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FALL 2020 POST-CONVERSION REPORT FOR REMOTE PHYSICS 132

Purpose

A report originally written as part of the "Workload Adjustment for Online Course Development" reflecting on the efforts made to convert the course to fully online. Includes: a self-assessment of what worked well in the course design and delivery as well as what I would improve in the future.

Summary of Efforts

The driving forces of the conversion of the lecture portion of Physics 132 to an online course were flexibility and community. Development of a valuable laboratory experience that was doable remotely was an additional challenge.

Flexibility

The variety of home situations, many non-ideal, coupled with the scores of pandemic front-line workers among my students required the course to have a lot of flexibility built into it. Students could attend sessions either synchronously via Zoom, or watch the recordings of the sessions later at their convenience. One-question quizzes associated with nearly every class session served two important functions: they helped ensure student preparation and provided an extrinsic motivator to stay caught up with the material. As one student said in the Forward FOCUS survey at the end of the semester, "The quizzes every class to keep the information organized and know what we are doing / when. It was a factor that helped me stay on top of the information being taught." These quizzes were given both during the synchronous sessions via Zoom poll and asynchronously via Moodle. The asynchronous version was open for one week. Even the three exams were made as flexible as possible. For each exam, students were offered a window of at least 12 hours to begin it. During that time, I was available on Zoom for around 10 hours for questions. To enhance equity, all exams were open book/notes, and all students were given double time to complete the exam.

Community

Establishing the sense of community known to be beneficial to student success is intrinsically difficult in a 300+ person course. Online/remote, the challenges are amplified. I tried to begin establishing

community right from the beginning of the semester with a H5P interactive syllabus (http://openbooks.library.umass.edu/toggerson-132/back-matter/fall-2020-syllabus/) which presented much of the information in text and video format. In addition to providing multiple modes of engagement with the content in line with Universal Design for Learning Principles[1], video can help humanize me as an instructor before the course even begins. I also began my syllabus with opening remarks acknowledging my students' feelings and anxieties with regards to remote learning as well as the societal impacts of the pandemic more broadly. I extended this principle of empathy throughout the semester, encouraging students to tell me of the stressors in their lives through various methods, both identifiable and anonymous. In general, I feel these efforts were successful. As one student commented, "you really were a wonderful online professor, and you always expressed (to me at least) a sense of understanding which was really valuable to me during this time of stress."

Beyond the syllabus, I also used teams to try and create a sense of community. While teams are an integral part of my Team Based Learning pedagogy[2], I felt they were even more important during this remote semester. Teams were organized to be as diverse as possible while ensuring that students from under-represented groups were not solo. Research shows that such groups are the highest performing[3]. Beyond my usual structures, I added questions to the CATME team-formation algorithm[4] regarding time-zones, out-of-class schedules, and intent to take the course synchronously vs. asynchronously. I also created a "team contract" assignment in Moodle, based on work by Nawaz[5], to facilitate teams setting their norms and expectations for the semester. Several students mentioned in the Forward FOCUS survey that they found the teams helpful in connecting to the course: "I absolutely loved my group this semester… I made such great connections with the other members. Our group worked really well together. We got the work done and even had time to laugh and get to know one another."

To facilitate out-of-class communication, I created a Slack workspace. I chose Slack as it is a tool that students are likely to see in the professional realm and I therefore saw benefit in exposing them to it. In line with recommendations from Slack, I created a #random channel for the sharing of information unrelated to the course. For example, I posted information and discussion about the Nobel Prize awardees. A few students also contributed with interesting questions tangentially connected to the material or even just funny memes.

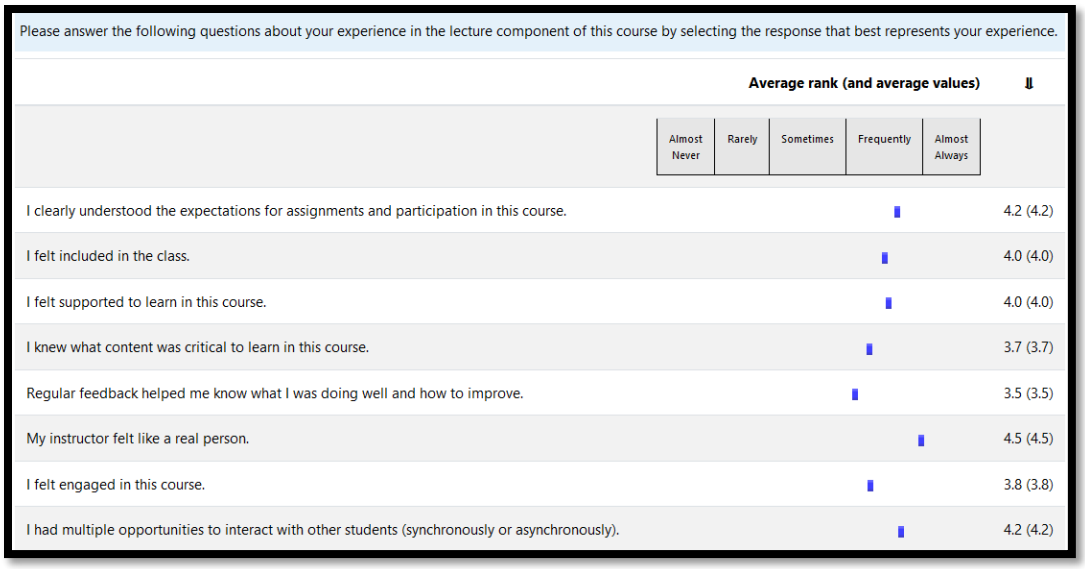
Lab

Constructing a genuine and valuable lab experience that could be done remotely was perhaps the biggest adjustment for the course. To help keep student costs down, particularly in this time where many students are facing additional financial stress, I wanted the labs to use materials that students already had access to at home. Aidan Philbin, and undergraduate physics major interested in education, and I built upon the work done by Paul Bourgeois and David Nguyen to create a lab manual: *Understanding Data* (http://openbooks.library.umass.edu/p132-lab-manual/). This series of five labs explored data analysis techniques and experimental design while teaching valuable spreadsheet skills that students will use in the workforce.

What Worked Well

Lecture

The lecture portion of the course I think went quite well overall. These perceptions are supported by some of the Forward FOCUS results which show that students felt like I was a real person, felt supported to learn, and found the lectures to be the most valuable component of the course.



Please answer the following questions about your experience in the lecture component of this course by selecting the response that best represents your experience.

	Average rank (and average values)
	Almost Never / Rarely / Sometimes / Frequently / Almost Always
I clearly understood the expectations for assignments and participation in this course.	4.2 (4.2)
I felt included in the class.	4.0 (4.0)
I felt supported to learn in this course.	4.0 (4.0)
I knew what content was critical to learn in this course.	3.7 (3.7)
Regular feedback helped me know what I was doing well and how to improve.	3.5 (3.5)
My instructor felt like a real person.	4.5 (4.5)
I felt engaged in this course.	3.8 (3.8)
I had multiple opportunities to interact with other students (synchronously or asynchronously).	4.2 (4.2)

Questions

One interesting observation is that I believe I received more questions during lecture than usual. Perhaps the anonymity of the Chat in Zoom encourages some students to ask questions who may not feel comfortable speaking up in a 300-person lecture hall. I would like to find some way to facilitate such participation when I return to face-to-face instruction so as to make my class more inclusive.

Teams

Several students mentioned in the Forward FOCUS survey that they found the teams helpful in connecting to the course: “I absolutely loved my group this semester… I made such great connections with the other members. Our group worked really well together. We got the work done and even had time to laugh and get to know one another."

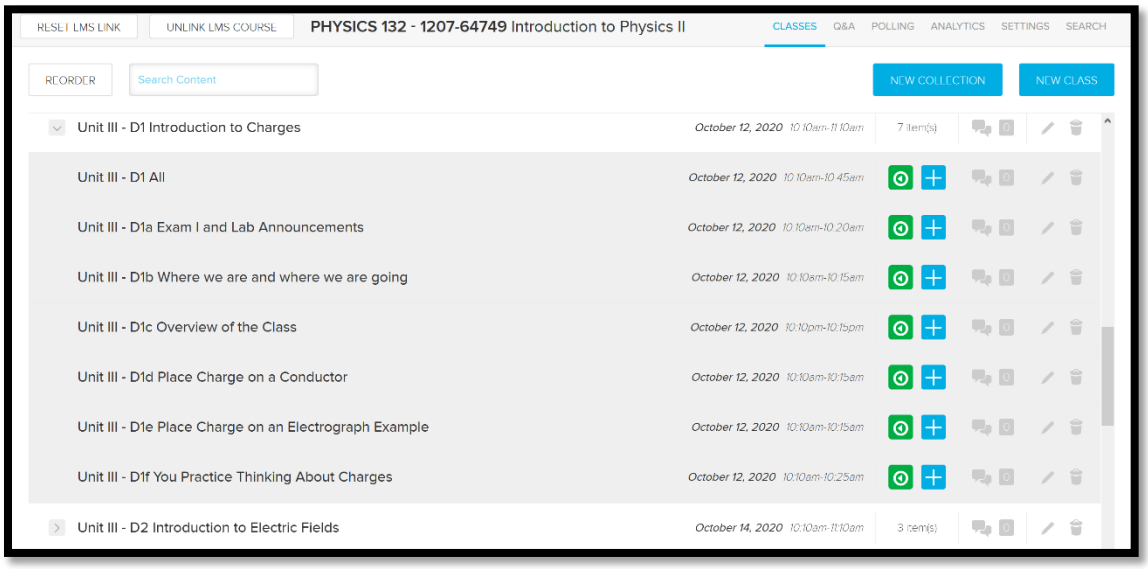
Challenges to Fix in the Future

Video Editing

One aspect of remote instruction which was more time consuming than I had anticipated, was the chunking of the synchronous sessions’ video recordings. My course sessions are centered around problem solving: I will typically do an example and then give students time to work similar problems on their own or collaboratively. While students are working, my TAs and I are moving around Zoom breakout rooms helping students progress. I do not want to include these interactions in the recordings as I suspect it will make students nervous of being wrong and therefore less likely to engage in the

process. The time students are working is thus not particularly useful to the recording as it is a silent blank screen. Furthermore, I want the recordings themselves to encourage the viewer to pause the recording and try to solve the problem out before proceeding. Finally, in line with what is considered best practice, I want my videos to be on the order of 10 minutes or less. Such chunking allows students to easily divide up the content to fit into complex schedules.

The solution is to edit the videos into chunks based on topic and remove the "thinking/working time" that I provide during the synchronous sessions. When the "thinking/working" time is removed, I add a title card to the video encouraging the viewer to, "PAUSE HERE: Try to solve it on your own before moving forward." The result is that a single 50-minute synchronous session may be divided into two-to-five sessions of five-to-fifteen minutes each with a total time of around 25-minutes. These mini-videos are then uploaded to Echo360 as a "Collection" containing both the individual segments and one uninterrupted video as visible in the screenshot below. Again, the goal is flexibility. Based upon a Midterm Assessment (MAP), some students prefer to watch the session as a continuous unit, while others really prefer the divided nature.



All this editing was extensively time consuming, particularly removing the "thinking/working time" and then rendering all the videos associated with each class. My goal was to get the videos out within 24 hours of the synchronous session. This goal was very difficult to meet as I was also trying to write lecture and lab materials. Getting the videos out for the Friday sessions was particularly challenging as I taught a graduate seminar on Friday afternoons.

Online/Asynchronous Community

The Slack workspace was not as active as I would have liked. There were a few students who engaged, but they were the same few people over-and-over. Even their participation fell off over the course of the semester. I am contrasting the Slack activity to prior semesters where I have had a comparatively active Piazza forum. I am not sure exactly why the community was so quiet. In the Forward FOCUS, I asked my students their perceptions. I explicitly stated that I did not want to make posting to Slack part of their grade as, in my experience, students are then encouraged to just post-for-points. A few common threads were:

- “Looking foolish in front of the entire class”
- “One more platform to check”
- “Too many channels”
- “No incentive”

The “looking foolish” concern, I think, is a significant difference between Slack and Piazza. In the Piazza platform, the default is to be anonymous. The tutorial I made for Slack, however, encourages using one’s real name. Adding to the tutorial video explicit permission to use pseudonyms, as well as more detailed instructions for renaming oneself, would, perhaps, increase participation.

Reducing the number of Slack channels may also help. My Fall 2020 Slack workspace had 14 channels: one for each unit and exam, as well as others such as #random. In contrast, the Discord server the students setup for themselves had only three. Following my students’ lead and reducing the number of channels, and therefore the number of possible places to post, may increase participation by reducing confusion. In the spring 2021 semester, I therefore plan to just have #lecture, #lab, and #random.

As for the issue of platform-fatigue, I am not sure how to get around this. Some students suggested a Moodle forum. I have not had great success with Moodle forums in the past, but that was before all my students’ courses had extensive use of technological tools. As one student put it, “We are on Moodle all day, one more platform to check is just too much.” I need to think about what is the best option going forward. I am looking into the possibility of putting Slack within Moodle as an html <iframe>. Such a setup would maximize flexibility: students could access Slack via Moodle, or download the app to their personal devices.

Lab

Given that this semester represented a first attempt for this lab, there were the usual challenges involving the clarity of directions etc. There were also technical challenges associated with hosting the labs in Moodle and providing multiple attempts at questions. However, the biggest challenge involved getting students to engage with the lab early and get help from their TAs. In line with the goal of flexibility, I designed the labs so that students could do them asynchronously on their own. However, they were also designed to take about four hours in the company of a TA. The problem arose that few students actually attended their synchronous lab sessions. In addition to compounding the expected clarity issues, failing to work with their TAs resulted in the labs taking an excessively long time for students. I am considering ways to encourage students to attend lab while still acknowledging the need for flexibility.

Another challenge with the lab is cultural. Given the focus on experimental design, I expect the data from students’ first attempts to not be very good. In fact, I specifically design procedure outlines (students are expected to fill in the details), that will have large statistical or systematic uncertainties. I want them to critically think about their procedures and devise ways to refine them. However, their prior lab experiences have taught them that poor quality data on the first attempt will lead to a poor grade. Overcoming this fear is a challenge for the future as well.

References

[1] Kelsey Hall and Marisha Marks, "Perspectives on Universal Design for Learning in Higher Education: On Campus and Online Learners," *Closing the Gap*, May 2018.

[2] Larry K. Michaelsen, Arletta Bauman Knight, and L. Dee Fink, *Team Based Learning: A Transformative Use of Small Groups in College Teaching* (Sterling, VA: Stylus, 2004).

[3] David Rock, Heidi Grant Halvorson, and Jacqui Grey, "Diverse Teams Feel Less Comfortable — and That's Why They Perform Better," Harvard Business Review, September 22, 2016, https://hbr.org/2016/09/diverse-teams-feel-less-comfortable-and-thats-why-they-perform-better.

[4] Richard A. Layton et al., "Design and Validation of a Web-Based System for Assigning Members to Teams Using Instructor-Specified Criteria," *Advances in Engineering Education* 2, no. 1 (2010), https://eric.ed.gov/?id=EJ1076132.

[5] Sabina Nawaz, "How to Create Executive Team Norms — and Make Them Stick," *Harvard Business Review*, January 15, 2018, https://hbr.org/2018/01/how-to-create-executive-team-norms-and-make-them-stick.