**Surviving the Desert Island of Learning Computation Online**
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Online classes can often create feelings of isolation, as though each learner is trapped on an island. When students are tasked with difficult or frustrating concepts, such as computation and programming, that island can feel even further from the mainland. Teaching computation online requires activities, projects, instructor feedback, and student-to-student digital interaction. Implementing specific tools that require virtual human contact helps to enable lifeboats, provide accomplices, and build bridges between these islands, ideally resulting in students who don't feel stranded alone on a desert island, while also increasing comprehension of computation.

Learning MATLAB in any setting can be a confusing and frustrating experience. When students are able to freely work in a classroom with their peers, teaching assistants, or instructors, they are able to get spot-checks when they need assistance, and can easily help others if they have gotten past the sticky parts. The online learning environment eliminates this casual, physical realm that I had previously employed in my classroom. A major challenge I face in teaching computation online is student burnout due to frustration and isolation; without the ability to bounce ideas off their peers or to ask questions "off-the-cuff", students may lose confidence over time. I am still learning how to best overcome this challenge, but I have implemented some successful strategies.

**Lifeboats: Provide Substantial Opportunities for Questions.** I provide multiple avenues for asking questions. Beyond office hours, I also offer workshops with teaching assistants, and special MATLAB-only drop-in hours where students are always able to share their screens. One of my teaching assistants has shared his personal phone number; students are more comfortable texting him at all hours, and he is able to direct them to me if needed. We also have a class Discord server for students to connect with one-another to ask questions, or just to voice general frustration – or jubilation (there's nothing like getting a code to finally run!).

**An Accomplice: Keep Students Talking.** In addition to the Discord server, I provide other methods for the students to interact. I incorporate course discussion boards for students to post their thoughts. For example, students are encouraged to post relevant news articles pertaining to computation and engineering. Students should be regularly replying and posting, which helps create a feeling of community, even if the discussion is not directly about MATLAB.

**Building Bridges: Incorporate Group Projects.** Collaborating on group projects online can be even more challenging than in person, however, I believe it is a necessary component of learning material *and* practicing social skills. I create a range of projects: "MiniProjects" that can be completed in roughly 30 minutes, and larger projects that can take up to a week. Our college's Learning Management System allows small groups to

have their own discussion board and file sharing system. I also employ "Breakout Rooms" during Zoom sessions where students have a dedicated time to meet with one another.

Implementing these three strategies is not a guaranteed recipe for success, especially considering the diverse community of students that my college serves. Unfortunately, in online learning, if a student chooses to be absent, there can be no easy way to track them down and encourage participation. However, by keeping communication open via email, consistent messaging, drop-in hours, and contact with peers, students can find the best way for them to personally learn, explore, express frustration, and even teach each other. By providing many opportunities for questions, encouraging student interaction, and facilitating group projects, I hope that my students no longer feel isolated in their computational journey.