$
 $\theta_1 = \text{critical angle for which total internal reflection occurs}$
 $\theta_1 = 90^\circ, \sin 90^\circ = 1$
 $n_2 \sin \theta_2 = n_1$ ($n_2 > n_1$)

Calculate the θ_c for an interface between 2 media with indices of refraction n_1 and n_2 ($n_1 > n_2$)

$n_1 \sin \theta_c = n_2 \sin 90^\circ$
 $\sin \theta_c = \frac{n_2}{n_1}$

$\theta_c = \sin^{-1}(\frac{n_2}{n_1})$

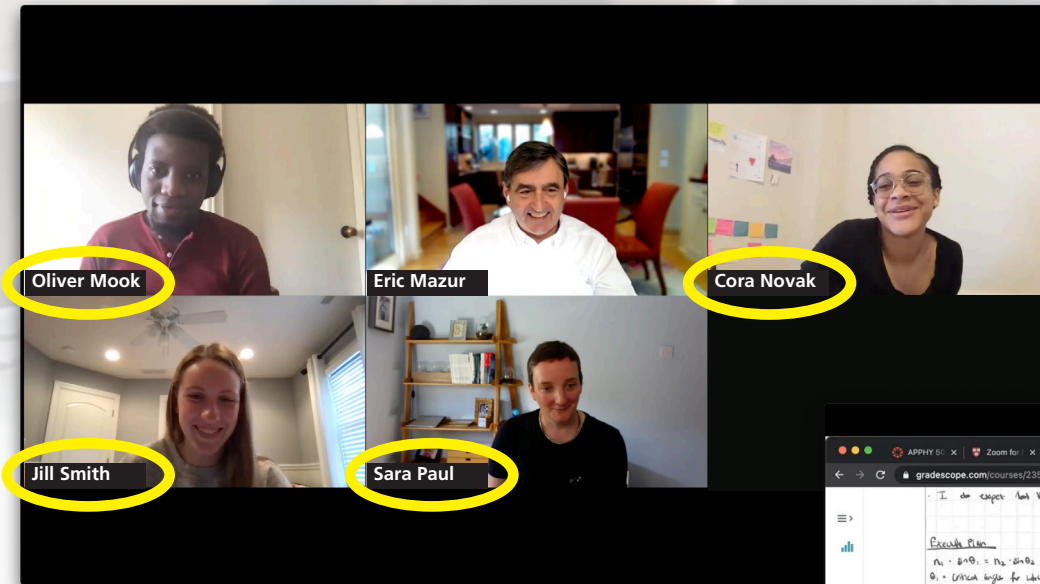
$\cos^2 \theta_c + \sin^2 \theta_c = 1$
 $\cos^2 \theta_c = 1 - \sin^2 \theta_c = 1 - \frac{n_2^2}{n_1^2}$
 $\cos \theta_c = \sqrt{1 - \frac{n_2^2}{n_1^2}}$

$n_1 \sin \theta = n_2 \sin \theta$
 $1 - \sin^2 \theta = n_2^2 \sin^2 \theta / n_1^2$
 $\sin^2 \theta = n_2^2 \cos^2 \theta / n_1^2$
 $\theta = \sin^{-1}[\frac{n_2}{n_1} \cos \theta]$
 $\theta = \sin^{-1}[\frac{n_2}{n_1} \sqrt{1 - \frac{n_2^2}{n_1^2}}]$

$\theta = \sin^{-1}[\frac{n_2}{n_1} \sqrt{1 - \frac{n_2^2}{n_1^2}}]$
 $\theta = 1.941$

Personalize instruction

every student on front row & address each by their name



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

Establish continuous accountability

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

2 reimagining course



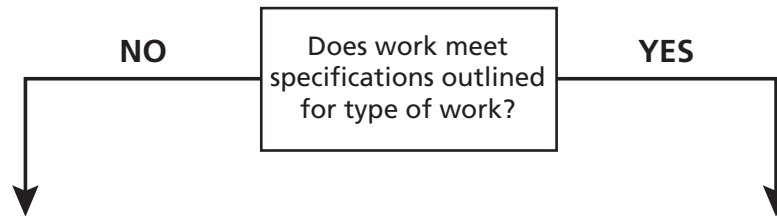
Establish continuous accountability

Specifications grading

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

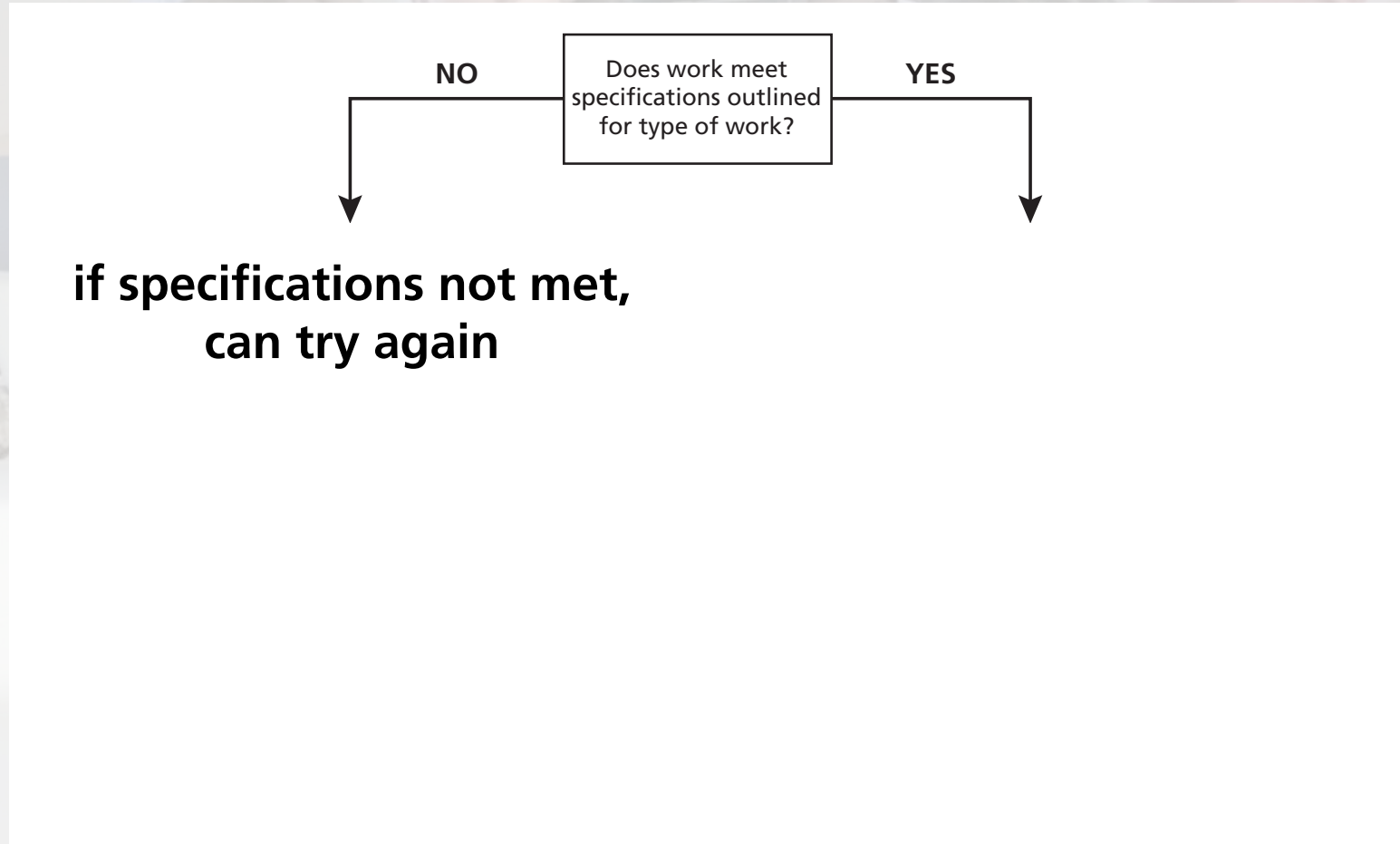
2 reimagining course

Establish continuous accountability



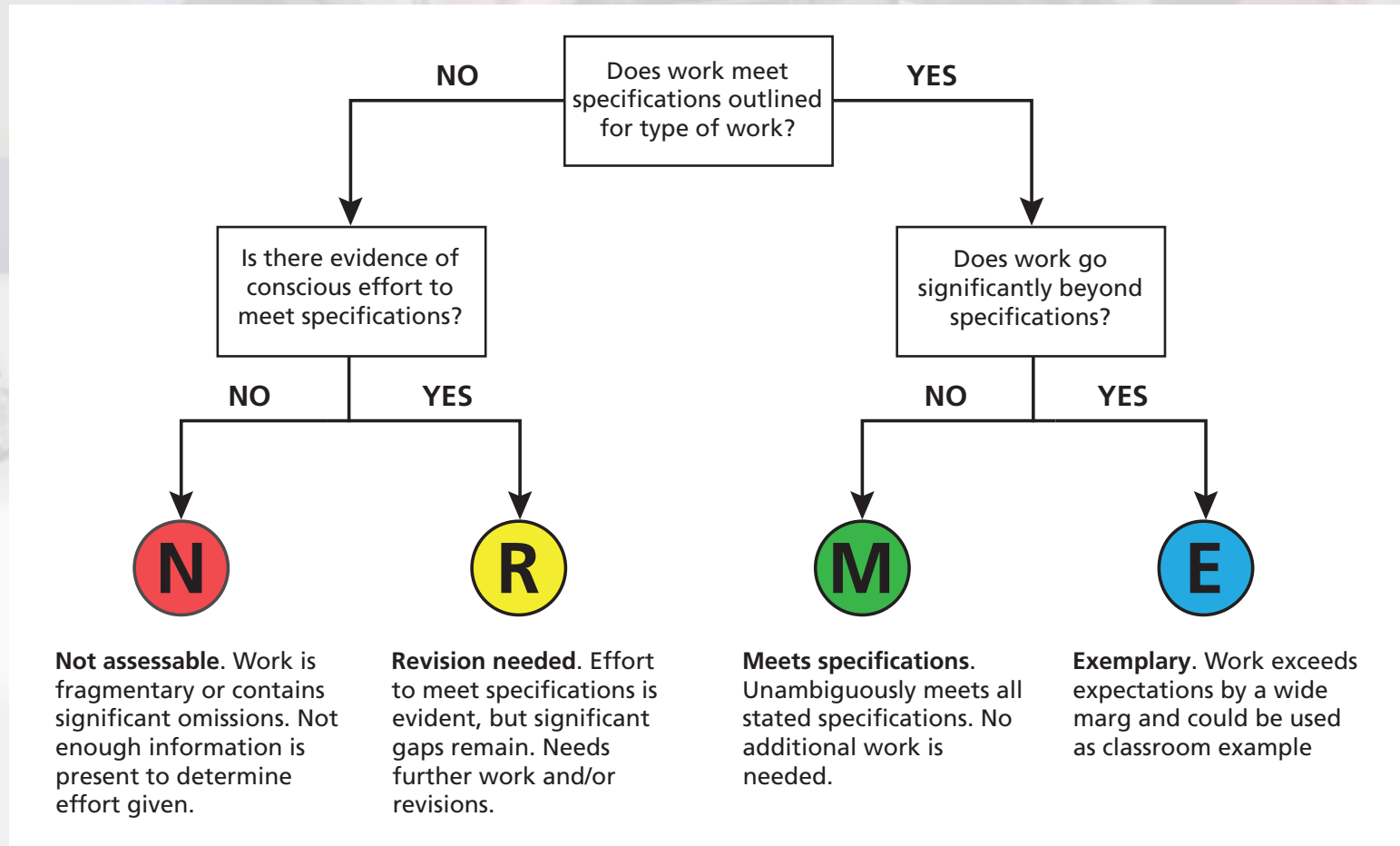
Inside Higher Ed, *Yes, Virginia, there is a better way to grade*

Establish continuous accountability



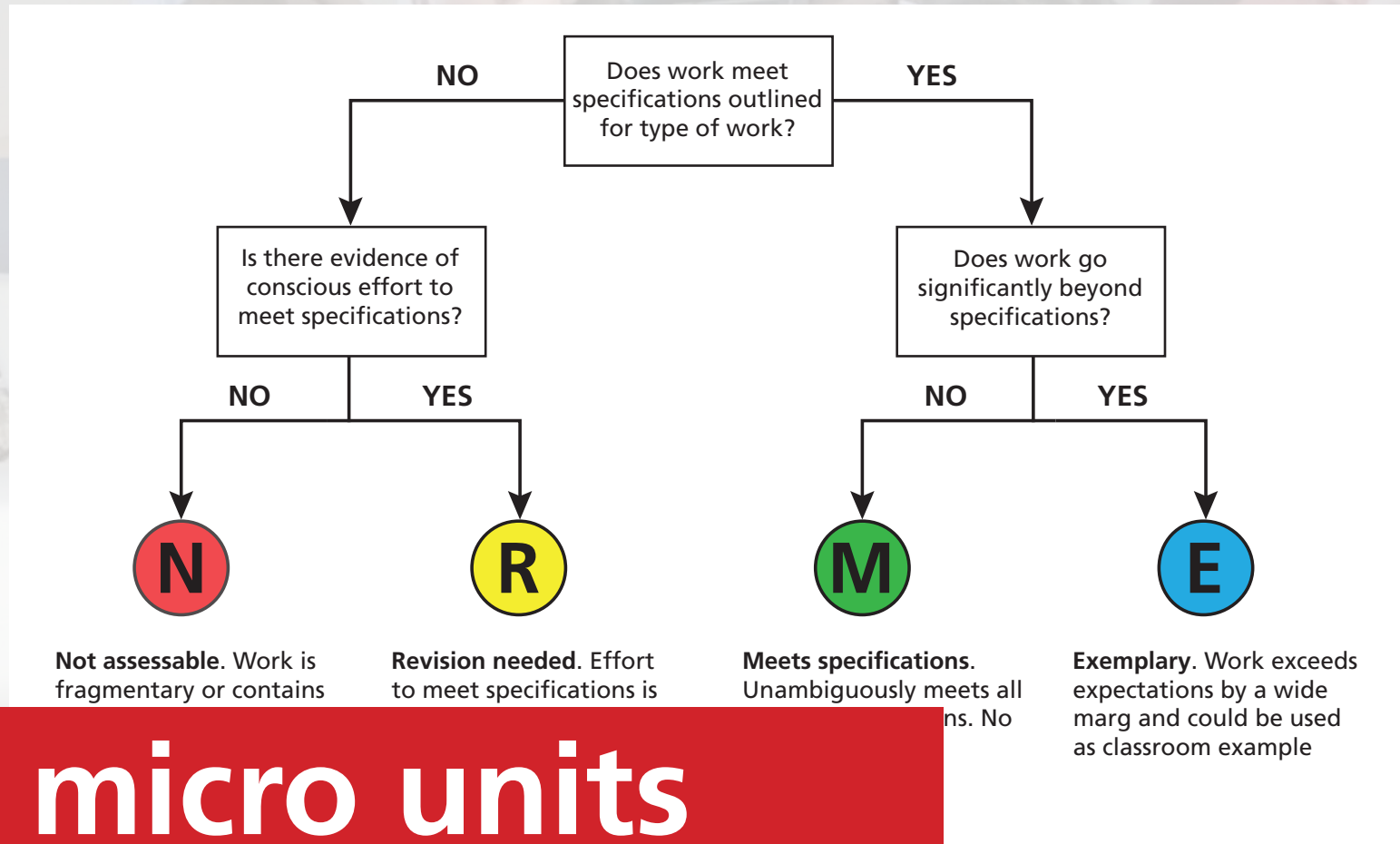
Inside Higher Ed, *Yes, Virginia, there is a better way to grade*

Establish continuous accountability



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

Establish continuous accountability



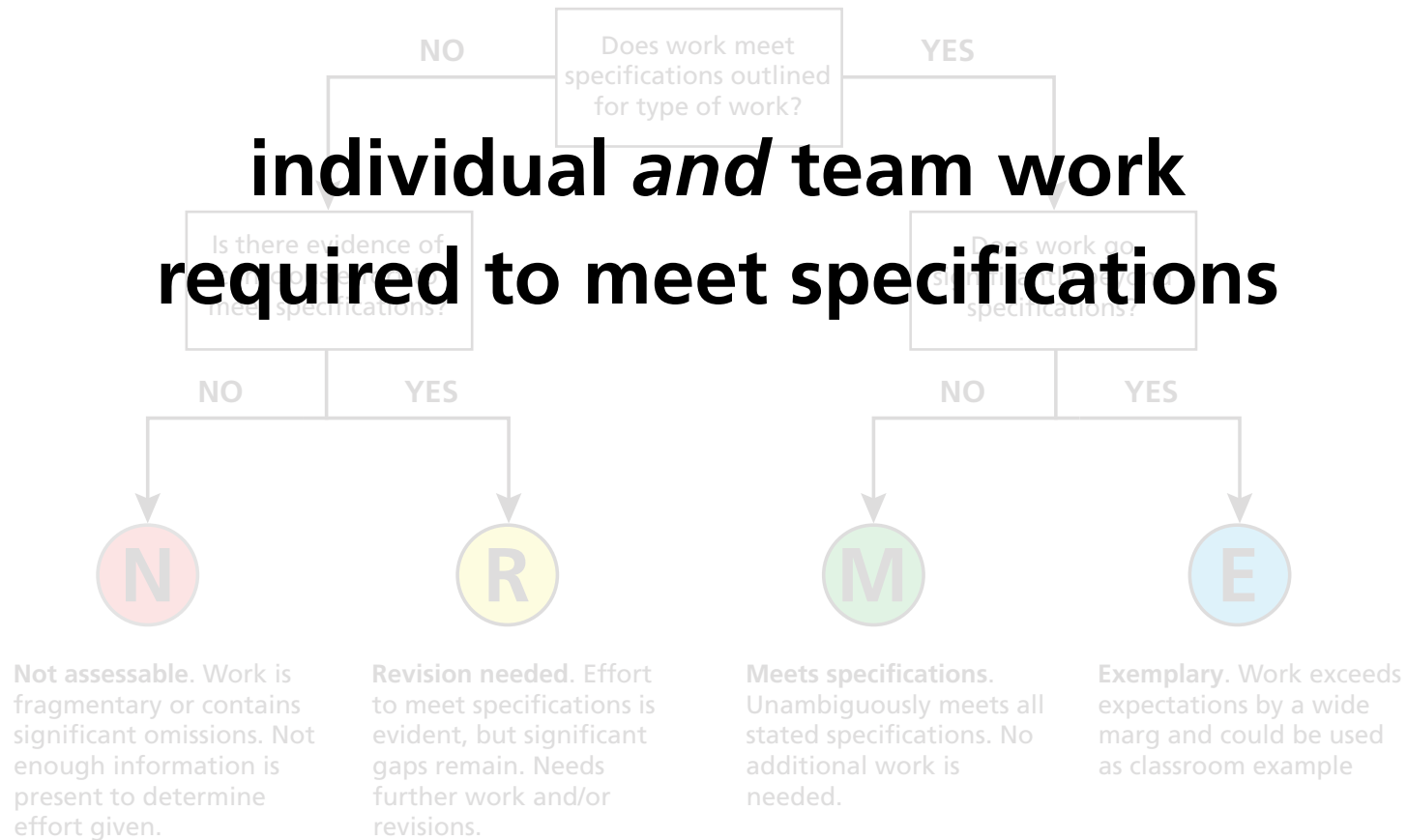
68 micro units

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

2 reimagining course

Establish continuous accountability

individual *and* team work required to meet specifications



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

Establish continuous accountability

**individual *and* team work
required to meet specifications**

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

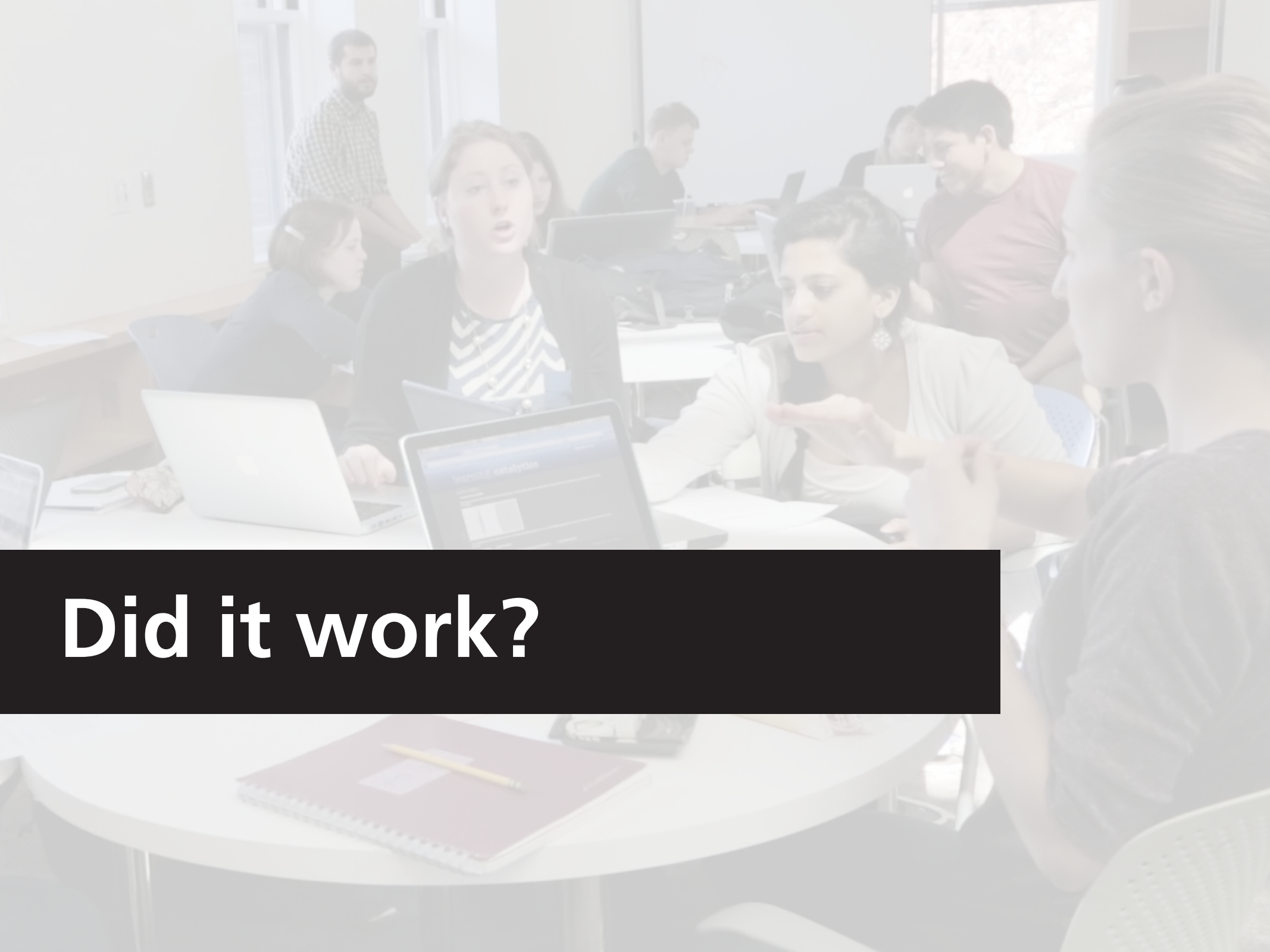
N
Not assessable. Work is fragmented or contains significant omissions. Not enough information is present to determine effort given.

R
Revision needed. Effort evident, but significant gaps remain. Needs further work and/or revisions.

M
Meets specifications. Work meets stated specifications. No additional work is needed.

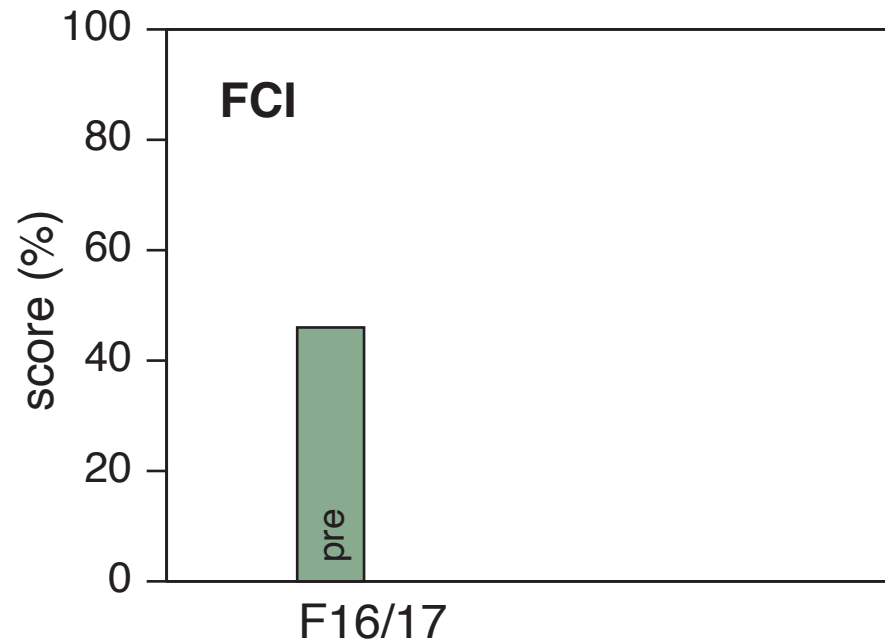
E
Exemplary. Work exceeds standards and could be used as classroom example.

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

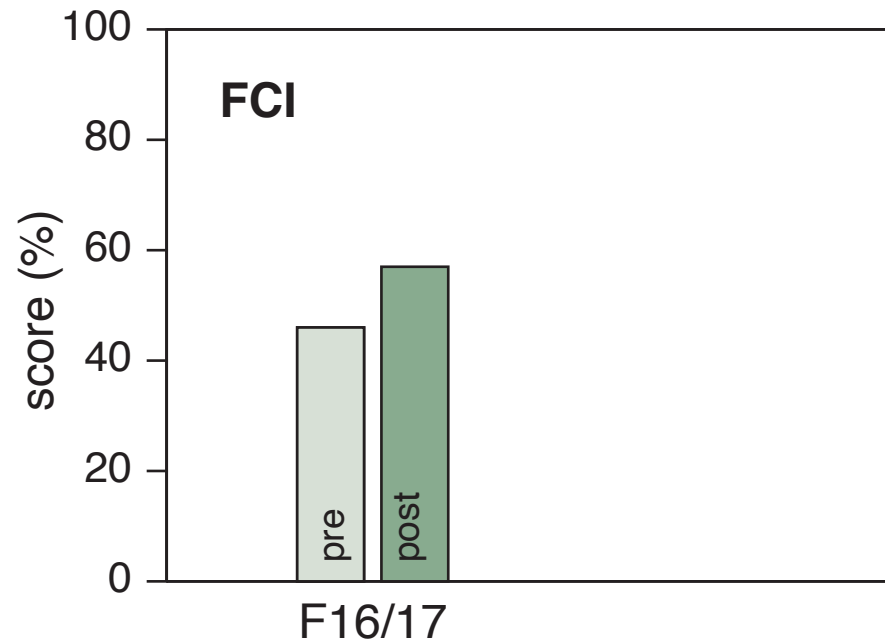


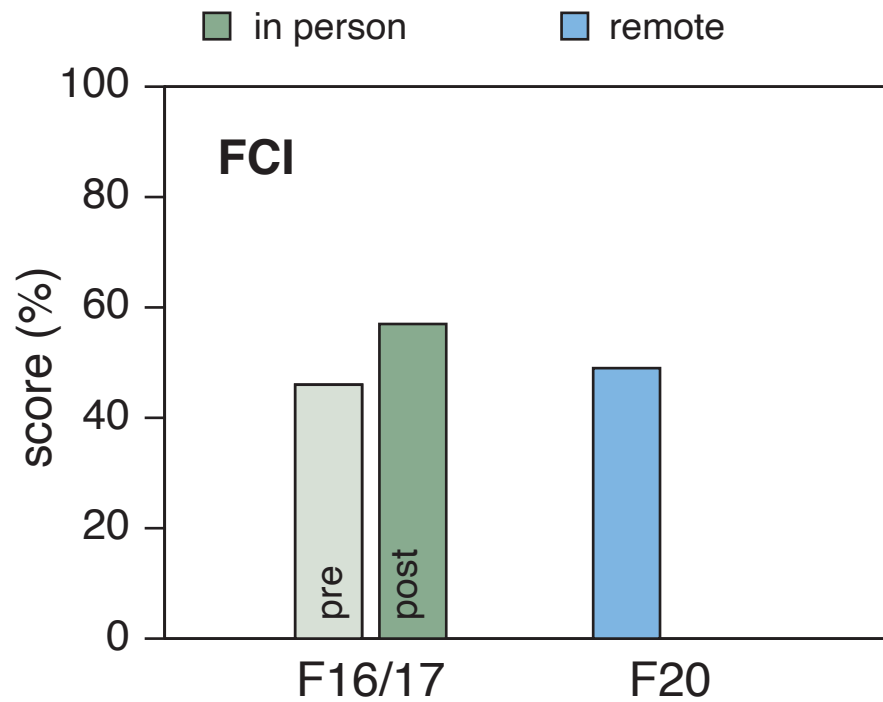
Did it work?

Fall Content Learning Gain

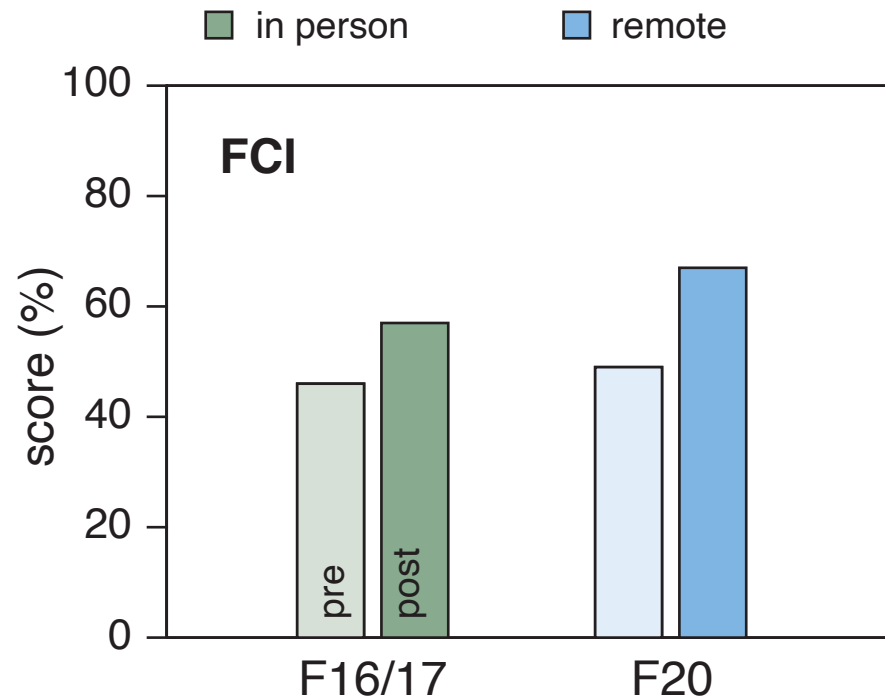


Fall Content Learning Gain

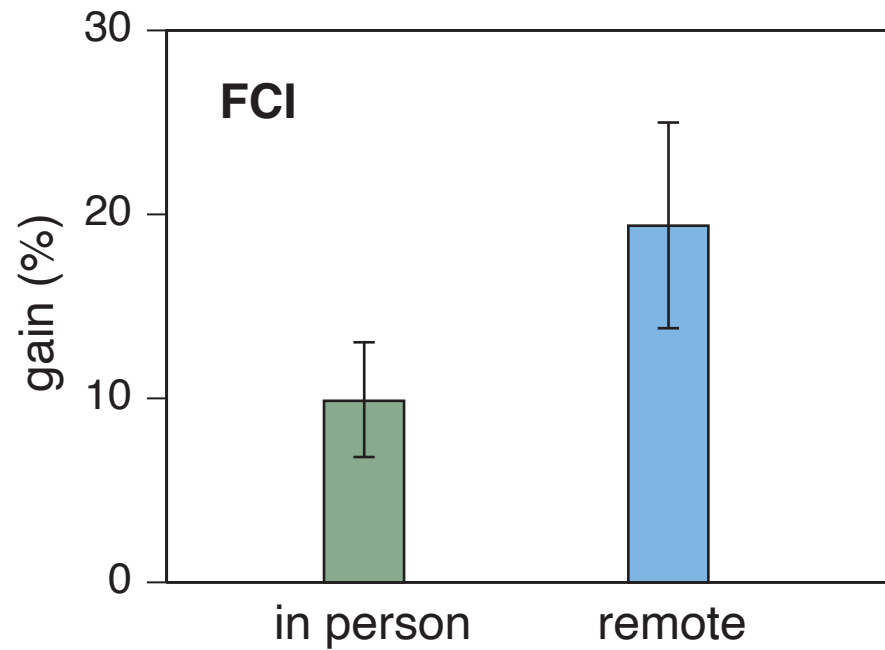




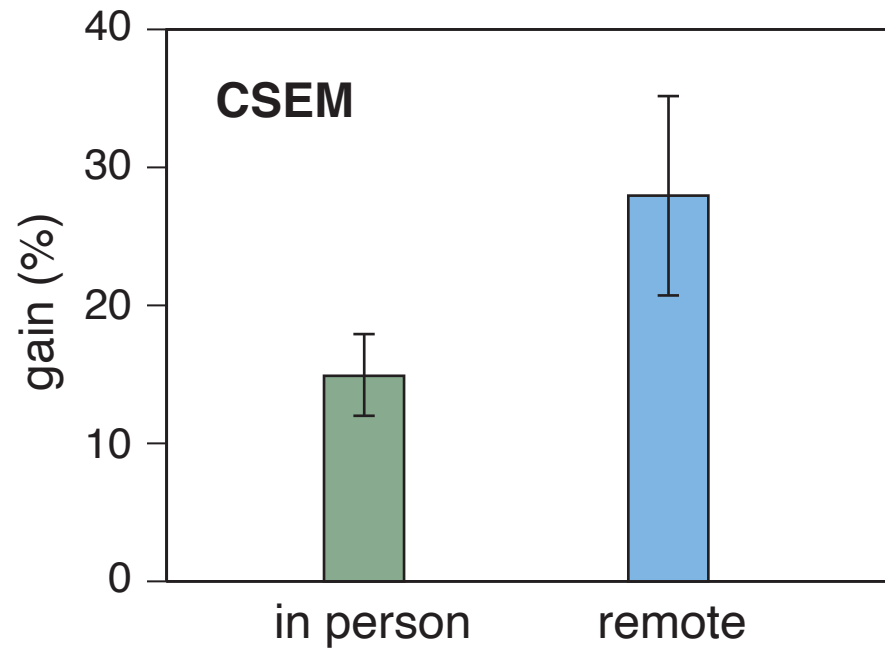
Fall Content Learning Gain



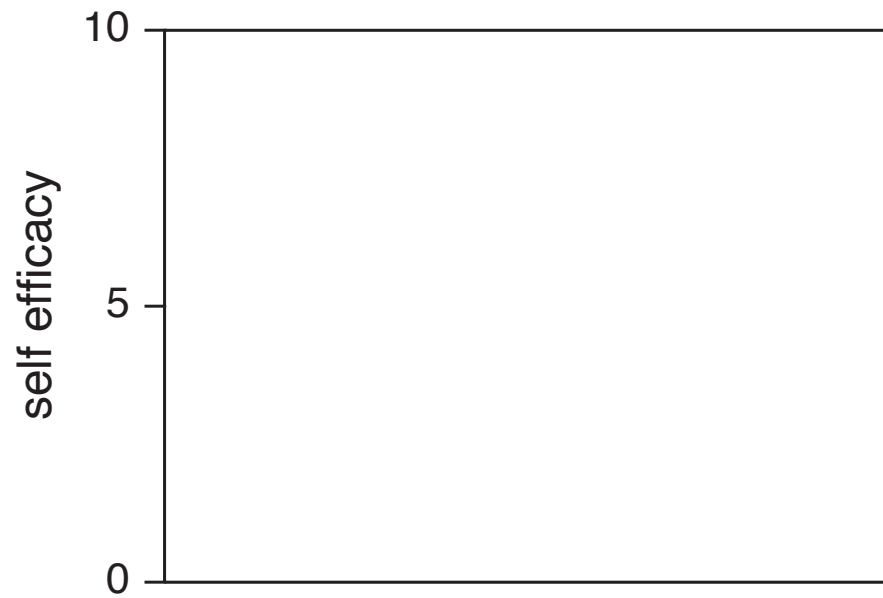
Fall Content Learning Gain



Spring Content Learning Gain



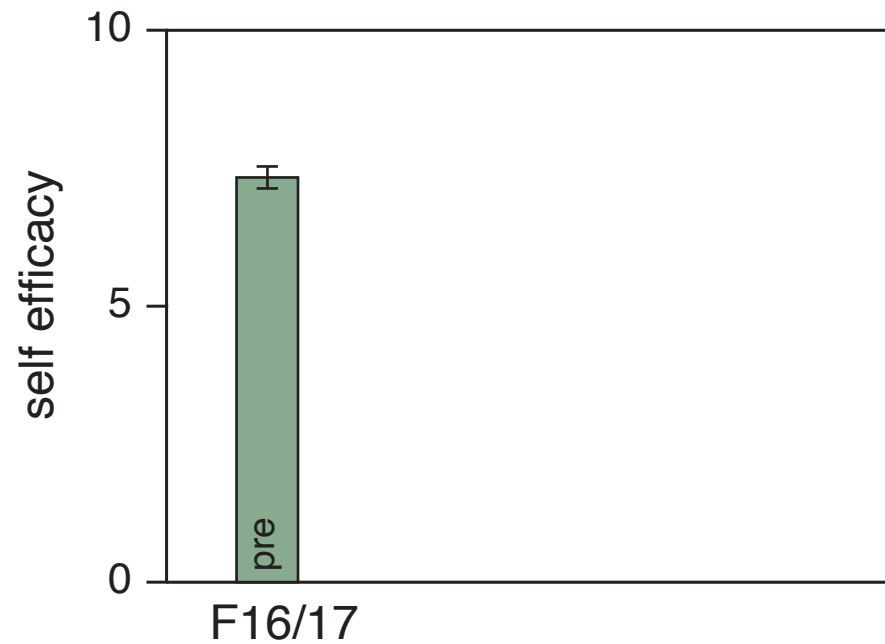
Self Efficacy



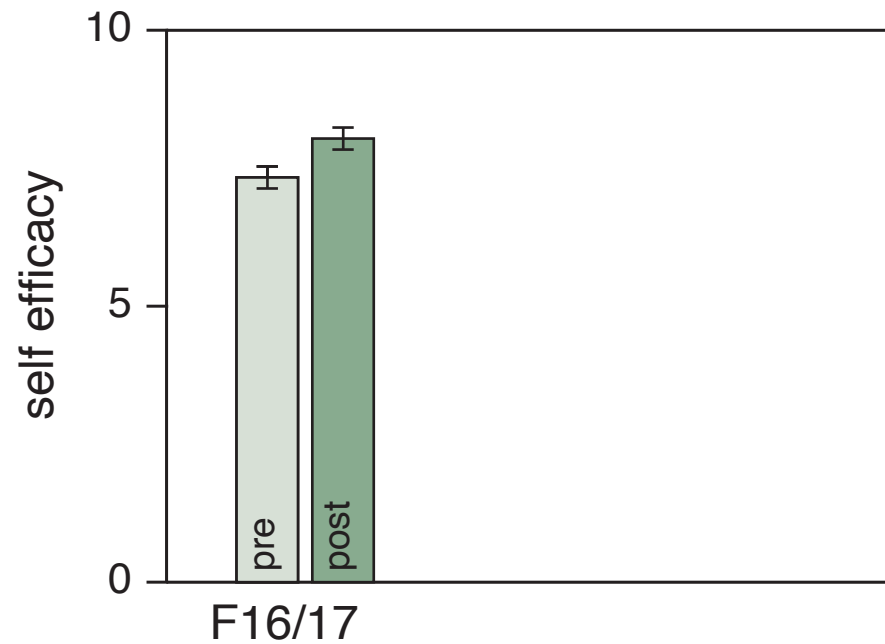
Self Efficacy

belief in ability to succeed in a given domain

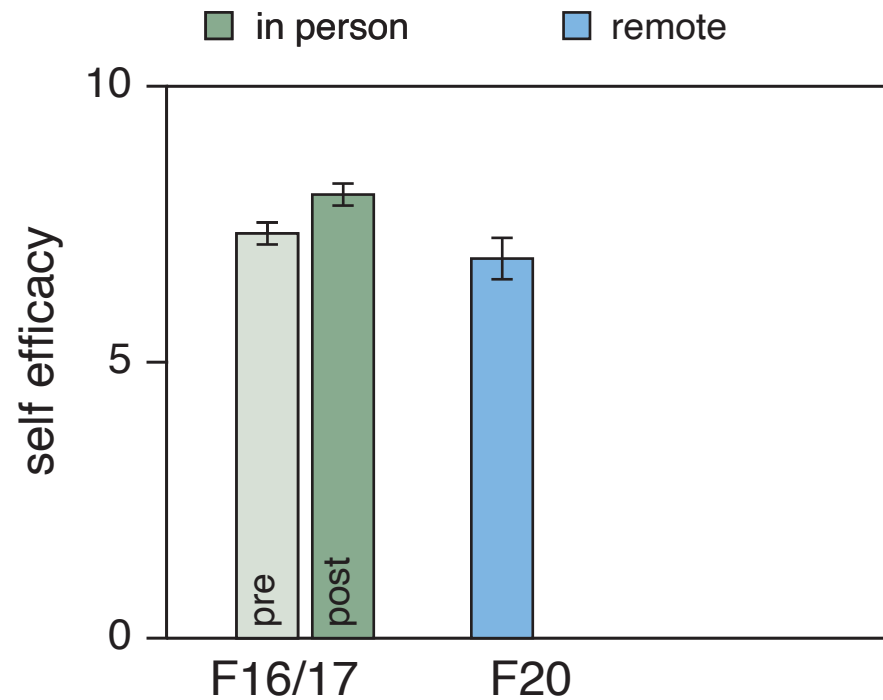
Self Efficacy



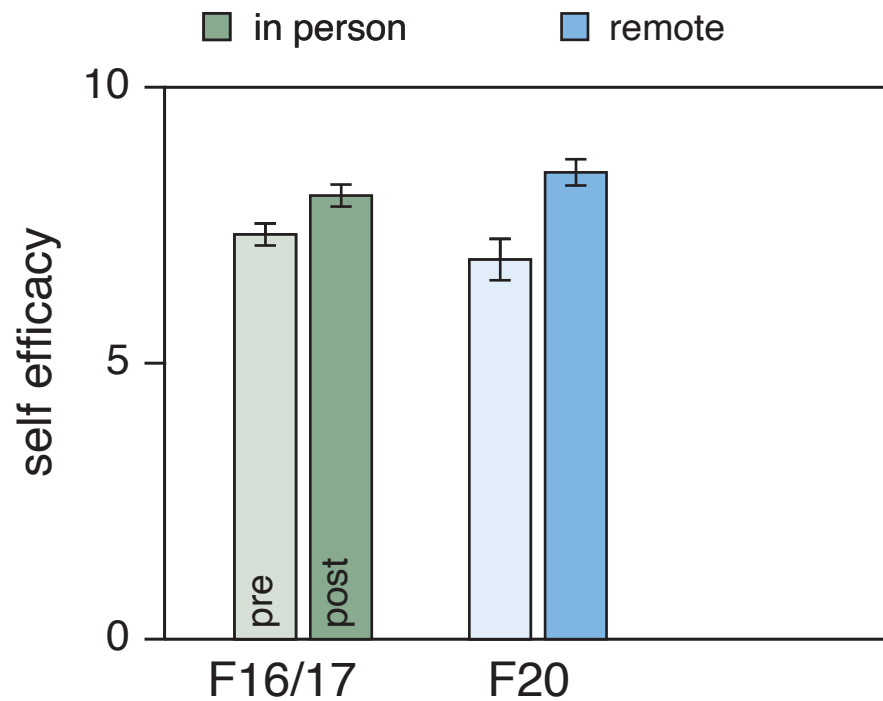
Self Efficacy



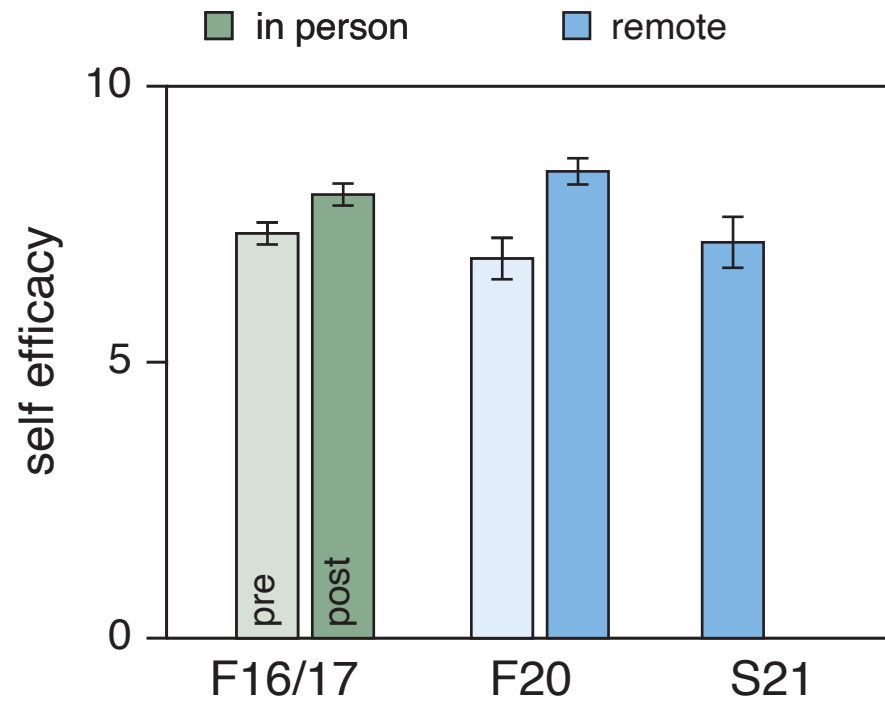
Self Efficacy



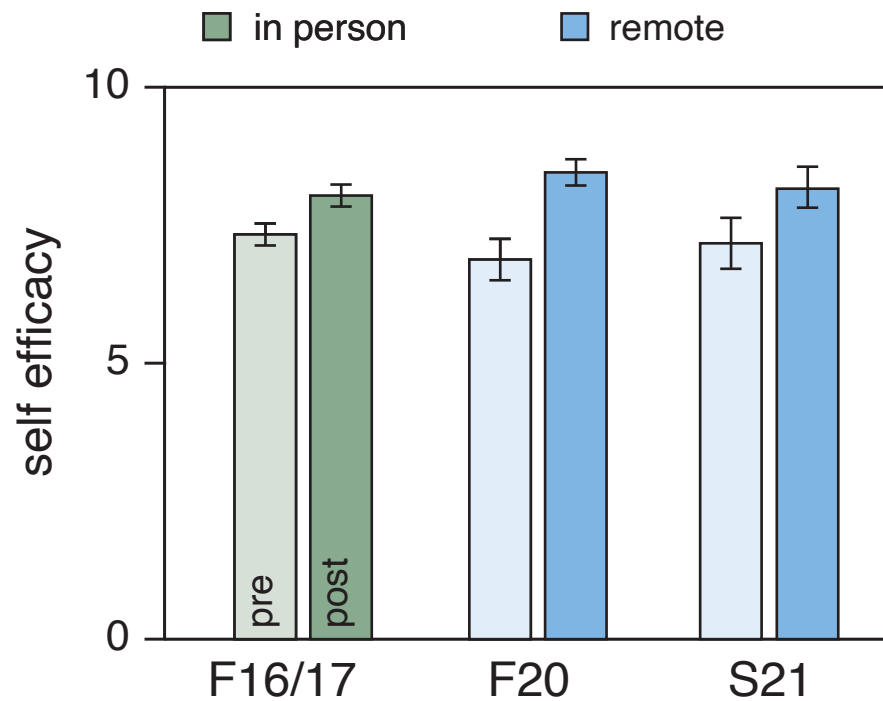
Self Efficacy



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.

3 results



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

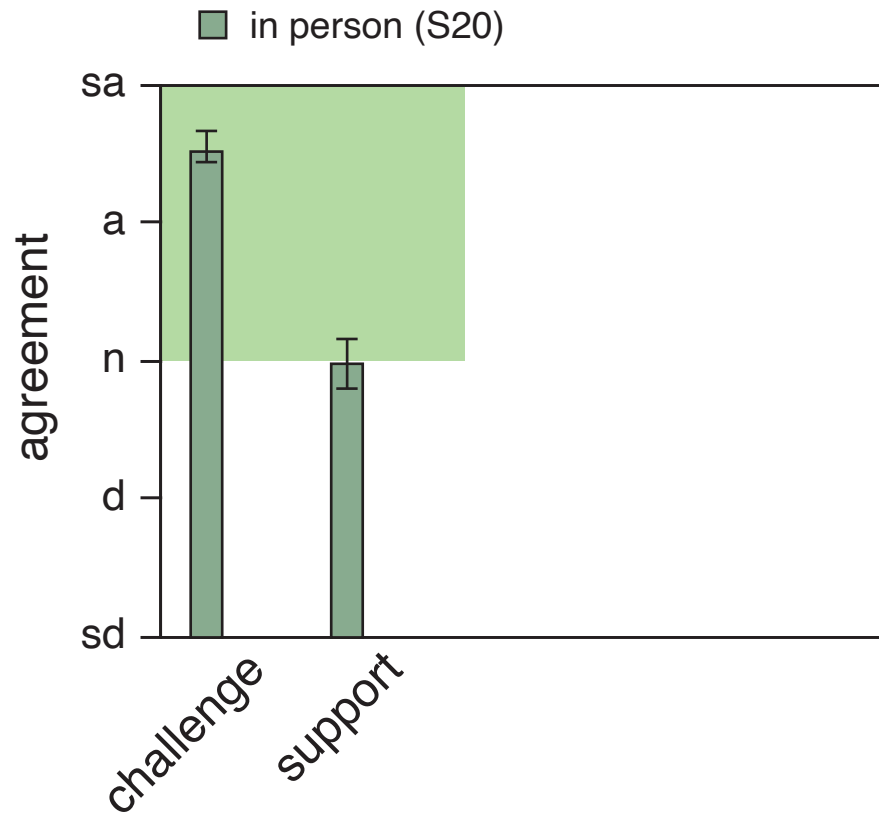
Agile Feedback Survey (Talbert)

- 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**

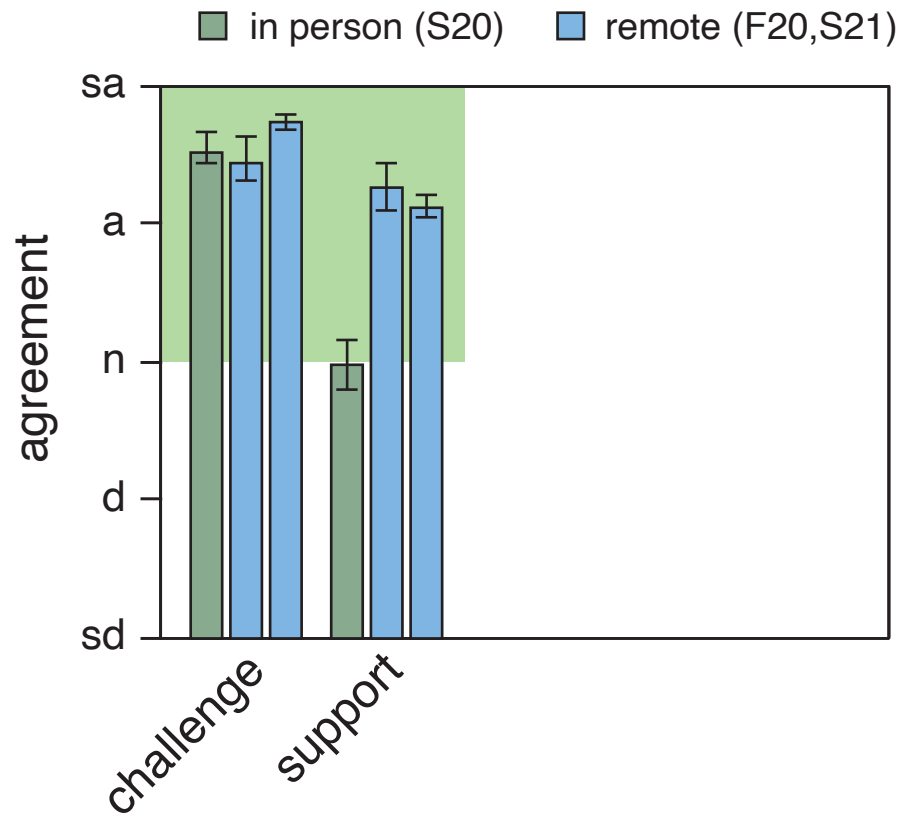
Agile Feedback Survey (Talbert)

- 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



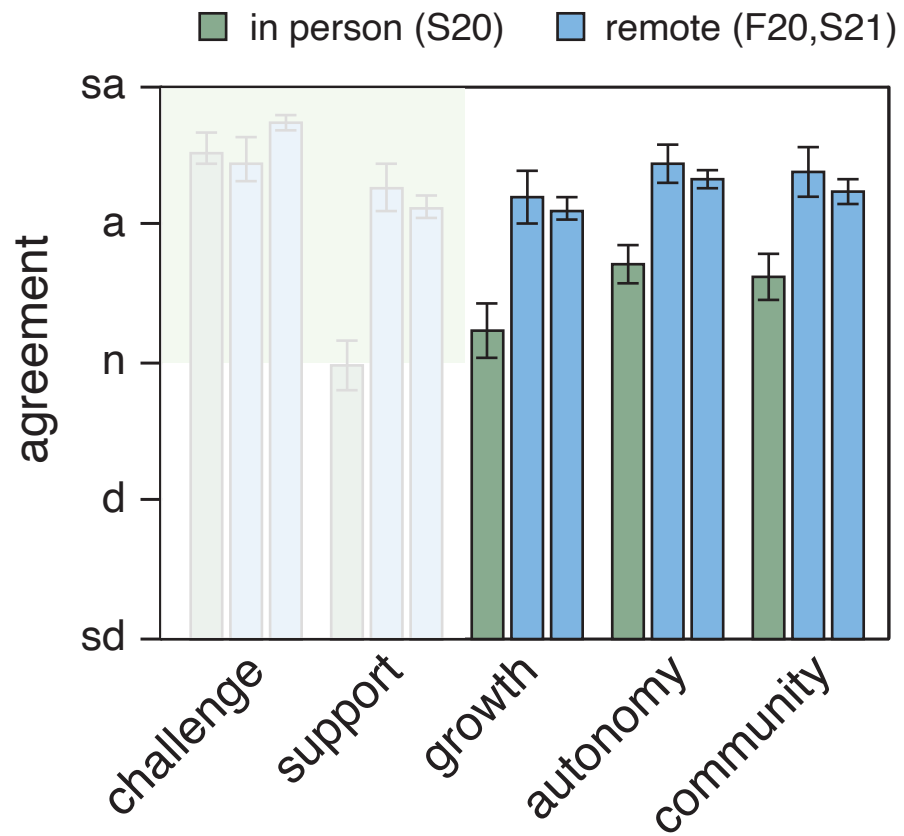
challenge vs. support



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



Improved

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

3 results

Improved

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

It worked for students too!

3 results

ikbeat

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I did my best teaching ever remotely!

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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I did my best teaching ever remotely!

Research Shows Students Falling Months Behind During Virtual Learning

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.

So, now what?

Building together





Project Fairs



Revert back?

Christina Gamboa

David Turner



Louis Collins

Amanda McKeever

Andrew Brown

Debra Linton



Matt Jenkins



Justin Cohen



Benjamin Harris

Changes implemented

- **Optimize face-to-face time**
- **Personalize instruction**
- **Establish continuous accountability**



(Post?) Pandemic changes

- **Optimize face-to-face time** ✓
- **Personalize instruction**
- **Establish continuous accountability**

(Post?) Pandemic changes

- **Optimize face-to-face time** ✓
- **Personalize instruction**
- **Establish continuous accountability** ✓

(Post?) Pandemic changes

Sections – in person or online (same experience, either way!)

You and your team can decide not only when, but also how to participate in the regular weekly class meetings for AP50. You can meet with your team and the TFs and me in the classroom (Pierce Hall 301), during one of the two section times. Alternatively, you can meet with us via Zoom, ideally during those same time slots.



In person: You and your teammates will be seated around a table in Pierce Hall 301 and share your work with each other using Zoom. Members of the teaching staff will check in with you at the table. (Note: Unlike in the picture, face coverings are **mandatory** in the classroom.)



Online: You and your teammates will meet in your team's Zoom meeting room and communicate and share your work with each other using Zoom. Members of the teaching staff will check in with you in your team's Zoom room.

“Multimodal approach”

No matter how you participate, the experience will be the same, as we carry out all class activities on the same platforms in person and online. On Zoom, your team will meet in its own Zoom room and you will share your work with each other via Zoom. In the in-person classroom your team will be seated at a table and also use Zoom to share work, but of course you will be able to see a large amount of people – you can just talk to each other. In both cases, whenever your team is ready to have its work validated by the teaching team or if you have a question, you will notify us on Slack and one of us will visit your Zoom room or come to your table in person. **Note:** Face coverings are **mandatory** for any in-person meetings (see below for additional details).

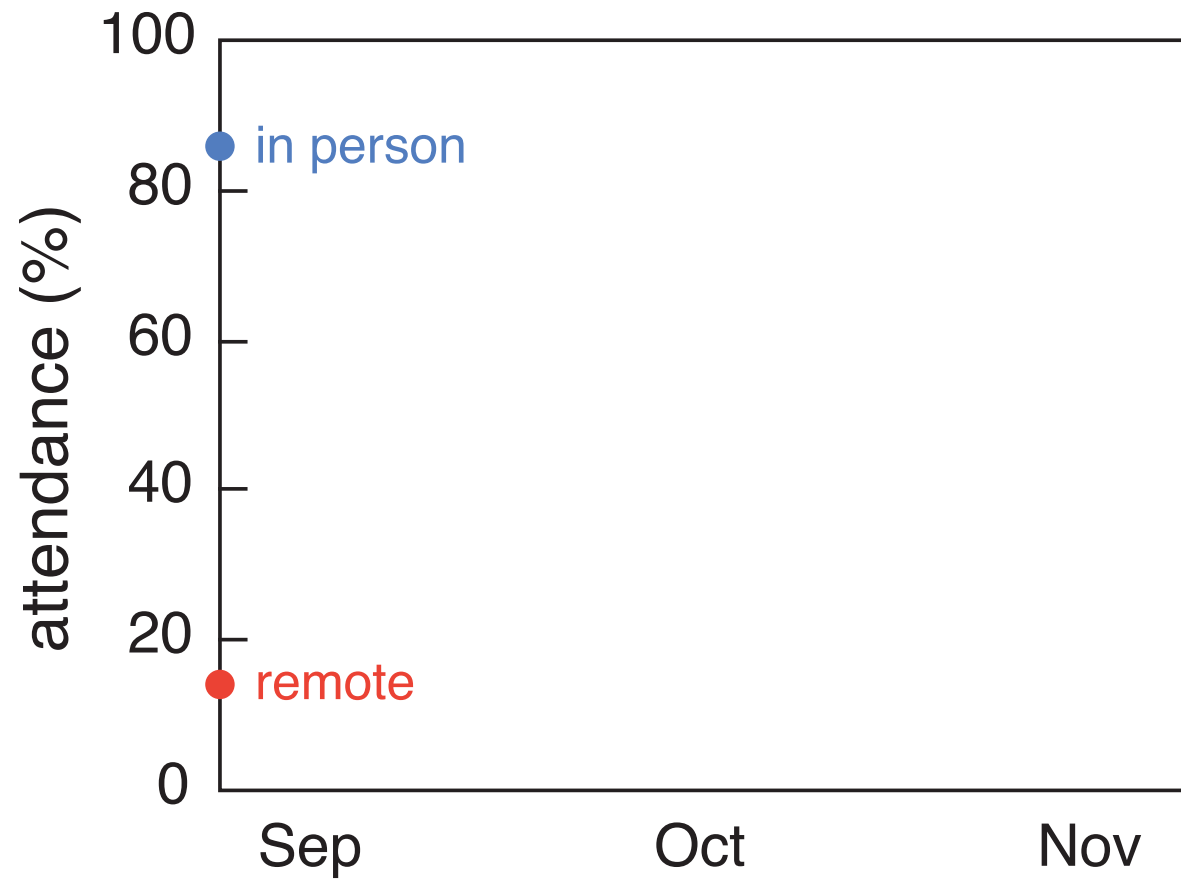
You **don't need to commit to in-person or online in advance**, and you can switch back and forth as you please, **provided the entire team agrees to participate at the same time and in the same modality for a given activity** (all in-person or all online). To facilitate that process, we will ask you for your preferences before we form teams and match you with people who have similar preferences.

Sections – Logistics

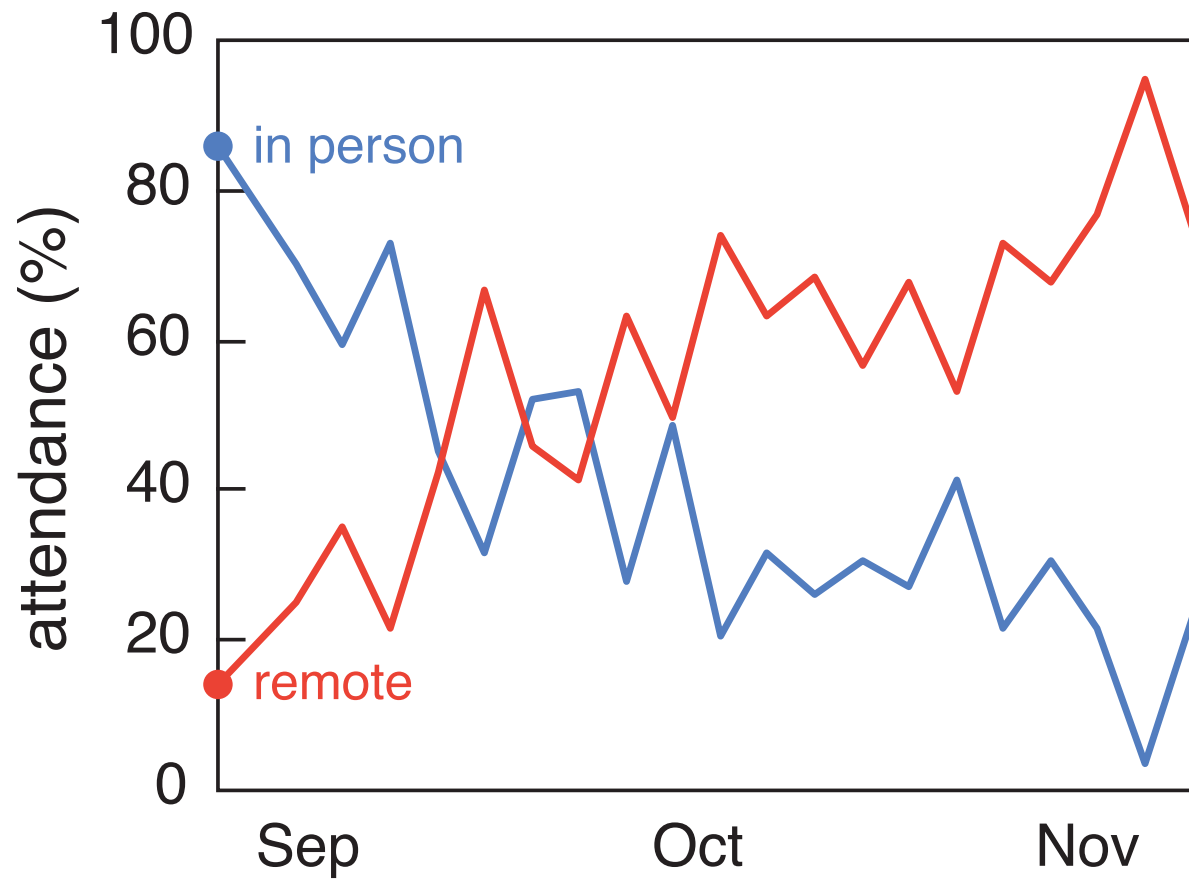
... in Pierce Hall 301. If you participate online, begin your section by going to the [AP50 Teaching Team Room](#) on Zoom. All ... the AP50 Teaching Team Room on ...

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- Pages
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- Academic Integrity Policy
- Support Resources
- Panopto
- Collaborations
- Outcomes
- Rubrics
- Quizzes
- Files
- Settings

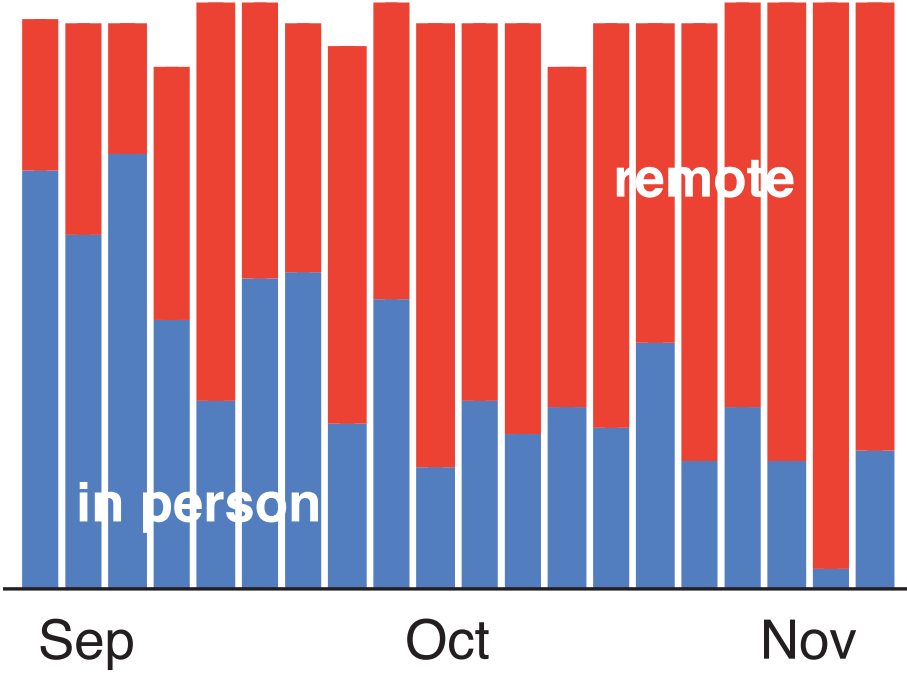
in-person vs. remote



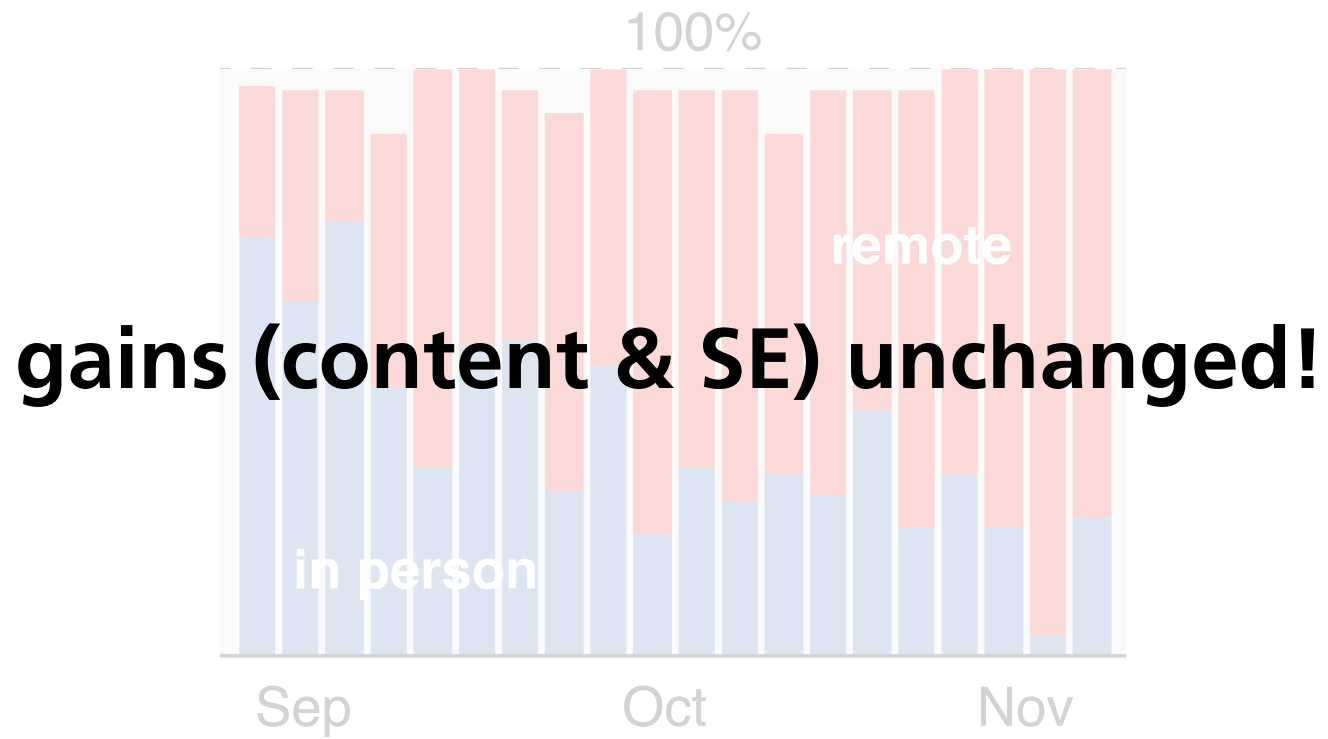
in-person vs. remote



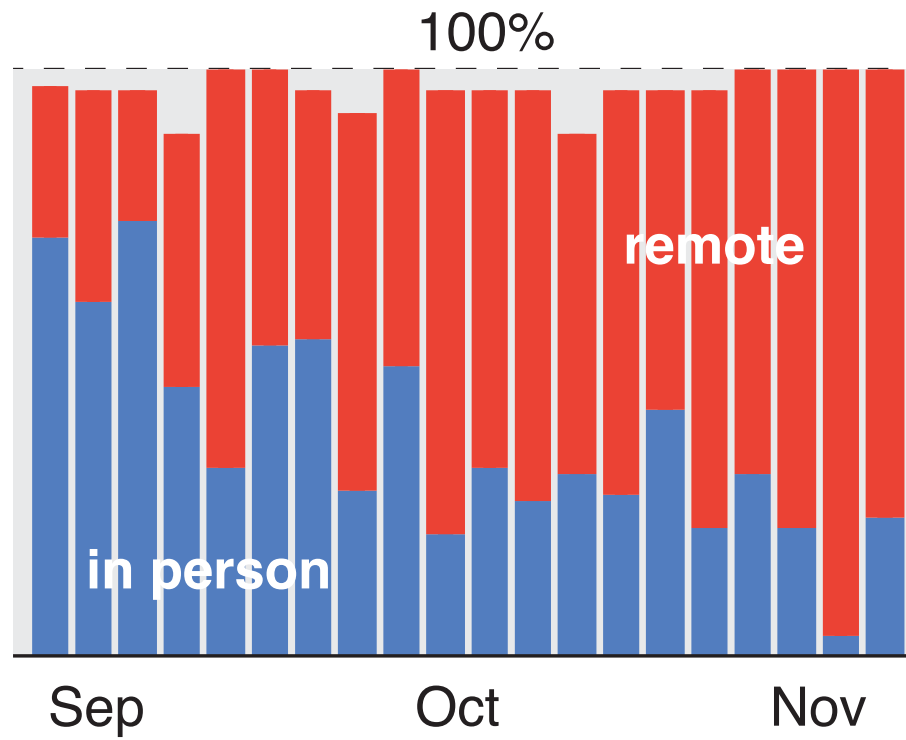
attendance



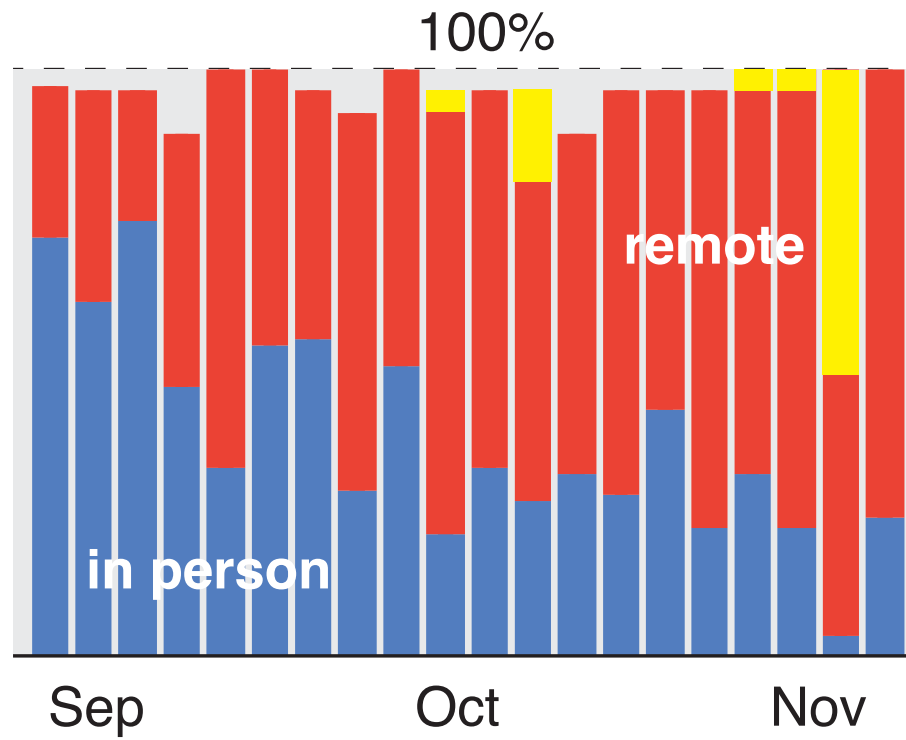
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attendance



time-shifts





“breaking down classroom walls”

Christina Gonzalez

David Turner

Eric Mazur

Louis Colton

Ariana McKeever

Andreas Bonitz

Debra Linnik

Matt Jenkins

Justin Cohen

Mr. Anna Marjan



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.



Tuesday

	A	B	C	D
9:45	Tutorial 2.112		Project SEC ALL	Skills SEC 1.402
11:00				
11:15		Skills SEC 1.402	Tutorial 2.112	
12:30	Project SEC ALL			

Thursday

9:45	Challenge 2.112		Skills SEC 2.112	Project SEC ALL
11:00				
11:15		Project ALL	Challenge 2.112	
12:30	Skills SEC 2.112			



Improvements

- **pedagogy and course outcomes**
- **efficiency**
- **flexibility**

for a copy of this presentation:

mazur.harvard.edu

course Canvas page: bit.ly/erics_course

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@eric_mazur