

Three Challenges to Online Teaching: Engagement, Observation, and Cheating

Engineering problem solving lends itself pedagogically to an active learning approach. In face-to-face classes, this involves giving students problems to work in class then working with them as needed to help them learn to solve the problem. Online, the problem-solving process can be demonstrated and then students can be asked to work problems on their own, just as in the f2f classroom. Manually solving problems and showing the work done is its own struggle in the online environment, but that may not be the greatest obstacle to student success.

Two of the biggest challenges presented by transferring to online coursework are related: keeping all students engaged when you can't observe them physically in class and you can't see their work to offer help and keep them engaged. Looking over their shoulder to review their work (and to see if they are actually doing any work) is not possible online.

Our problem-solving course first seeks to engage students in problem solving by teaching a process and then having them practice that process by solving problems in teams of 3 during class time. The remaining 2/3 of the course is spent teaching students to have the computer solve problems for them. MATLAB serves as a useful tool for students to learn both the basics of programming and computational problem solving.

As with manual problem solving, computational problem solving can be demonstrated in the online environment. The challenge comes in keeping students engaged in learning and in observing their work. Our class sessions are held on Teams, which doesn't support breakout rooms yet. Even if breakout rooms were used to break teams of students into small groups, the overhead for a professor to visit each team would be so time consuming that many students would still be left behind.

Student engagement and the ability to observe students while they are working are two quite extreme challenges to teaching computing online. Perhaps the biggest challenge is the prevalence of cheating in online classes. While there are strategies for reducing the incentive to cheat, for many students, the pressure to succeed is so great that when confronted with a question they can't answer, they make a very poor choice and decide to cheat, ignoring the possible consequences. Students are often successful in finding problem solutions online with a quick google search, but they may not be aware of how that access is keeping them from learning required material. Many times, students aren't even aware that finding a solution online is cheating.

In the online environment, it is also easy to ask someone else for help. One would hope that the student being asked would respond with integrity by refusing to provide assistance during an exam or anytime that student interaction is prohibited. The culture at our university clearly allows many students to access forbidden materials or cheat by any method with very little fear of the consequences. Changing student culture to one of honesty and integrity is perhaps the greatest challenge of all.