

Fostering Student Engagement and Effective Online Learning During the COVID-19 Pandemic

In March 2020 universities across the world converted to online instruction due to the COVID-19 pandemic, requiring professors to quickly implement virtual content delivery with enough flexibility for students to cope with challenges caused by COVID-19. Every aspect of a course was reimagined: content delivery, assessment techniques, grading methods, and even office hours. Below I share my experiences developing successful online content delivery for two upper level Chemical Engineering courses. Based on student feedback, there were three keys to effective online instruction: 1) combining engaging asynchronous lectures with synchronous opportunities for interaction, 2) using low stakes assessments to incentivize students to keep up with the material and gauge understanding, and 3) clear organization and communication of expectations and online content.

Figure 1 shows how I combined asynchronous and synchronous learning opportunities in a typical week. Students are given five days to view asynchronous content, after which they must complete a low-stakes, auto-graded quiz focused on key lecture concepts. Students shared that the quizzes incentivized lecture viewing and provided formative feedback, and the quizzes also allowed me to pinpoint common misunderstandings.^[1]

I used a digital stylus to record lectures for Heat and Mass Transfer, mimicking “chalk talk” that maintained a reasonable pace and encouraged students to take notes, while I found PowerPoint slides were more appropriate for my Biopharmaceutical Process Development course. I ensured that recorded lectures were shorter than a typical class period, since in-person classes include time for questions and discussion. I aimed to provide a combination of recorded content and synchronous meetings that approximated typical weekly contact hours, preventing content overload. I mimicked typical classroom interactions as I recorded; I often asked questions, encouraging students to pause the video and think about the answer, and threw in the occasional joke, which many students loved and said kept them engaged. Online discussion boards, focused on weekly content, proved to be a useful tool since they enabled all students to view questions and responses.

Synchronous class meetings were used to summarize key points, address questions, do additional “active learning” examples or concept questions, and discuss current literature. I used features such as Zoom breakout rooms to split students into smaller groups for active learning exercises, enabling both whole class and small group discussions. Several students commented that the synchronous sessions helped them stay engaged and connected, especially during the isolation of the pandemic. Synchronous sessions were recorded (except for small group work) and posted for students who were unable to attend. Homework was submitted online at the end of each week once students had multiple opportunities to get help via discussion boards and virtual office hours.

Organization and communication are critical to the success of an online course.^[2] I made sure to clearly explain both the plan for and pedagogical rationale behind the content delivery strategy. I used a master table to organize links to weekly content (homework, lectures, quizzes, discussion boards, etc.), posted material on time, and sent reminders about assignment due dates. I sought student feedback and found that making small changes to when items were posted/due or what was covered during synchronous sessions made a big impact. Finally, I found that flexibility and empathy go a long way towards creating a supportive online environment where students feel empowered to succeed during these challenging times.

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Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
Weekly lectures posted	Students view lectures asynchronously				Lecture quiz due		Homework due
Weekly Homework assigned	Students post questions to discussion boards				Synchronous class session		
Lecture quiz assigned				Professor/ TA responds to discussion board questions			
				Virtual office hours			

Figure 1. Typical weekly schedule. Black boxes indicate asynchronous activities, grey boxes represent asynchronous but interactive activities, and white boxes denote synchronous interactions.

REFERENCES

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