

Testing Solutions from TTU STEM Faculty
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In Spring 2020, Texas Tech University responded to the COVID-19 pandemic by adapting face-to-face courses into remote courses, facilitated online. This adaptation meant that many students and faculty began to use a teaching modality that was somewhat, if not completely, foreign. Aside from the expected challenges of remote instruction, faculty had to adjust to new ways of assessing students' learning.

As we move forward into Summer 2020 and beyond, faculty and students at Texas Tech continue to look for ways to teach and learn effectively using distance education modalities. While Spring 2020 was a real time response to social distancing requirements, future academic terms can and should be planned as distance courses from the ground up.

This document explores some of the final assessment strategies that faculty from the STEM Teaching, Engagement & Pedagogy (STEP) Program at Texas Tech are employing. We will follow up with the same faculty members after the final exam period to ask for their reflections on the assessment that was deployed and their reactions to their students' performance. We will specifically ask questions such as, "What worked well? What didn't work well, and What will you do differently in the future?". This is not intended to be educational research, but rather, an educational resource for upcoming academic terms that will be offered in the distance modality.

Spring 2020 Final Exam Preparation

Logistical considerations: In the final week of classes, STEP Program faculty at Texas Tech were asked to comment on their final assessment plan and "reply to all" in the email thread so that all STEP faculty could benefit. Faculty from several Science, Technology, Engineering & Mathematics (STEM) departments contributed. All of the faculty who responded indicated that they planned, at minimum, to make logistical adjustments for their exams. For example, **Dr. Jhones Sarturi, Associate Professor in the Department of Animal Sciences** followed the institutional final exam schedule but is extending the amount of time to complete the exam by two hours to, "...compensate for internet speed and or connection."

When Multiple Choice Isn't an Option: **Dr. Sheima Khatib, Assistant Professor in the Department of Chemical Engineering**, has created an accommodating 24-hour testing window to give students ample time to arrange their schedules to take the exam. Once they begin the exam, they will have the institutionally prescribed 2.5 hours to complete it. Also, because engineering exams are computationally heavy, Dr. Khatib is giving her students twenty minutes to take photos of their calculations so that they can be uploaded to Blackboard. This solves two problems: a) it ensures that the students are doing their own work and b) it allows Dr. Khatib the ability to award partial credit.

Dr. Josh Howe, Assistant Professor in the Department of Chemical Engineering, is using a similar approach. However, in Dr. Howe's course, students will download the exam 24 hours in advance from Blackboard and will complete the exam for submission via e-mail. Students are expected to attach their calculations to him as a .pdf. They have access to their course materials but are expected to work individually.

Just as you would expect engineering courses to be calculation rich, so too are mathematics courses. **Dr. Brock Williams, Professor in the Department of Mathematics and Statistics** provides a link, via Blackboard, to a .pdf exam document. Students are instructed to write their answers on their own blank paper. Once completed, students must convert their hard copy responses back to an image, via camera or scanner, and upload the file to Blackboard.

For those teaching graduate courses or small enrollment undergraduate sections, it may be practical to require a significant amount of writing from your students. **Dr. Neo McAdams, Assistant Professor in the Department of Geosciences** will be administering an open-resource, take-home exam that students will receive via email. Once complete, student will simply reply to her with their answers. Dr. McAdams employed the same strategy for her second midterm and compared student performance on that take-home exam with student performance on the first midterm, which was a conventional, closed-resource exam. She found that her students performed, “approximately as well,” comparatively. Similar to Drs. Khatib, Howe and Williams, students in Dr. McAdams class will be encouraged to submit images of any drawings that help them explain their answers. **Dr. Scott Longing, Assistant Professor in the Department of Plant and Soil Sciences**, has decided to use a similar strategy in his graduate “Pesticides” course. His goal is to determine if his students have been able to apply theoretical knowledge to “real world” agricultural problems. He decided that a multi-day take home style exam was the best way to find out.

If you teach a laboratory or a laboratory-based interactive engagement course, like **Dr. Beth Thacker, Associate Professor in the Department of Physics and Astronomy**, you might need more help in assessing students’ ability to apply their understanding to physical (or virtual) models. Dr. Thacker uses a tool called “Expert TA” for her exams. This platform enables students to type and draw using tools that are designed specifically for physics courses. This platform has similar tools for other disciplines such as astronomy and biology, too.

To Proctor or Not to Proctor: Regardless of the modality, academic integrity is always at the forefront. Without question, proctoring exams in face-to-face courses offers far fewer challenges than assessing our students online. That doesn’t mean that isn’t possible to monitor the testing environment online, however. Texas Tech University offers two services that give faculty a degree of control over the online testing environment. In our pivot to remote teaching in Spring, 2020, this was not an option for faculty who were not previously using [Proctorio](#) or [Respondus](#) as students have to be informed about the incorporation of these tools prior to the start of the semester. But for those planning future courses, TTU eLearning has a required syllabus statement and a student handout for your use.

During the COVID-19 transition from face-to-face courses to remote teaching, many faculty were hesitant to employ monitoring services due to lack of familiarity for both them, and their students and/or the need for special equipment. This encouraged some STEP Program faculty to deploy creative solutions. For three sections of Honors General Chemistry, **Minnie Stevens Piper Professor, Dr. Dom Casadonte**, will physically observe his 82 students complete their exam using ZOOM. He successfully employed this strategy on a previous exam. He encourages his students to use the private chat feature to communicate with him, in case they have clarification questions about the exam.

Similarly, **Dr. Nathan Collie, Associate Professor from the Department of Biological Sciences**, chose Blackboard Collaborate Ultra as his preferred technology for students to reach out to him during the exam. As for proctoring, Dr. Collie opted for the “honor system,” given the quick modality transition. That doesn’t mean that he didn’t make adjustments, however. Instead of attempting to proctor students’ activity, Dr.

Collie's strategy is to increase the complexity and length of the exam, thereby using time constraints to discourage student collaboration.

If you do employ utilities such as Proctorio and Respondus, the Teaching, Learning and Professional Development Center (TLPDC) at Texas Tech encourages you to consider whether the addition of these unfamiliar measures may introduce a degree of anxiety that may distract your students from an already stressful environment. One way that **Ms. Chijuan Hu, Assistant Professor of Practice in the Department of Chemical Engineering**, has mitigated this lack of familiarity, is by creating a "mock exam" in Proctorio ahead of time. While this does require a bit of lead time, it can serve two purposes: a) it allows students a chance to familiarize themselves with Proctorio and b) it gives them an opportunity to practice working problems and submitting their work using your preferred method.

In some cases, STEP faculty have eliminated the need for exam proctoring by substituting a traditional test with a final, group project. **Dr. Robert Cox, Associate Professor in the Department of Natural Resources Management**, builds working groups into the curriculum of his Restoration Ecology course. These working groups are tasked with creating a restoration plan for a local ecosystem throughout the semester. Instead of creating a summative assessment, Dr. Cox has asked his students to demonstrate their mastery of the course material by submitting a final "Restoration Proposal."

Another creative solution that eliminates the need for proctoring is through the use of video. **Dr. Sheima Khatib** is requiring her students to prepare and submit a 3-4-minute video where they explain how they solved an assigned problem. Students are given a rubric in advance so that they know what the expectations are for this assignment. Dr. Khatib originally assigned this component to mitigate academic dishonesty, but has found it to be an excellent assessment tool.

Similar to Drs. Cox and Khatib, **Dr. Lauren Gollahon, Professor in the Department of Biological Sciences** is using both a project-based approach and video. She has done away with the traditional summative final assessment in her Cancer Biology course. Historically, students in Dr. Gollahon's course work in teams all semester to explore the putative cellular pathways associated with cancer. In the face-to-face modality, Dr. Gollahon evaluates her students' mastery through in-class group presentations. In Spring 2020, her students will present their findings in a live ZOOM session.

Whether you're preparing your Spring 2020 final exam or planning your Summer distance course these are just some of the assessment strategies being used by STEP Program faculty at Texas Tech. Given the level of innovation, in these approaches, it is highly likely that these instructors will consider using similar methods when we return to a face-to-face modality. Either way, assessing our students can take many forms. If you have any questions regarding these or other assessment methods, please reach out to Dr. Ken Griffith, STEP Program Director at Ken.griffith@ttu.edu.