Instruction in the Era of COVID-19: Learning from Fall 2020 and Preparing for Spring 2021

Hosted by The Academy for Excellence in Engineering Education (AE3)

October 15, 2020

Lightning Symposium Norms

- All participants will be automatically muted upon entry to the Main Room.
- The symposium will consist of:
  - Eleven (11) unique presentations of **2 minutes or less**
    - An audible signal will alert presenters when they have 30 seconds remaining and again when time has expired.
  - A general Q+A session following all presentations
- The chat space will remain open during the lightning presentations
  - You are encouraged to post questions, share ideas, and offer comments during the presentations; the presenters will not be responding to chat during their 2-minute presentations but rather during the Q+A session following all presentations.
  - AE3 staff will monitor for the chat for questions that may be addressed during the open Q+A sessions following all presentations.
- Please raise your hands to ask open-mic questions during the Q+A session.
- The symposium will be recorded and available on the AE3 website (http://ae3.engineering.Illinois.edu) later this week.

Our Presenters

SUPPORTING STUDENTS AND BUILDING CONNECTEDNESS IN ONLINE ENVRIONMENTS

Kerrie Douglas

School of Engineering Education

Supporting Undergraduate Engineering Students Online

Prof. Kerrie Douglas

1. Be Available

- Have regularly established check-in times students can talk to you
- Have synchronous component for discussions in break out rooms
- Start online link early and stay
- Call students by their name
- Set expectations on how to ask questions and timeframe for feedback
- Proactively reach out
- Majority of ‘teaching’ time should be spent interacting with students or providing feedback

Supporting Undergraduate Engineering Students Online

2. Facilitate Peer Interactions and Accountability

- Foster a “we’re in this together” attitude
- Group students into breakout rooms for discussion
- Have students formally introduce themselves
- Establish course virtual co-working times
- Encourage students to set goals and communicate progress with each other
- Set up course-wide communication tool

National Science Foundation
EEC #2030133A

Flipped instruction

Chrysafis Vogiatzis

Industrial and Enterprise Systems Engineering

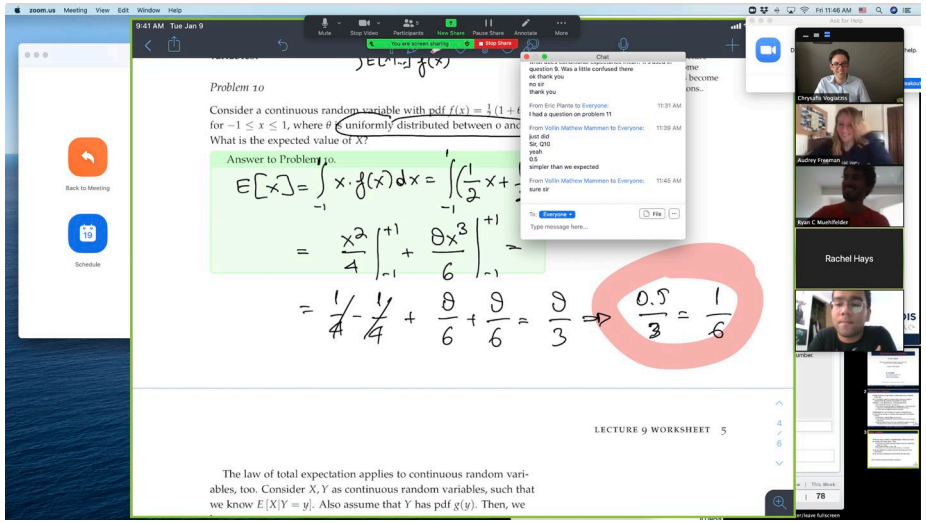
Flipping the classroom

So much more than “classwork at home, homework in class.”

In preparation for a session, students have access to:
- small duration video lectures;
- lecture notes or other reading materials;
- solved examples, practice problems, case studies.

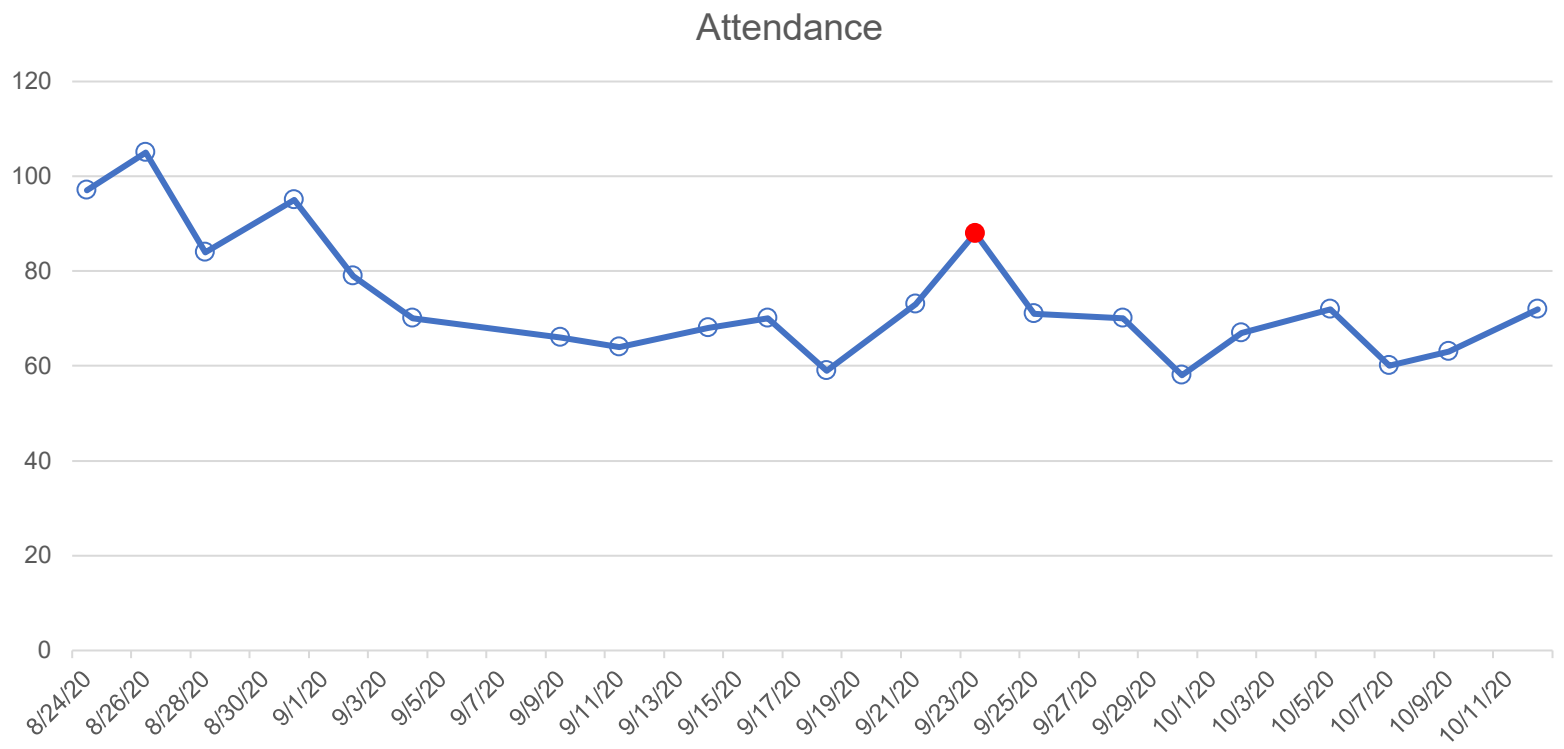
During class meeting times, students participate in carefully designed activities (worksheets):
- they are entered into groups (breakout sessions);
- they can call for help or even visit other sessions;
- they need to submit their worksheet within 24 hours.

Before and after class, students can communicate through Piazza (for most Q&A sessions), Zoom (for face-to-face discussions), gather.town (for larger review sessions).



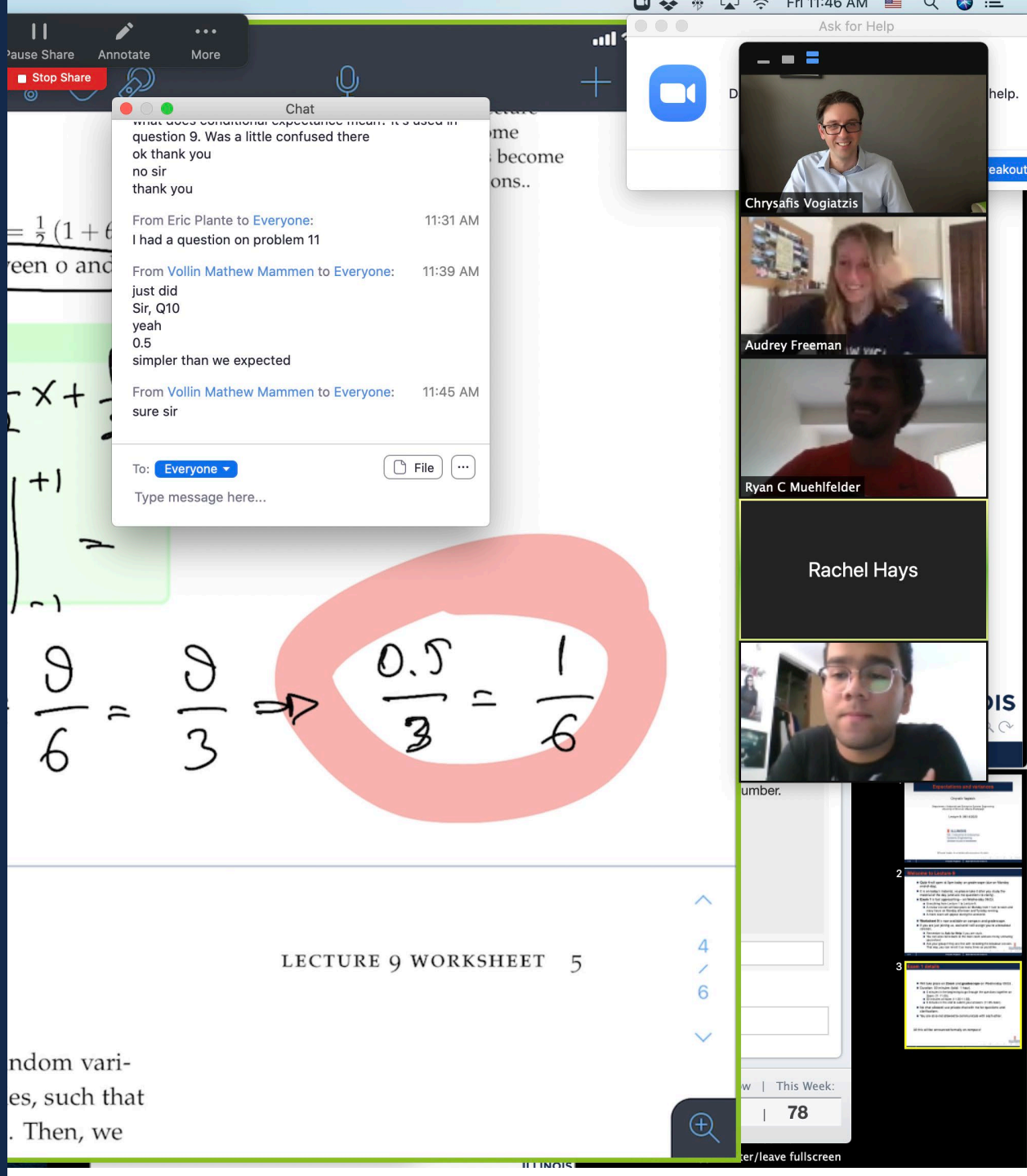
Flipping the classroom: attendance

Attendance has been consistent, even though not mandatory.



Tools used include:

- Compass
- Illinois Mediaspace
- Zoom
- Gradescope
- Piazza
- Jamboard
- gather.town



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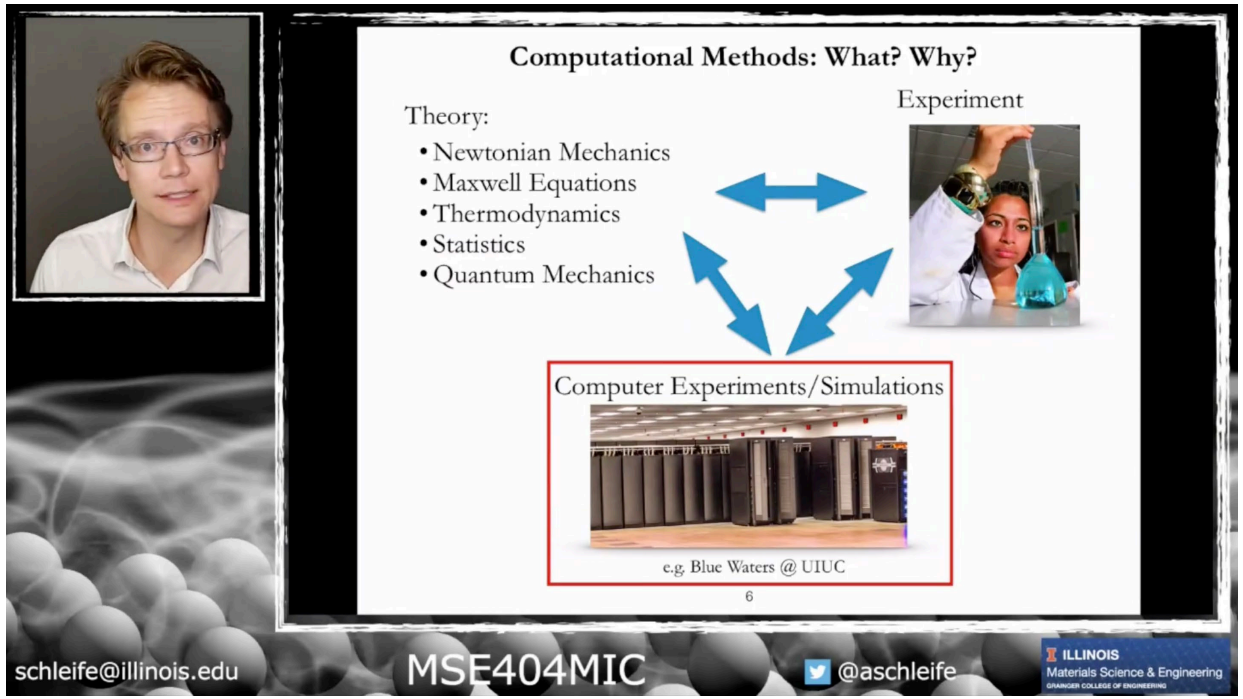
Open broadcaster software (OBS) and gather.town

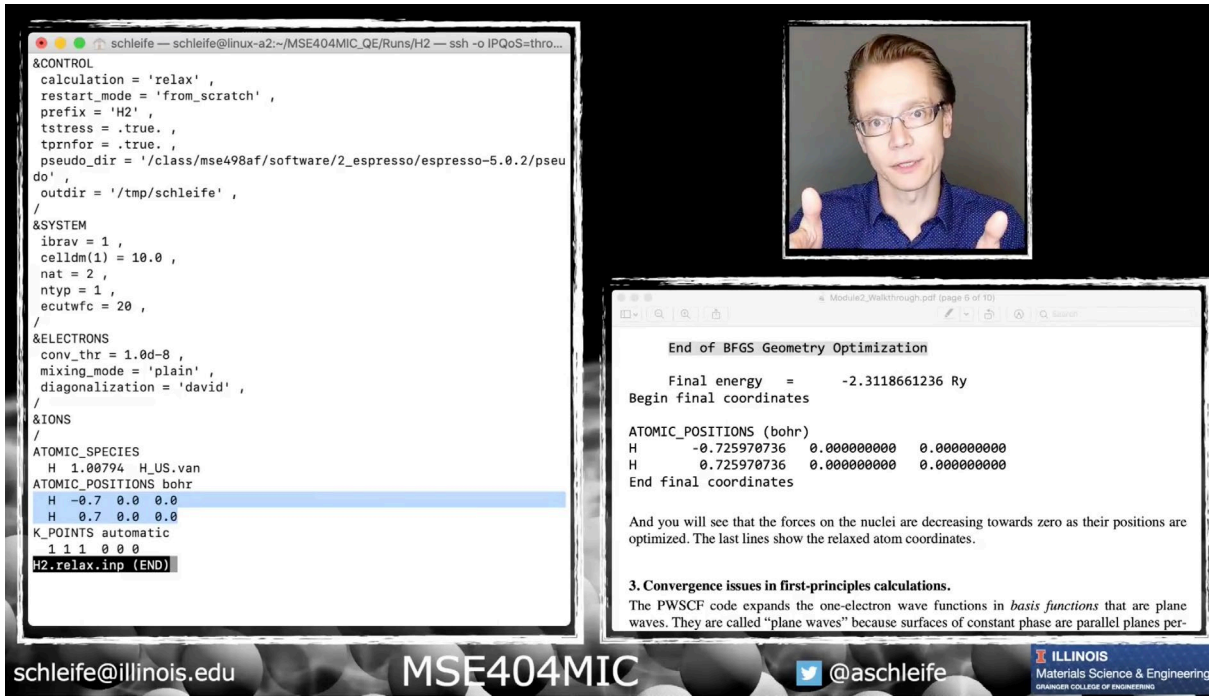
Andre Schleife

Materials Science and Engineering

Open Broadcaster Software (OBS)

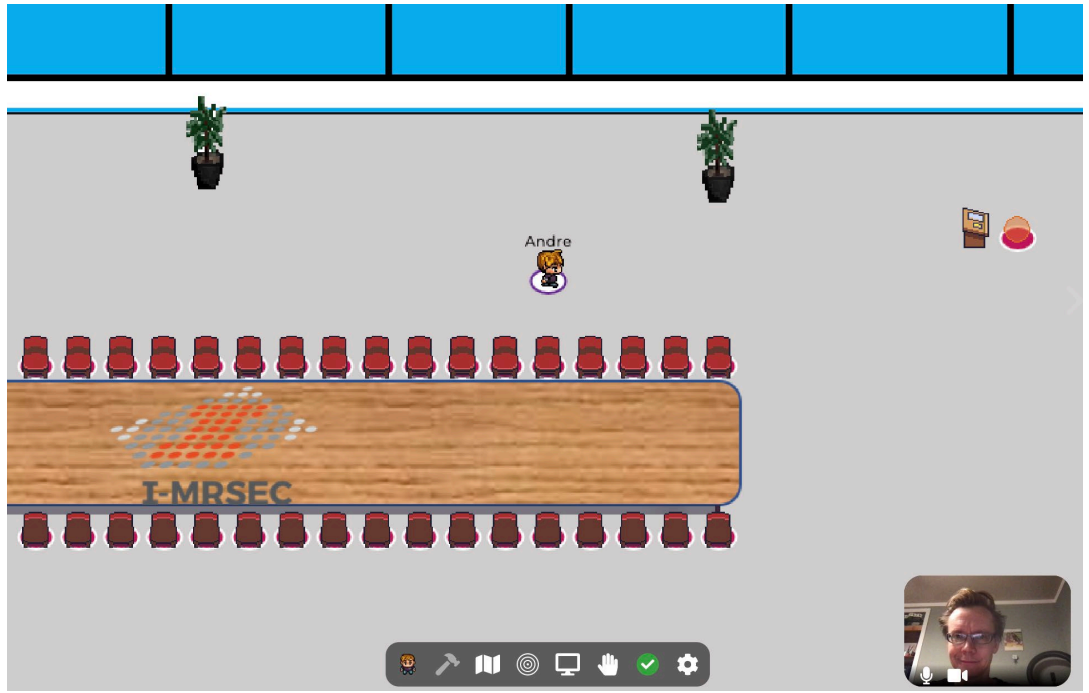
- Very flexible in composing your screen/window arrangement (independent from the actual window arrangement)
- Slides+video on the same screen (increase attention)
- Cut out unnecessary/distracting background
- High quality/resolution
- Interface with Zoom through virtual camera

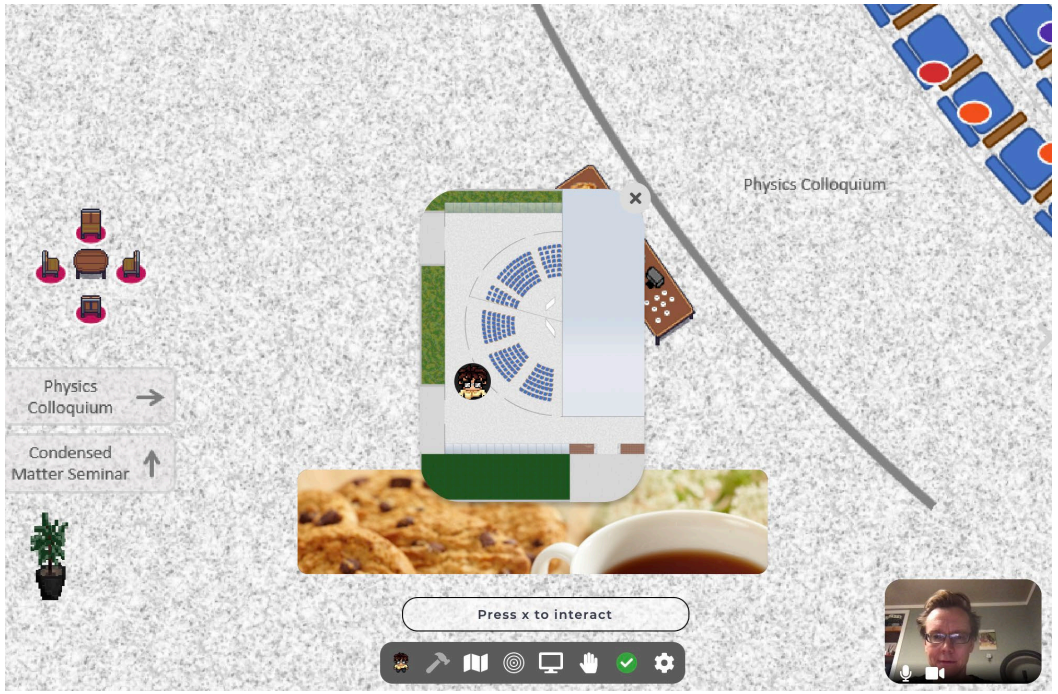




gather.town

- Seamless one on one conversations with students (+screen sharing)
- Group discussions between students
- Change of pace during class/less sterile than Zoom breakout rooms
- Lots of add-ons/infoboards/games and custom maps





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Synchronous online peer instruction using Zoom and Discord

Craig Zilles

Computer Science

Goal: Create opportunities for student interaction during lecture

- Reduce isolation, give opportunities to meet fellow students

Peer Instruction:

- Ask a challenging multiple-choice question
- Have students vote individually
- Present results of first vote (*optional*)
- Have students discuss with their neighbors
- Have students vote again

How to replicate in online setting? In particular, in lecture with ~500 students.

Synchronous online peer instruction using Zoom and Discord (Craig Zilles) - 2

What we're doing:

- Large capacity Zoom + Zoom polls
- Discord
  - Each "channel" has a small group of students for text chat
  - A "bot" controls assignment of students to channels

How it is working:

- Students seem to value the interaction we're providing
- Took a couple of lectures to get students comfortable
- Ongoing maintenance: reshuffle students to maintain active groups

Polling and student questioning in online lectures

Cecilia Leal, Materials Science and Engineering

MSE201: Phases and phase relations. Enrollment: 50-70. 120 min, TR

A. Class structure pre-COVID19:

- Pre-prepared **or spontaneous** i>clicker questions distributed throughout the class.
- Primary goal of i>clickers was not to quiz students but to engage participation.
- Students did get participation points.

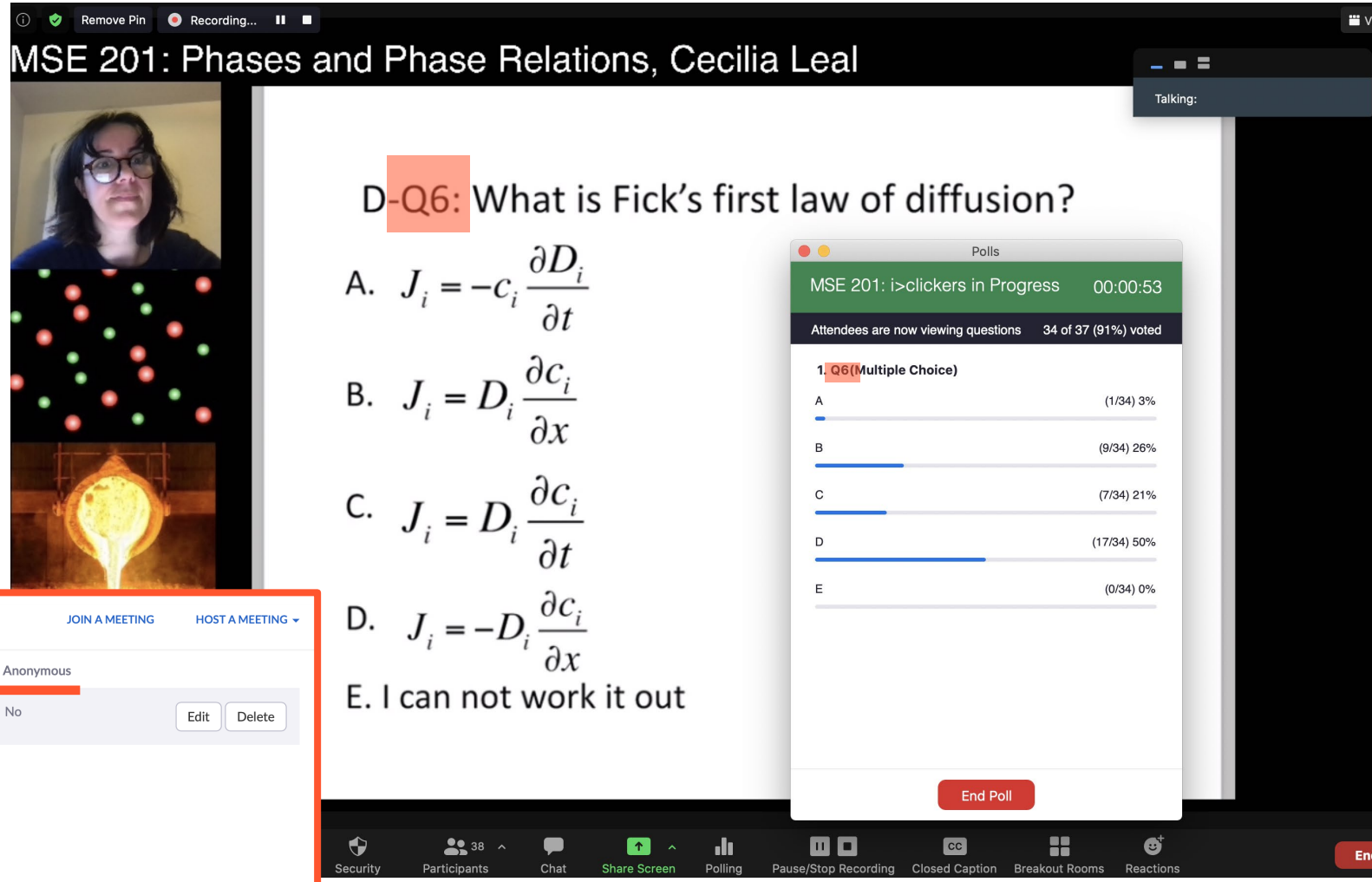
B. Preparing for MSE201 with COVID19:

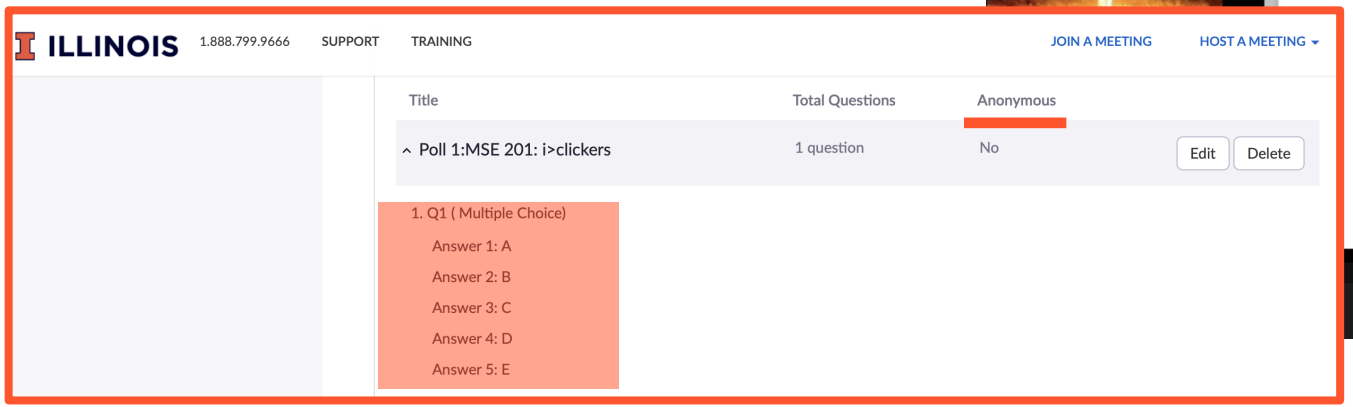
- i>clicker apps may not be accessible to everyone and it is one more thing!
- Not all students are synchronous. How to handle “participation” points?
- How to make MSE201 consistent with previous years?

Zoom polling + same questions made available on online assessment tools

Setting up Zoom polls

- Polls are set as **generic Q1-Q25**. Keeps to **ALL recurring** meetings
- **Questions** are written (sometimes on the fly) **on the presentation**
- Each **poll is launched whenever** desired
- Student participation >**90%**
- Can be graded by assessing poll reports
- I release the poll questions on prairielearn – great for asynchronous students!





Collaborative learning activities in online classes

Mariana Silva

Computer Science

Incorporating Collaborative Learning Activities in Online Classes

Mariana Silva, Teaching Associate Professor

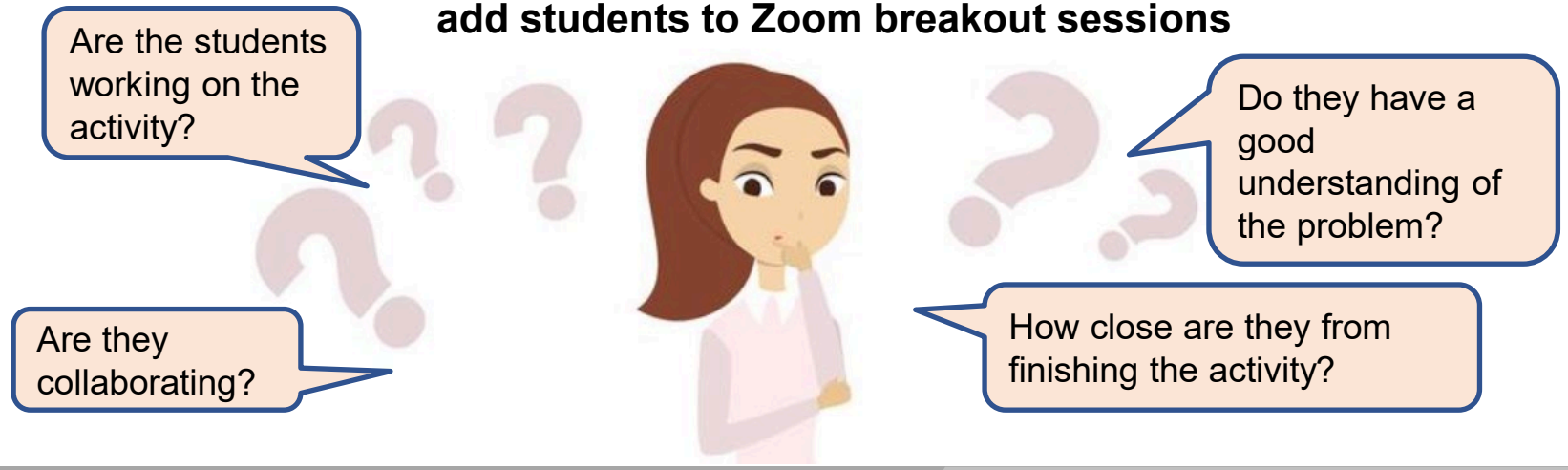
Face-to-face discussion session

Zoom breakout session

- LOTS of benefits from collaborative learning activities
- Visual ”big picture” of the status of the class
- Indicators of how well students are working together
- Create opportunities for social interactions became even more important!
- How to convert these activities from in-person classroom to online format?
- **Approach 1) Use same material developed for in-person class**

+

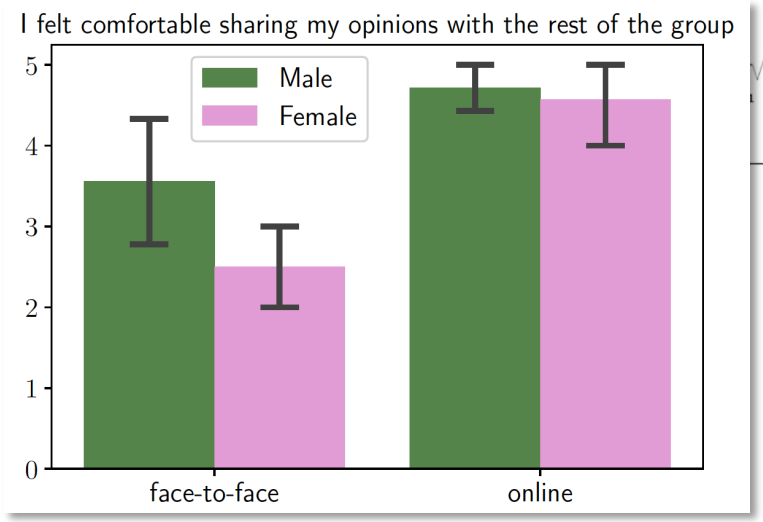
add students to Zoom breakout sessions

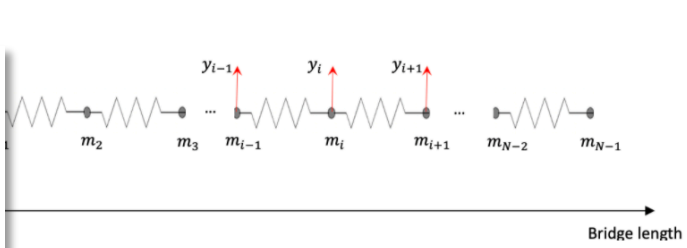


Approach 2: Computer-based collaborative learning tools

Mariana Silva, Teaching Associate Professor

- PrairieLearn (CS 357) and CoCalc (MATH 415)
- Groups share the same assessment and the same score
- Synchronized lectures + breakout zooms
  - 1:25 teacher-student ratio
- Asynchronized lectures
  - Assessment open for 24 hours
  - Support available via zoom
  - Remote or in-person collaborations
- Prompts to promote student's interactions
- Instructor can monitor progress / activity in real-time
- Provide students with guidelines for good collaboration
  - Assign team roles





1.1) Simple model: unsupported bridge (no pillars)

The unsupported bridge model consists of N small masses m_i connected by springs, as illustrated below:

for $i = 0$,
for $i = 1, 2, \ldots, N-2$,
for $i = N-1$.

$$\lambda \mathbf{y} = \mathbf{A}\mathbf{y}$$

where $(\lambda, \mathbf{y})$ are the eigenpairs for the matrix $\mathbf{A}$, which you know how to solve!

All you need to do now is construct the matrix $\mathbf{A}$. Store it in the variable `A`. Use `N = 200`.

```
N = 200
```

```
#grade (enter your code in this cell - DO NOT DELETE THIS LINE)
```

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Team Teaching in the Time of COVID-19

AE 100

Negar Mehr, Theresa Saxton-Fox, Brian Woodard

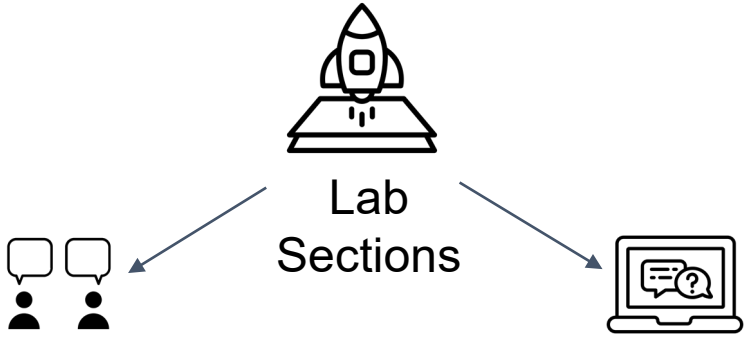


Course Elements

Lectures

One *recorded* lecture per topic for *all* students.

Faculty *split topics* at start.



New online-only projects developed *jointly by all faculty*, with support from TAs, CAs.

Online, in-person project *sessions split* between faculty with support from TAs, CAs.

Coordination

Weekly *meetings* with course *staff*

Informal communication channels

In-person staff

Online Staff

Text
Campuswire
Email
Box
Google docs

Benefits

- Redistributes workload
  - *Reduces repeated effort* on lectures
  - More time spent on *course coordination, development*
- Improves student experience
  - Students get to *know more faculty*
  - Specializes *online vs in-person* experience
- More faculty interaction
  - *Collective ideas of staff* lead to a rich and engaging class
  - *Faculty learn* from, support each other

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Interactive Asynchronous Lectures via PrairieLearn

Jessica A. Krogstad

Materials Science and Engineering

Embedded videos in PrairieLearn as a replacement for iClicker in asynchronous lectures

The Challenge:

Students find it difficult to focus on prerecorded lectures and report this as a less effective route to learning

A Solution:

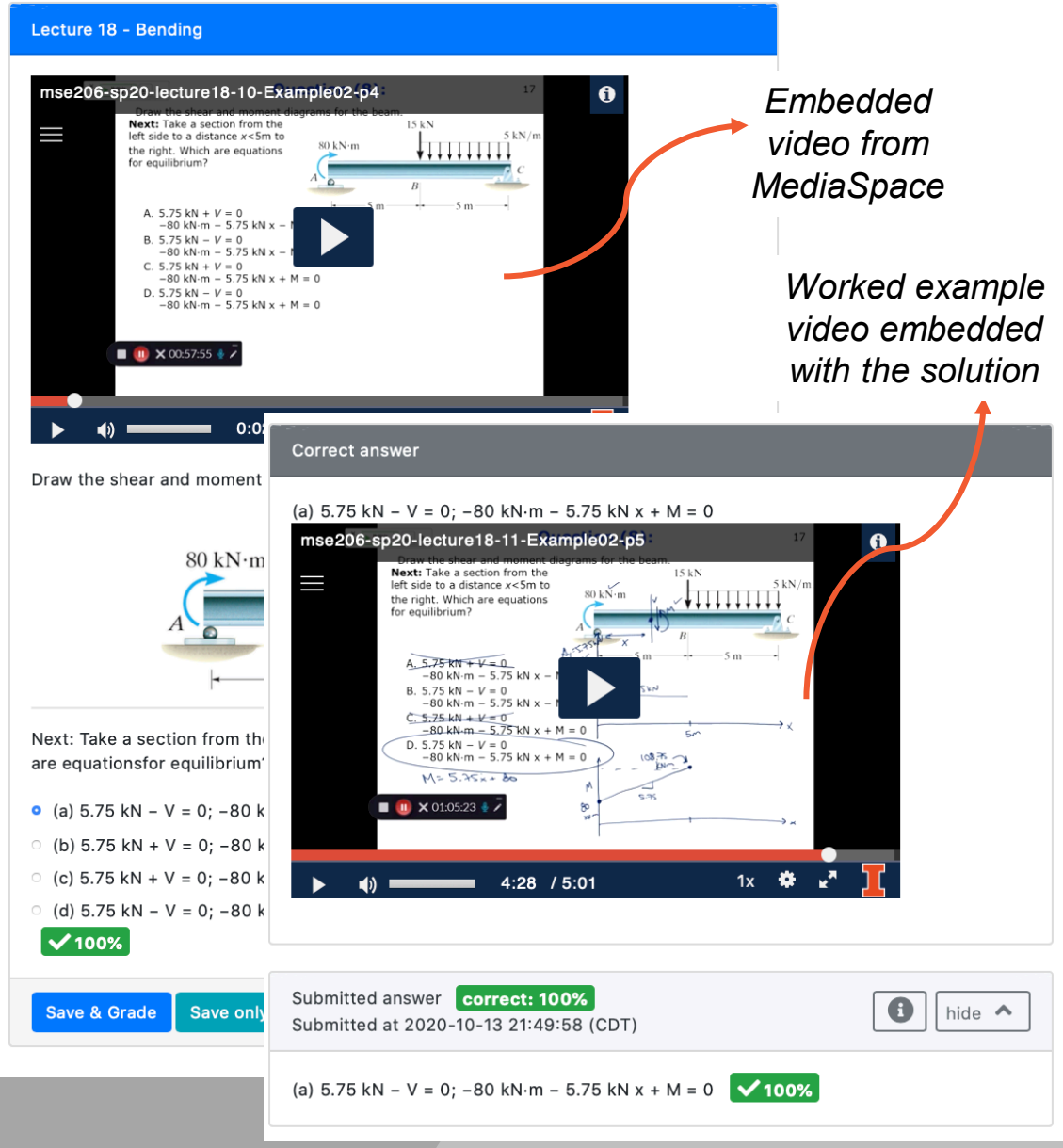
Asynchronous lecture videos can be interrupted by periodic, low-stakes assessments

The Method:

Embedding videos that provide background, set up the problem/question, and eventually provide a solution in the PrairieLearn platform that students are *already familiar with* allows them time to process material and draw attention back to the lecture.

Student feedback:

Students feel in control of the lecture pace and report better notes and perceived understanding



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Remote Labs [and Design Projects]

Blake Everett Johnson
Mechanical Science and Engineering

During Spring Break 2020, I became an actor, director, and film editor.

Labs were filmed and put into Webtools Forms

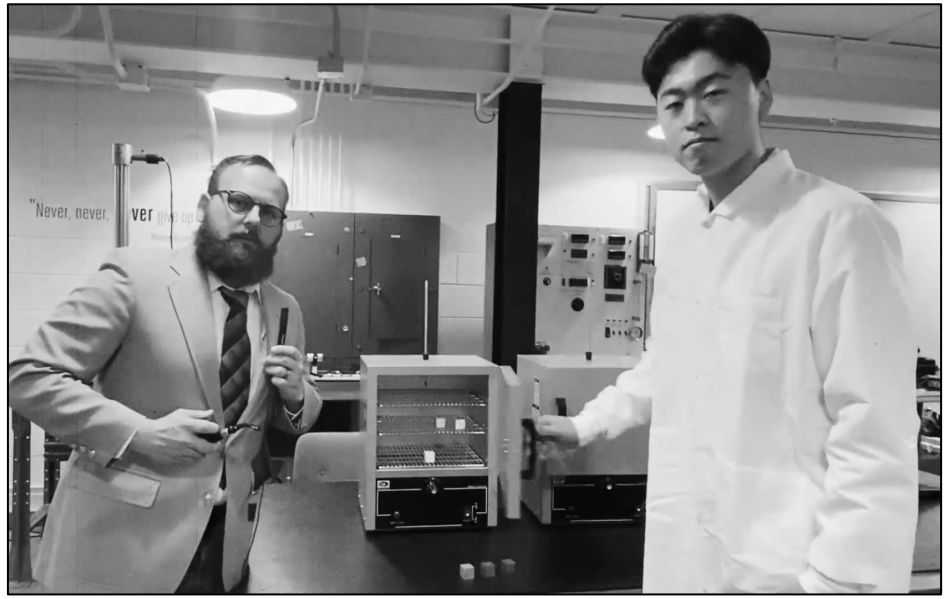
ME 310, ME 320, and TAM 335 laboratories all converted

Each webform has a multi-page format

Page 1: Link to theory lecture video, followed by questions

Page 2: Link to procedures video, followed by questions

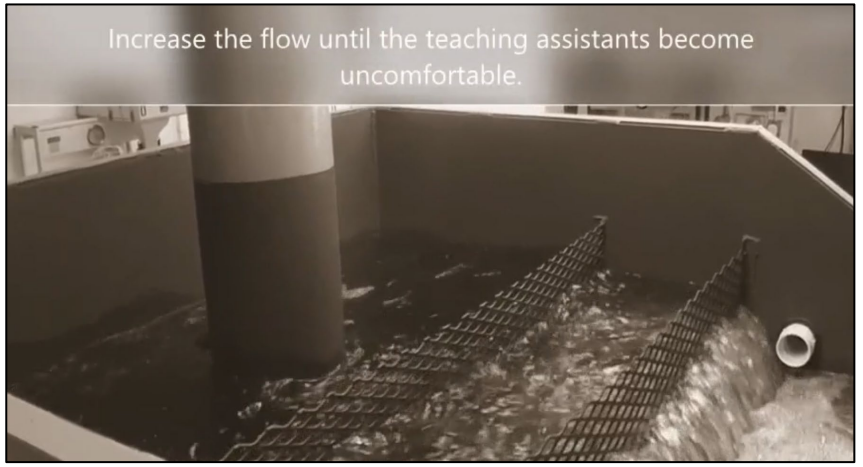
Page 3: Dataset download for analysis and reporting



This semester, we are offering the labs in both online-only and in-person formats.

For ONLINE-ONLY students:

- Lab is offered asynchronously
- Students complete theory and procedures webforms
- Students download data and prepare lab reports
- TAs support the students through Zoom office hours and Piazza



For IN-PERSON students:

- Students complete the theory webforms before lab
- Each 2-hour lab session is split into two 50-minute, socially-distanced cohorts
- Students sanitize and use PPE to take experimental measurements
- TAs coordinate measurements and curate data sets to share with the cohorts
- Any extra time is used to conduct writing-to-think exercises and discussions

Feedback:

- Online students enjoy the webforms, given the circumstances
- In-person students appreciate handling equipment and interacting with people

STUDENT TEAMS WORKING REMOTELY

Amanda Johnston

School of Engineering Education

Supporting student teams remotely

I had little interaction with other students, except for my engineering group. After moving to remote learning, **I felt like I was pretty much on my own.**

During my engineering zoom meetings, each group would split up into their own room, and **gave me a since of stability**. Reminded me of when we had class together."

For classes that required teamwork, **the communication wasn't very effective**

Support student teams remotely

Group students in semester long teams- even if you don't assign team projects	Encourage students to set goals and communicate these to each other	Establish routines for communication
Try break out rooms	Encourage students to use video during calls and get to know each other	Establish virtual co-working times

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Informal student feedback on learning during Fall 2020

Tim Stelzer
Physics

Student Survey Results from Physics 211

Prelectures (15 Minutes) | Asynchronous CheckPoint Questions | Lectures (50 Minutes) | Synchronous | Chat | Polling | Breakout Rooms | Recorded

Students prefer Synchronous Lectures 3:1

Synchronous

Structure
Engagement
Questions

"I like the synchronous method because it allows me to interact with the professor and other students to work on problems. It is also better because it creates structure in my day."

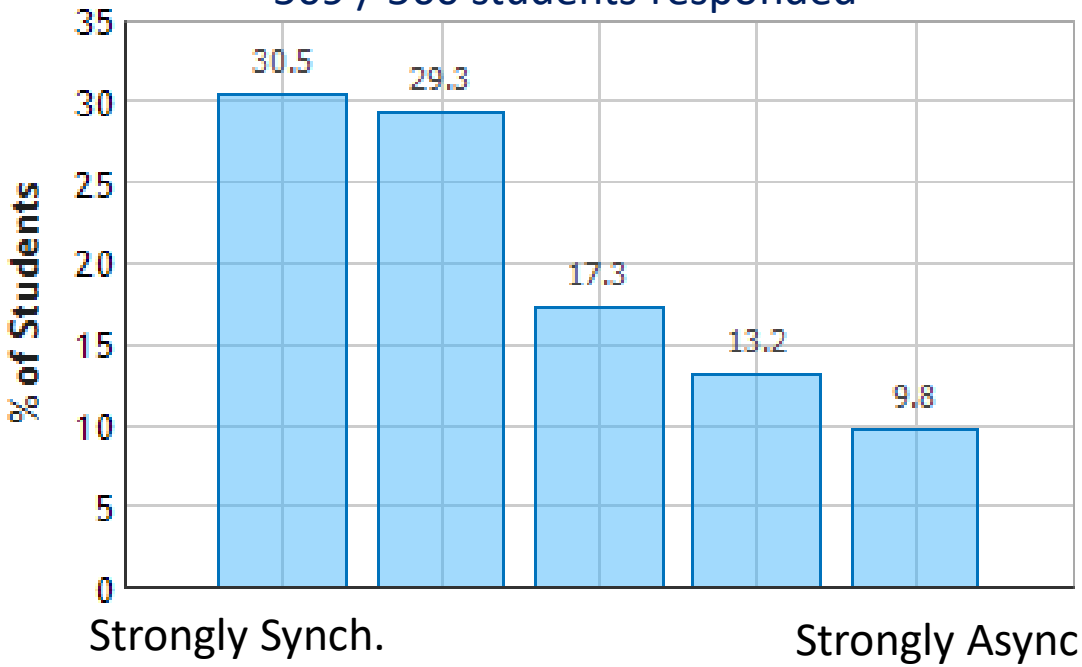
Asynchronous

Flexibility

"It's just easier for me to schedule my time if I can choose when I do each assignment. It allows me to take the necessary breaks and time to complete each assignment well and learn the material. It is also a lot less stressful."

What is your preference of format for online lectures. Synchronous, with everyone meeting at the same time (e.g. Zoom) and the lecture presenting live, or Asynchronous a pre-recorded lecture that you can view anytime?

509 / 560 students responded



Student Survey Results from Physics 211

Prelectures (15 Minutes) | Asynchronous CheckPoint Questions | Lectures (50 Minutes) | Synchronous | Chat | Polling | Breakout Rooms | Recorded

Online is a LOT harder for students to focus/engage
Good Teaching Practices even more important

What works

Questions
Chat Channel
Camera's on
Polling
BreakOut Rooms

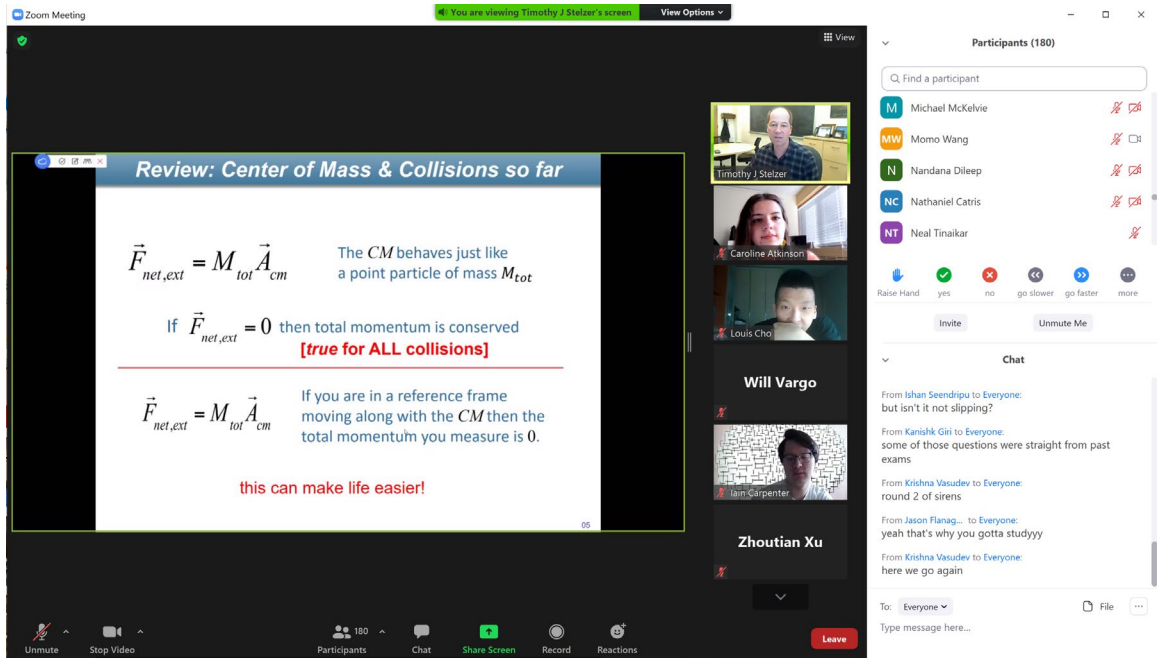
"I think making space to allow students to still ask questions and also allowing students to talk to one another in chat about questions they have similar to what might happen at an actual lecture. I also enjoy using the iclicker."

Common mistakes

Reading slides
Too fast
Running long

"I have had some professors that basically only go over slides for an hour with no change of pace activities or breakout sessions. It gets very hard to focus in lectures and stay engaged when the class is just straight slides for an hour. Also, some professors don't check the chat."

Please use the space below to share your thoughts on the best things professors can do (or avoid) to make online lectures effective (e.g. what should we all be doing). Note, this can be from physics 211 or any of your courses.



Moderator:

John Popovics:

Associate Head and Director of Undergraduate Studies;
Professor, Civil and Environmental Engineering
Education Innovation Fellow (EIF)

Thank you for your participation in today's lightning symposium. Please continue to watch for additional events and programs related to engineering education on the AE3 website: http://ae3.engineering.Illinois.edu

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