Adapting Just-in-Time Teaching for online environments

JET Symposium on Economics Teaching
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Sylvia Kuo
Brown University

Motivation

- Question: How to maintain student engagement in a large (100 person) class in an online/remote environment?
 - Unable to ask questions in real time (back and forth)
 - Reduce incentive to passively ingest material

Considerations:

- 1. Easily implementable
- 2. Low cognitive burden administratively for students
- 3. Easily managed and used by instructor
- 4. Observable payoff to instructor while being low cost

My solution

- Reflective questions at the end of each "lecture" (set of videos), through the LMS
 - What is most important idea?
 - Any questions (or areas of confusion)?
- 2. Questions asked EVERY "lecture" (e.g. Canvas quiz) = 3x a week
- Instructor downloads responses in csv file at the end of the week, scans for any themes, and address issues in live Zoom Q&A "discussion section"

Findings: Exposed unexpected student difficulties and learning gaps, which were used to revising presentation of material "in real time."

Related techniques

- "Minute paper" -- Felder and Brent (2016)
 - At the end of class, in 1-2 minutes, (anonymously) jot down the answers to (1) what was the main point of today's class and (2) what was the muddiest point (or most confusing point or your most pressing question).
 - Instructor collects sheets of paper, reviews responses, and use as springboard for the following class.
- Just-in –Time Teaching Simkins and Maier (2010), (2004)
 - Students submit answers to carefully designed assignment on the LMS prior the class meeting.
 - Include an open-ended question, e.g. "what did you find confusing, interesting or surprising in this reading?"
 - Instructor reviews responses and adjusts in-person class structure based on the student responses.
- My strategy = "online minute paper" or bare-bones just-in-time

Evolution of course structure:

Large upper-level economics course, N = 150 students per semester

Pre-pandemic (pre-2020)	Quick pivot: mid-Spring 2020	Pandemic (Fall 2020, Spring 2021)
In-person lecture, with student Q&A, held MWF	Pre-recorded lecture videos (released with a few days prior)	Pre-recorded lecture videos (broken into smaller pieces) + reflective quiz + DUE DATE "MWF" midnight
Undergrad TA (UTA)-run discussion sections	Instructor-run discussion section on Fridays (live on Zoom, recorded)	Instructor-run discussion section on Fridays (live on Zoom, recorded)
UTA two hour drop-in office hours ("clinic") at the library on Sunday nights	UTA-run online discussion board for asynchronous student questions (i.e. Piazza)	UTA-run online discussion board for asynchronous student questions (i.e. Piazza)

The set up:

- Every lecture set up as a Canvas Quiz ("lecture barometer"); N = 31
 - Series of lecture videos
 - Same set of open-ended questions
 - Q1) Rate effectiveness of videos (scale 1-10)
 - Q2) What was most resonant idea?
 - Q3) Any specific questions or confusing concepts?
 - Q4) Open comment space
- Effort-based grading (0/1) as "participation score"; 10% of final grade
 - Ability to miss 25% of barometers (i.e. 8 of 31) for full credit
- I download responses (3 barometers) as .csv file every Friday morning and review to prepare for live Zoom Q&A.

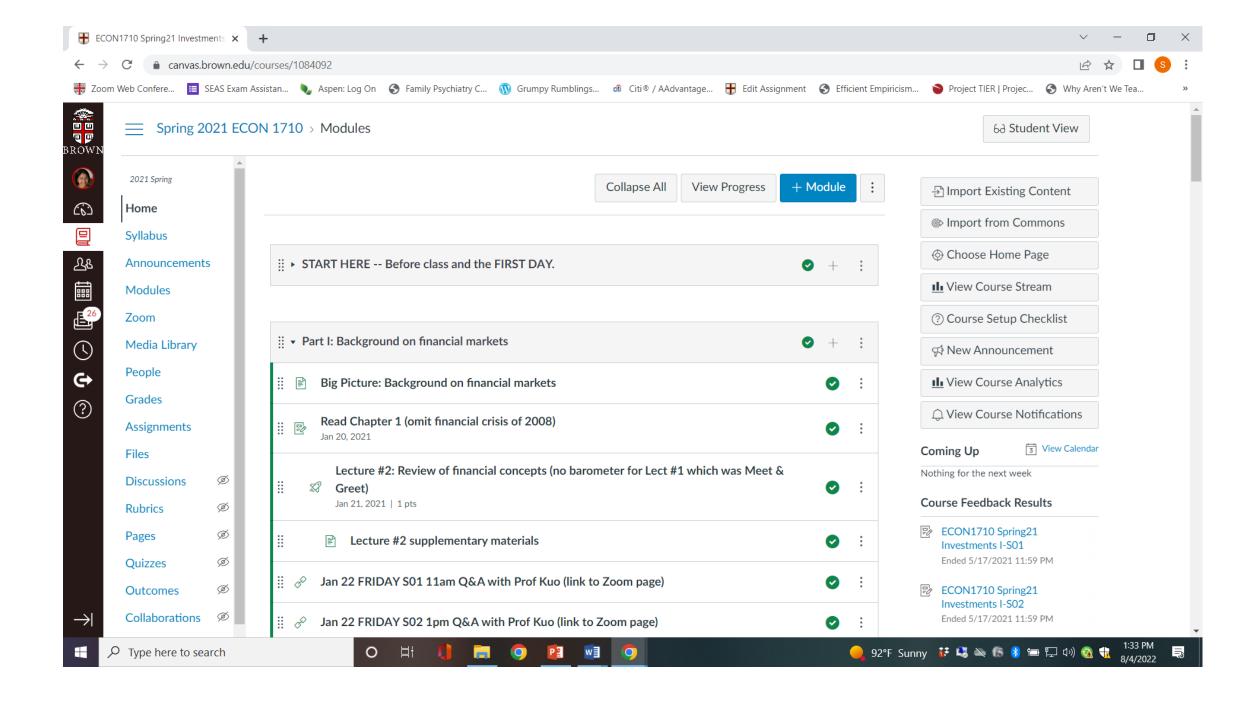
Intent of the quiz-based design

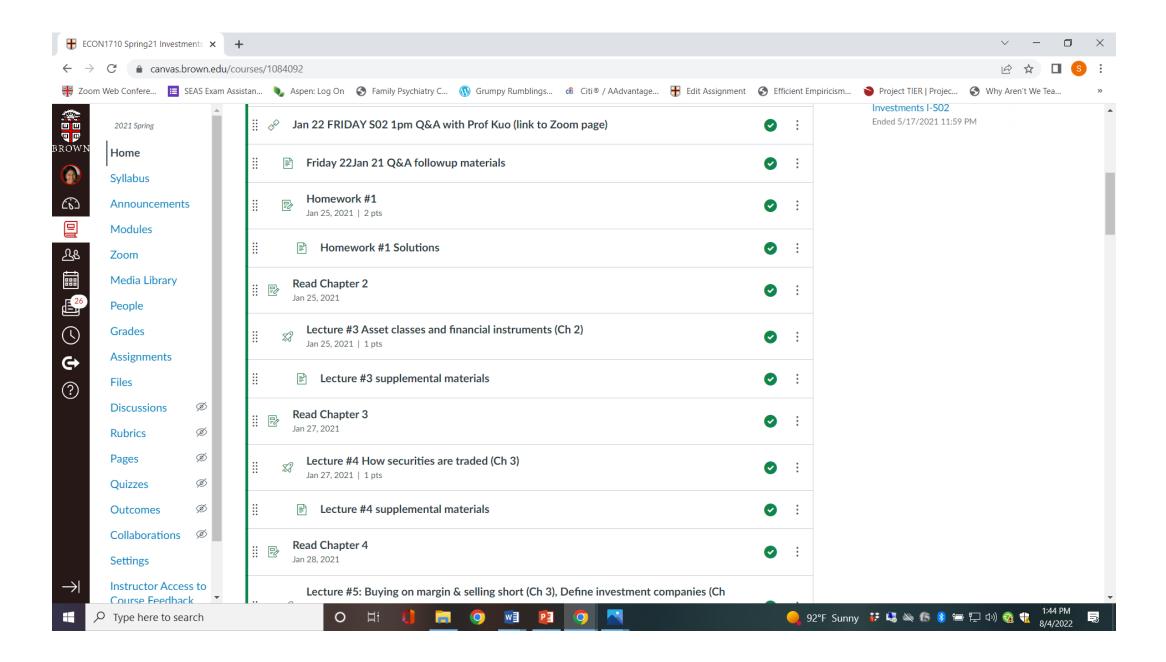
For students

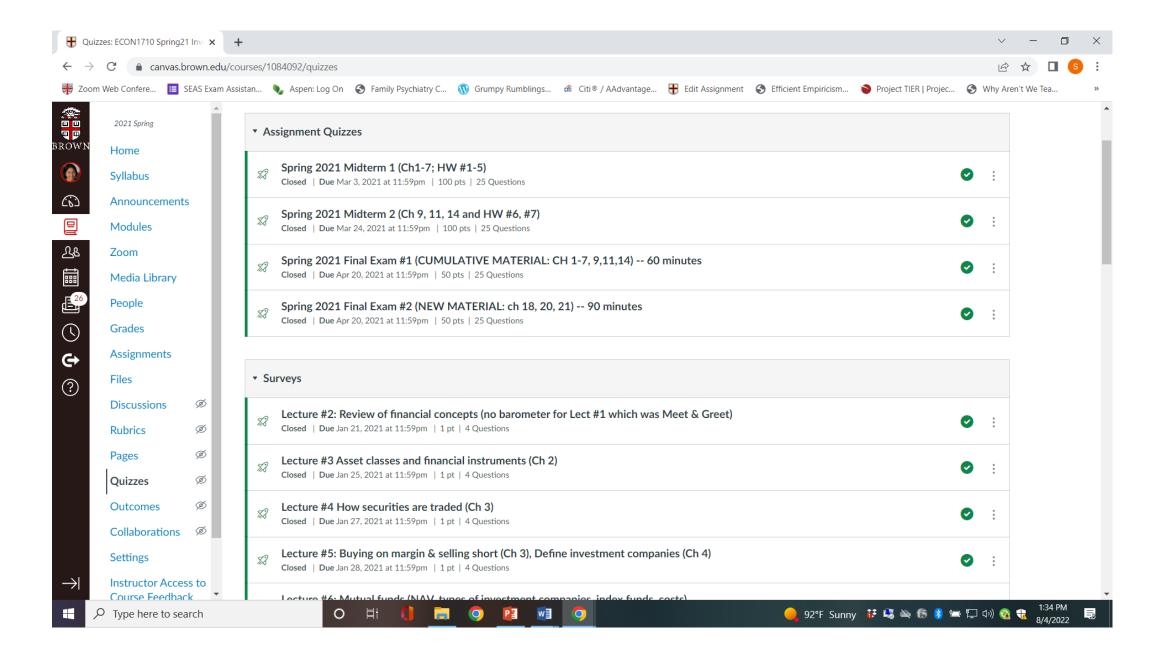
- Pace out the content (discourage cramming) to roughly MWF schedule
- Give framework to actively process lecture content (lower cognitive burden)
- "One click stop" designed with lecture videos embedded in the barometers
- "Easy" 10% of final grade; able to miss 25% of quizzes.
 - Explain intent is not to be burdensome, commitment device to stay on track

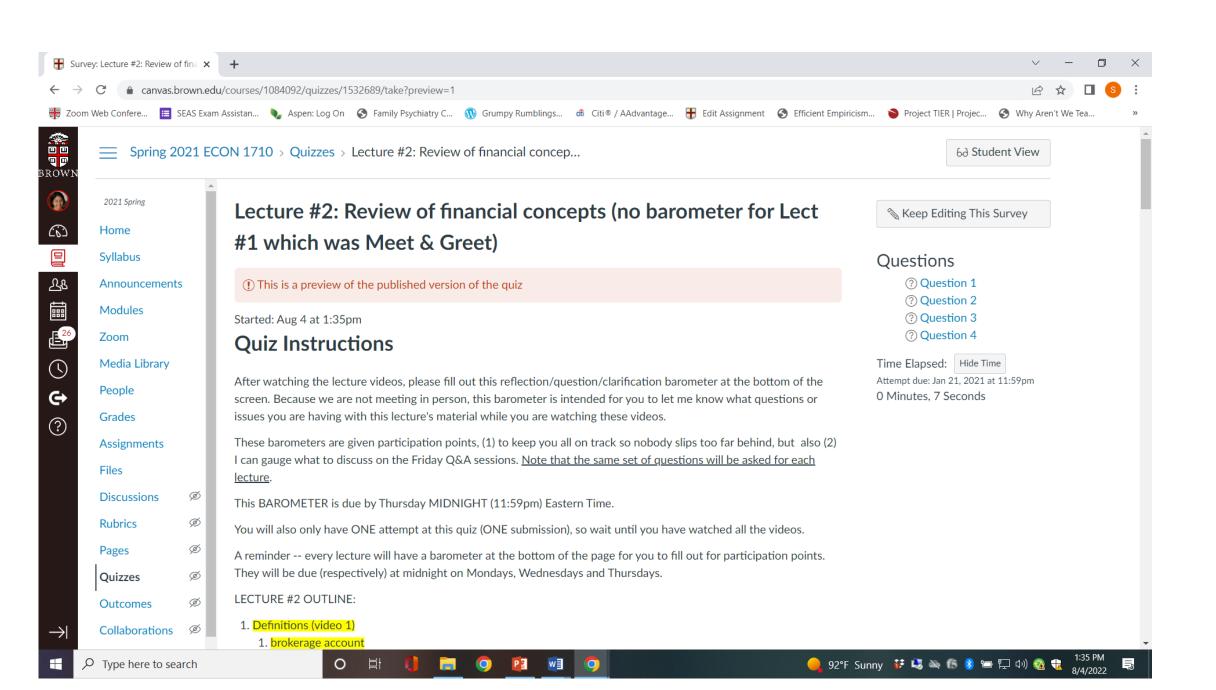
For instructor

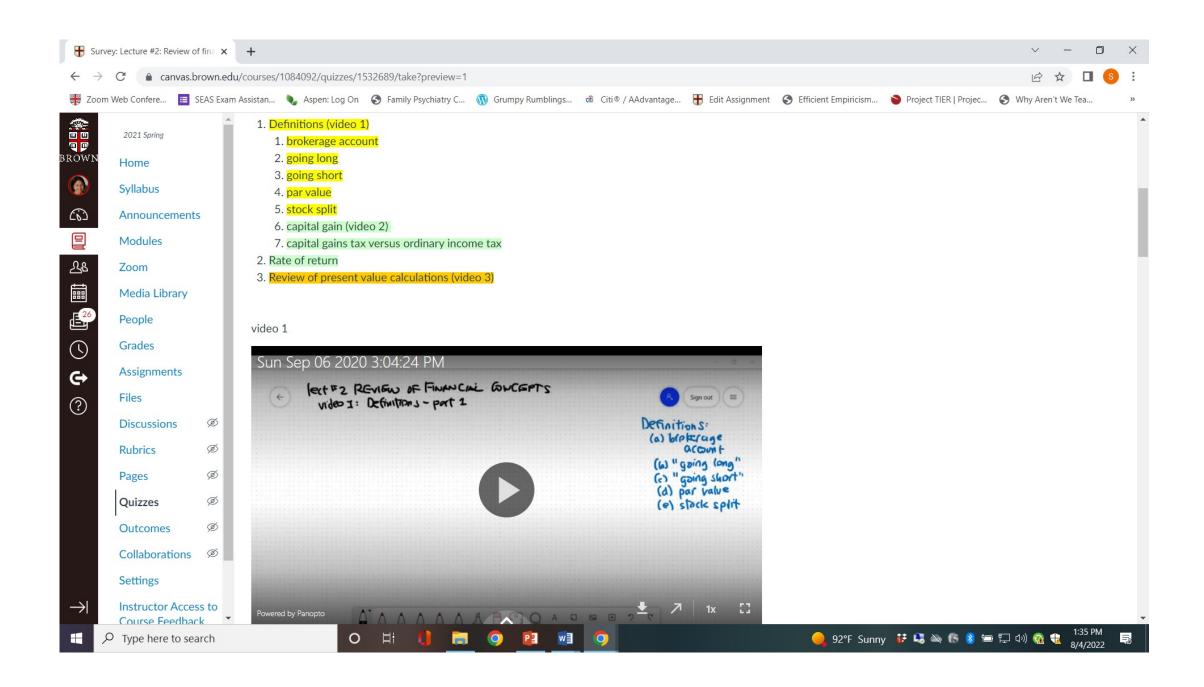
- Provide just-in-time questions on course material to structure Friday discussion section
- Democratize the question-asking from "all" students ("pulse of the class") rather than skewed towards handful of hand-raisers.
- Seed the discussion for students ("Any questions on this week's material?" = silence)

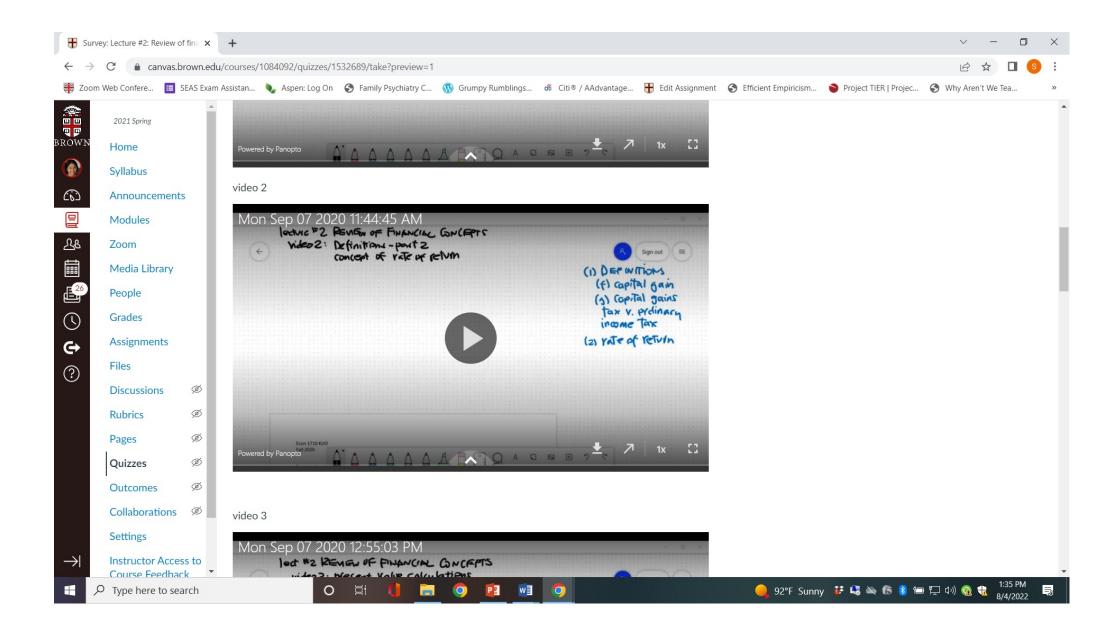


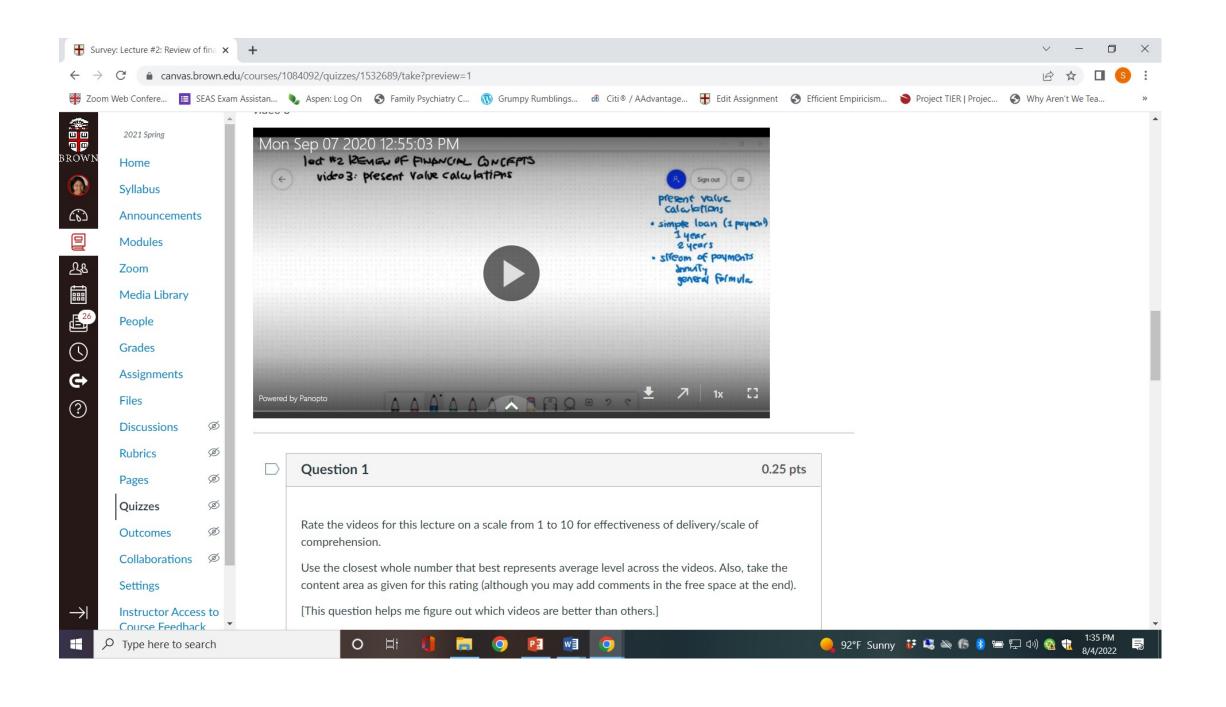


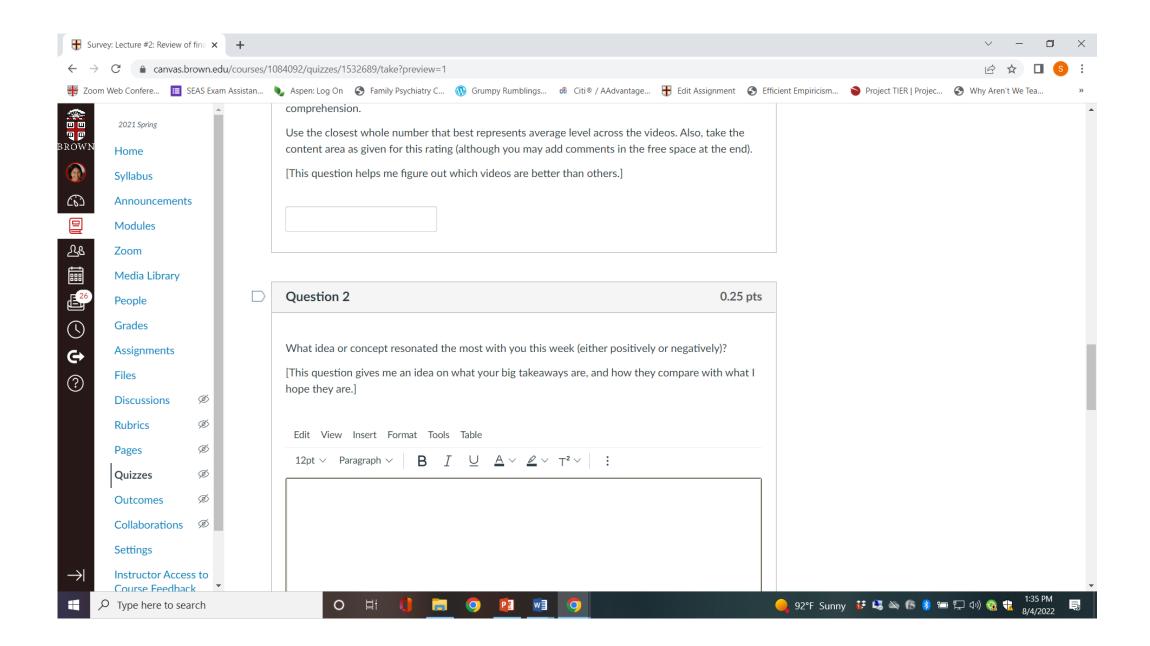


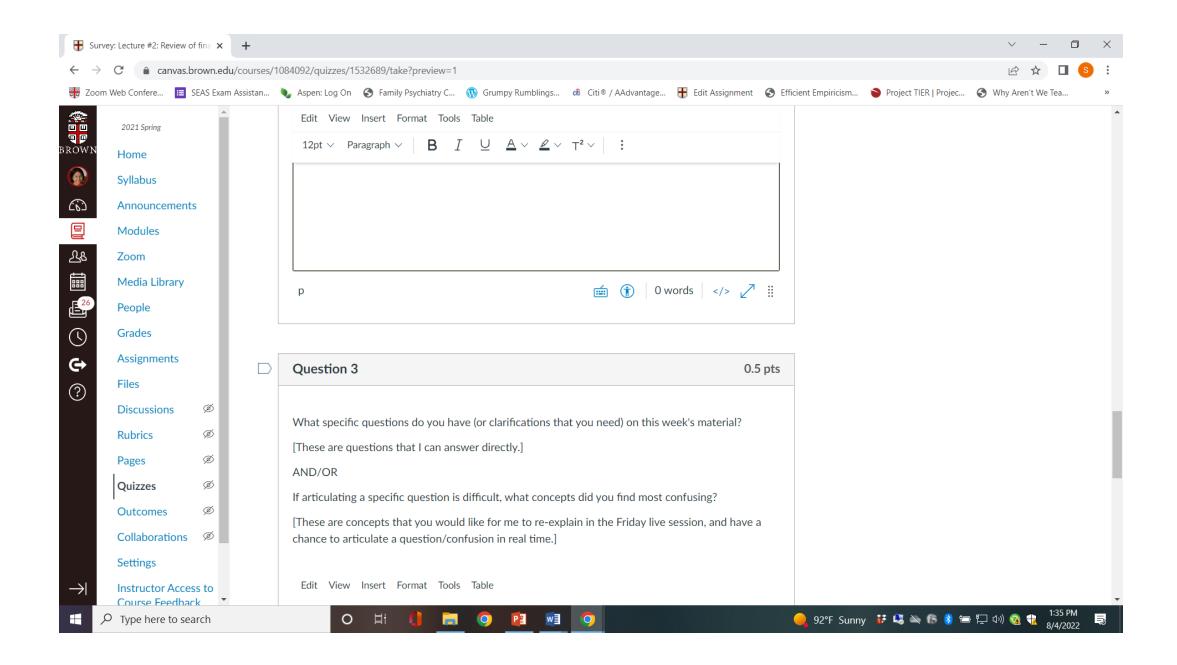


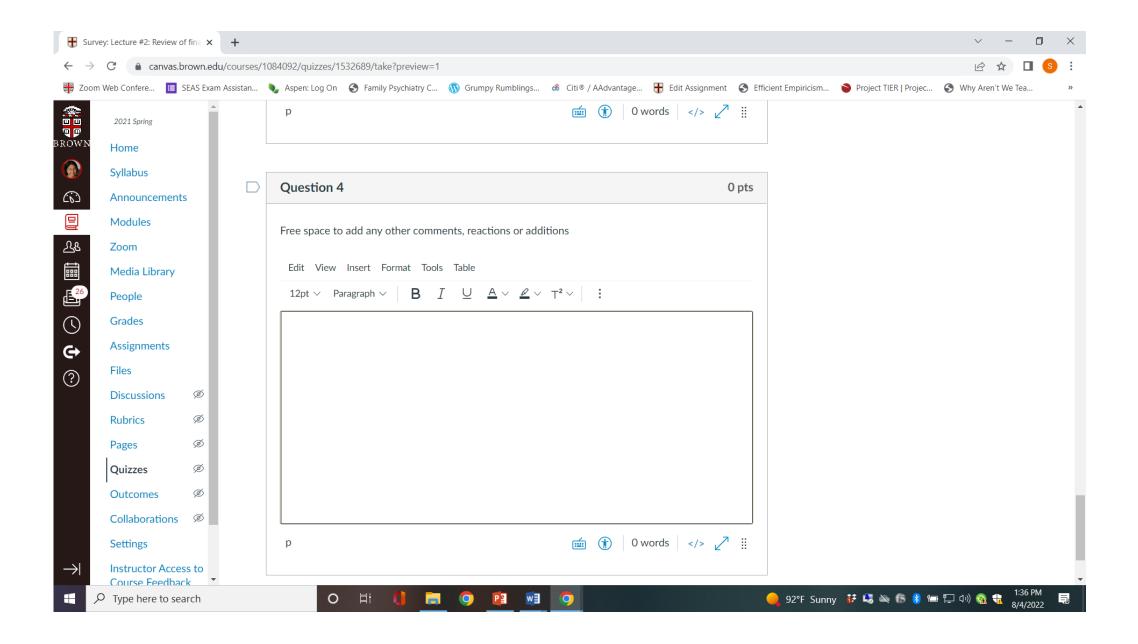












Engagement through student responses

- Democratized question asking
 - Asked across "all" students (not just fast-thinking hand-raisers)
 - Time flexibility (not ask in the few moments after material first presented)
- Students articulated questions in their own words (less passive)

• Better representation of what the class is thinking ("barometer") rather than a select sample.

Findings were humbling...

- Did have typical historical questions on confusing concepts/methods.
- HOWEVER.. uncovered unexpected misunderstandings:
 - 1. Ask "why" for definitions/factual concepts
 - "Why choose X and not Y" when there is no choice.
 - 2. Questions that suggested larger conceptual problems with fundamental ideas.
 - 3. Confusion with a basic concept covered in a prerequisite class
 - 4. Understood individual concept but had difficulty fitting components into larger structure/theme
 - 5. Not understanding what a "model" is
 - 6. Reveal more of student disconnect between what learn in class versus what they do in the real world [came out in live discussions]
- Notice student energy/momentum flagging towards end of the course by the quality of responses.

Lessons to keep in mind for the future:

- How clearly am I defining terms? Is it clear that they are definitions?
- Can I give simple examples to illustrate an idea rather than just a bunch of math with variable names?
- Many students can apply X formula to Y type of problem mechanically but do not understand why they are doing it.
 - Do not retain that knowledge because they have nowhere to "put" it.
 - Not building out their economic intuition (how to think), not reinforcing the branches of the tree or making it fuller.
- Being cognizant that maybe the inarticulate questions are the most precious and represent the greatest opportunity.

Lessons for future

- Caveat: Signals could be imprecise students could have just written down a throw-away question containing "buzz terms" in order to fill in the textbox for credit.
- Easily implementable low-cost strategy to elicit active engagement and expose learning gaps that better represent the entire body of students.
- Adaptations to an in-person world:
 - Could implement weekly through LMS
 - Could use to identify struggling students very early on (match responses to student identity through LMS)

Appendix: Lecture "barometer" (quiz) text:

Q1) Rate the videos for lecture #4 (how assets are traded - Ch 3) on a scale from 1 to 10 for effectiveness of delivery/scale of comprehension.

Use the closest whole number that best represents average level across the videos. Also, take the content area as given for this rating (although you may add comments in the free space at the end). [This question helps me figure out which videos are better than others.]

Q2) What idea or concept resonated the most with you this week (either positively or negatively)?

[This question gives me an idea on what your big takeaways are, and how they compare with what I hope they are.]

Appendix: Lecture "barometer" part 2

Q3) What specific questions do you have (or clarifications that you need) on this week's material? [These are questions that I can answer directly.]

AND/OR

If articulating a specific question is difficult, what concepts did you find most confusing?

[These are concepts that you would like for me to re-explain in the Friday live session, and have a chance to articulate a question/confusion in real time.]

Q4) Free space to add any other comments, reactions or additions.