Effective Remote Teaching

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South-African Institute of Physics Conference
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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 species. The decisions people and governments take in the next few weeks will define the future of the years to come. They will shape not just our world, but the world that we live in.
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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In normal times, governments, businesses and educational boards would never agree to conduct such experiments. But these aren’t normal times. Will remote teaching become a fixture of life?
TEACHING & CLASSROOM

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

By Matt Barnew and Claire Bryan | Jun 28, 2020, 12:13pm EDT

America’s schools underwent an unprecedented experiment: tens of millions of students were not coming into school, and instead began receiving
How higher education leaders tried to stave off disaster in 2020
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 Ćuratolo-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
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
Remote learning has been a disaster and it can't continue

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

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 reflects the shifting of our perspectives.
Remote Learning Is a Catastrophe. Teach Share the Blame.

By Jonathan Chait
Why Emergency Online Learning Got Low Grades From Many College Students

By Robert Ubell (Columnist)  Mar 8, 2021
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.
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.
Higher Education with Purpose

Prepare to make a positive impact with our unique approach to university education.

UNDERGRADUATE PROGRAM
Higher Education with Purpose

An online university helping individuals achieve success.

Find your degree
before (and just after) pandemic
Team based

before (and just after) pandemic
Project based

1. before (and just after) pandemic
Intrinsic motivation 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

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Backward design

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

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

before (and just after) pandemic
before (and just after) pandemic
information transfer
faculty-centered

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

student-centered

before (and just after) pandemic
no lectures
no exams
before (and just after) pandemic
before (and just after) pandemic
Solution

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

① before (and just after) pandemic
what about class activities? 

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
- **Tutorial**
  - 60 min
  - Work on worksheet with team
  - Explore concepts
  - Discuss with staff
- **Bring device**

#### Apply
- **EA: Estimation Activity**
  - 30 min
  - Estimate quantities
  - Develop individual strategy
  - Discuss and solve as team
- **EDA: Experimental Design Activity**
  - 90 min
  - 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
  - Self-assess & turn in
  - Part 2: solve with team
  - **Bring device**

---

1. Before (and just after) pandemic
before (and just after) pandemic
March 13, 2020

before (and just after) pandemic
instructional continuity between first and second half?

before (and just after) pandemic
instructional continuity between first and second half?

86% agreed

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

synchronous ↔ asynchronous
instructor-paced ↔ self-paced
Minimize sync/instructor-paced

synchronous ↔ asynchronous

instructor-paced ↔ self-paced

everybody together at the same pace
Minimize sync/instructor-paced

- synchronous ↔ asynchronous
- instructor-paced ↔ self-paced
Minimize sync/instructor-paced

- recorded lecture
  - synchronous
    - instructor-paced
      - self-paced
  - asynchronous
Minimize sync/instructor-paced

recorded lecture

synchronous ↔ asynchronous

instructor-paced ↔ self-paced

1.5x!
Minimize sync/instructor-paced

lab

synchronous ↔ asynchronous

instructor-paced ↔ self-paced
Minimize sync/instructor-paced

- synchronous ↔ asynchronous
- instructor-paced ↔ self-paced

homework/study
Minimize sync/instructor-paced

- Synchronous
- Asynchronous
- Instructor-paced
- Self-paced
Minimize sync/instructor-paced

synchronous → asynchronous
instructor-paced → self-paced

reimagining course
Minimize sync/instructor-paced

synchronous → asynchronous
instructor-paced → self-paced

more time to help students where it really matters!
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
Personalize instruction
every student on front row

2 reimagining course
Personalize instruction

every student on front row & address each by their name

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

Specifications grading

Does work meet specifications outlined for type of work?

NO

YES

Revision needed. Effort to meet specifications is evident, but significant gaps remain. Needs further work and/or revisions.

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

Exemplary. Work exceeds expectations by a wide margin and could be used as classroom example.

Meets specifications. Unambiguously meets all stated specifications. No additional work is needed.

YES

NO
Specifications grading

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

Does work meet specifications outlined for type of work?

- NO
  - Is there evidence of conscious effort to meet specifications?
    - NO
      - Not assessable. Work is fragmentary or contains significant omissions. Not enough information is present to determine effort given.
    - YES
      - Revision needed. Effort to meet specifications is evident, but significant gaps remain. Needs further work and/or revisions.
  - YES
    - Does work go significantly beyond specifications?
      - NO
        - Not assessable. Work is fragmentary or contains significant omissions. Not enough information is present to determine effort given.
      - YES
        - Exemplary. Work exceeds expectations by a wide margin and could be used as classroom example.

YES

Meets specifications. Unambiguously meets all stated specifications. No additional work is needed.

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

Revision needed. Effort to meet specifications is evident, but significant gaps remain. Needs further work and/or revisions.

Exemplary. Work exceeds expectations by a wide margin and could be used as classroom example.

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

Does work meet specifications outlined for type of work?

- YES
- NO

Is there evidence of conscious effort to meet specifications?

- YES
- NO

Does work go significantly beyond specifications?

- YES
- NO

**Exemplary.** Work exceeds expectations by a wide margin and could be used as classroom example.

**Meets specifications.** Unambiguously meets all stated specifications. No additional work is needed.

**Revision needed.** Effort to meet specifications is evident, but significant gaps remain. Needs further work and/or revisions.

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

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

score (%)

FCI

F16/17

pre
Fall Content Learning Gain

F16/17

Score (%)

FCI

pre  post

0  20  40  60  80  100

results
Fall Content Learning Gain

- **F16/17**
  - Pre: 40%
  - Post: 60%
  - **in person**

- **F20**
  - Pre: 20%
  - Post: 60%
  - **remote**

**FCI**

Scores are in percentage.
Fall Content Learning Gain

![Bar chart showing FCI scores for F16/17 and F20. The chart compares pre and post results for both in person and remote settings.](image-url)

- **F16/17**
  - Pre: 40%
  - Post: 60%
  - In person

- **F20**
  - Pre: 30%
  - Post: 90%
  - Remote
Fall Content Learning Gain

![Bar chart showing learning gain in FCI for in-person and remote results. The remote gain is significantly higher than the in-person gain.](image)
Spring Content Learning Gain

CSEM

gain (%)

in person  remote

3 results
Self Efficacy

belief in ability to succeed in a certain domain
Self Efficacy

![Graph showing self-efficacy results for F16/17 pre-test](image)

**F16/17 Results**

- **Self Efficacy**
  - Pre-test value: [Graph indicates a specific value]
Self Efficacy

Results for F16/17:

- Pre: [value]
- Post: [value]
Self Efficacy

SE *down* in lecture courses!

![Bar chart showing self-efficacy pre and post F16/17]
Self Efficacy

![Bar chart showing self-efficacy results for in-person and remote settings across F16/17 and F20.](image-url)
Self Efficacy

![Graph showing self efficacy comparison between in-person and remote learning in F16/17 and F20. The graph indicates a higher self efficacy in the post period for both in-person and remote learning, with a greater increase in remote learning for F20.]
Self Efficacy

![Bar chart showing self-efficacy scores for in-person and remote modalities across different years (F16/17, F20, S21). The chart compares pre and post-intervention scores.](chart.png)
Self Efficacy
Doubling of

• content learning gains

• physics self-efficacy gains
What do students say?

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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.
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

[Diagram showing a 2D axis with 'challenge' on the x-axis and 'support' on the y-axis, with a green rectangle labeled 'target' in the second quadrant.]
challenge vs. support

![Chart showing agreement between challenge and support](chart.png)
challenge vs. support

results
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

- Support
- Growth
- Autonomy
- Community

Results:
- In person (S20)
- Remote (F20, S21)
self-determination

What do you predict?

[Bar chart showing agreement levels for challenge, support, growth, autonomy, and community with error bars indicating variability.]
self-determination
course evaluation

3 results
course evaluation

Diagram:

- Evaluation scale: e (excellent), vg (very good), g (good), f (fair), u (unsatisfactory)
- Results:
  - Course:
    - m
  - Instructor:
    - nm

Total results: 3
course evaluation

[Bar chart showing evaluation of course and instructor in person (S19)]

- Course evaluation: vg
- Instructor evaluation: nm

3 results
course evaluation

3 results

<table>
<thead>
<tr>
<th>Evaluation</th>
<th>In Person (S19)</th>
<th>Remote (F20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instructor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Improved

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

3 results
• 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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I did my best teaching ever remotely!

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So, now what?
Building together
Revert back?
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Remote teaching may well become a fixture of life.
for a copy of this presentation:
mazur.harvard.edu

course Canvas page: bit.ly/erics_course

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