

Brewing Up Solutions in the Outer Limits of Distance Education

by Amy Leonard

How do you cut into a cadaver online? Can you titrate via Zoom? What organic chemicals are safe to send in a kit to students? These are questions instructors in the sciences had to grapple with as labs were hastily put online in the wake of COVID-19. It is fair to say outside of COVID-19 some classes translate easier than others into an online format. An easy way to break this down is into three categories: The classes that adapt easily to online delivery, e.g. English, political science, history; the classes that are challenging but doable online, e.g. math, environmental science, chemistry lecture classes; and the classes like biology labs, chemistry labs, dental, and nursing classes that would never go online but for a pandemic. As instructors in the sciences, allied health, and other disciplines that were never thought of as ideal for online instruction, faculty are taking stock of what worked, looking at how to improve, and keeping an eye on what curriculum changes need to happen in the future.

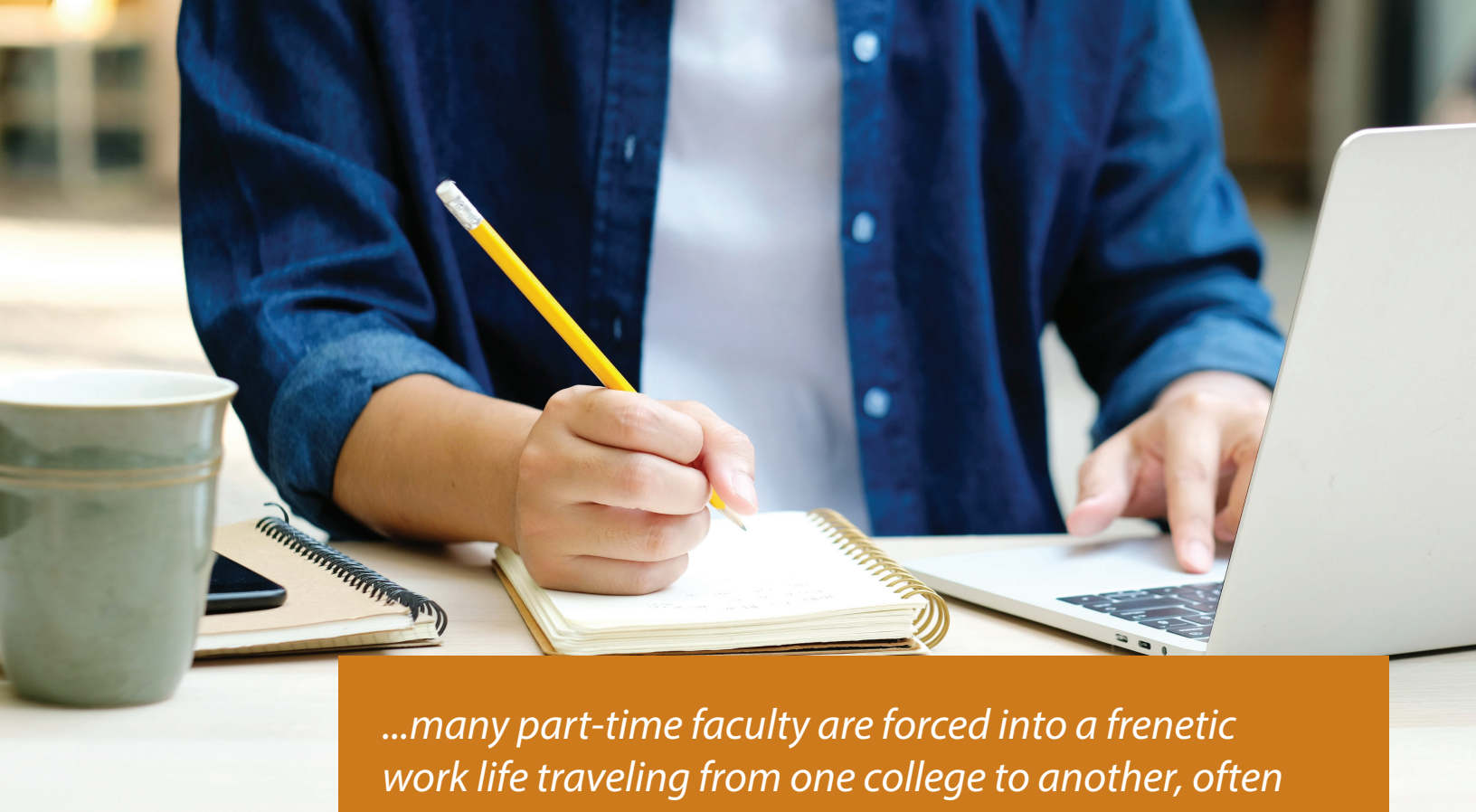
The Challenges:

De Anza College chemistry instructor Chris Deming says, “Many students during the summer quarter seemed a bit traumatized following their experience in the spring quarter. After the lecture, I would stay on for about 30 minutes to help with any issues. This made the class feel more face-to-face and allowed me to better know my students. I also found many students had poor internet/working conditions, so providing sympathy helped tremendously.” What Deming is describing is an instructor’s ability to help students overcome institutional barriers created by synchronous learning. When instructors like Deming take extra time to meet with students and help them, success is possible.

Likewise, Ram Subramaniam, Ph.D., Dean of STEM at Foothill College, summarized the spring experience in STEM: “Labs online were certainly challenging, especially in microbiology and organic chemistry, which are highly technique based. The simulation software that we were using in the spring for many of the chemistry labs was only moderately effective.” Some programs are designed to be in-person and it’s difficult to translate them to a fully remote delivery.

While curriculum forms do have a section designed for equipment needs, nobody could have imagined that all sections would be forced to go remote. The justification on various materials may become more important in the future as we decide on cheaper alternatives to a chemistry lab.





...many part-time faculty are forced into a frenetic work life traveling from one college to another, often hundreds of miles each week, leaving minimal time and energy for consultation with students, which is critical to their success.

The Successes:

From a biology perspective, Jeff Schinske from Foothill College reported, “For my own courses (Anatomy and Physiology) we were able to adapt to virtual labs okay. We’re using a virtual cadaver phone/tablet app that allows for virtual dissections. It’s a decent app, but the experience is certainly not exactly the same as hands-on dissections.” While the idea of virtual cadavers might seem strange, the textbook companies and science-based learning sites have stepped in with some cutting-edge products that can meet faculty needs.

De Anza College chemistry instructor Chris Deming also found success in online labs, “I found huge success using a free simulated lab program called ChemCollective. Most in chemistry described and demonstrated which lab would have been done, then

gave the data for calculations. In ChemCollective, it is literally a virtual chem lab, so I had students do their own ‘experiments’ to collect data. Although this was simulated, I had 82 percent of students (I took a poll) say they ‘really liked’ or ‘liked’ using this simulation. I had many students say how even a simulated experiment that they did was better than provided data.” What Deming is hitting on is something that faculty will need to be mindful of in the future, which is collecting their data from students and being able to show why they are making certain decisions. Online instruction offers faculty incredible tools for surveying and focus grouping students to demonstrate a need for funding or curricular changes.

These types of successes with online content were also the case at Foothill College’s chemistry department where Richard Daley said that even after the COVID-19 pandemic, a portion of the online labs will

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probably remain to be a component of labs because students reported, “Really enjoying the freedom to not be on campus nine hours a week to take a chemistry class.” Daley also suggested that COVID-19’s one main positive is that it “forced all the instructors to use Canvas and now that content will likely remain a part of our classes for the future.”

Essentially, Daley is suggesting that COVID-19 allowed faculty the opportunity to move into their campus’s LMS systems, potentially changing the way faculty teach in the long term.

Improvements for Fall:

Laura A. Hyatt, Ph.D., Dean, Science and Math Division, West Valley College, explains that “After some fits and starts, we’re offering our whole science and math curriculum online. Faculty are using the gamut of opportunities, ranging from filming themselves doing labs and sharing data for students to analyze, to plugging in Labster units, to preparing kits for students to use at home in BIOL, GEOL, and PHYSICS. Prepackaged kits seem to be nonstarters—way too expensive. Homegrown kits are also costing more than was budgeted; hopefully, some CARES money will be able to offset.”

Kits were also the priority for Ram Subramaniam, Ph.D., Dean of STEM at Foothill College, “For fall, we are sending students lab kits for some of the classes, and they will hopefully be a better experience than what we were able to provide in the spring.” The hope is, at least for general chemistry and non-microbiology classes, you can provide an experience that will be close enough to in-person to create a meaningful experience for students.

Biggest Concerns Going Forward:

Jeff Schinske asserts, “My biggest concern is about articulation. The CSUs guaranteed they would accept virtual labs, so that gives some comfort to our biology majors and non-major courses. But our anatomy and physiology students are mostly not going to CSUs or UCs. They end up at a huge range of nursing schools, allied health schools, and other professional programs across the state and country. In normal times, those programs can be quite strict about only accepting in-person labs for their prerequisites, and

it’s such a wide range of programs there’s no way for Foothill to individually get guarantees of transferability from each of them. As such, it’s pretty much up to each student to ensure that a virtual lab course will work for them. That makes me nervous.” This will be the defining question for students and faculty going forward because it will shape the future job and transfer prospects for students in these fields if private schools do not accept these classes.

Likewise, Laura A. Hyatt, Ph.D., Dean, Science and Math Division, West Valley College, echoes the same concern: “A lot of biology faculty were concerned about the transferability of the Physiology and Anatomy classes they were teaching once they transferred online. Faculty were hearing that some out-of-state PA and Nursing programs are pushing back on accepting classes completed partially online. I’ve gotten one specific report of a candidate whose applications were receiving friction due to this.” This is certainly a chance for faculty and administrators to take action with different programs outside of the CSU and UC to make sure that curriculum can be created to support these students in their career and transfer goals. Yet, it is also a time to heed the advice of the state, which is suggesting that all labs must have some “hands-on component” to make sure that students are actually learning the skills and that colleges are investing in the materials to teach them.

Foothill Chemistry Department faculty member Richard Daley is already developing some curriculum for lab skills classes that students could take to make up for anything they lost in remote instruction. Daley strongly believes, “we will never go back to the way instruction was before since we have seen what works and invested the time in creating new ways of doing things.” In the end, the disruption of COVID-19 might offer faculty the best opportunity ever to reflect on how to change and brew up new solutions to fit the times. ■