Online Problem-solving & Programming Labs Discussion

On Tuesday, April 28, 2020, 37 members of the UMN teaching community convened to discuss problem-solving and programming labs in disciplines like computer science and statistics. Ideas and effective practices generated during that discussion are documented here. Contact cei@umn.edu to suggest an addition to this resource.

Facilitator and experienced online instructors

- Kris Gorman, Center for Educational Innovation
- Christine Bakke, Math, Science & Technology, Crookston
- Marta Shore, Biostatistics, School of Public Health, Twin Cities

Recording and resources

- Session recording
- Christine Bakke's slides with links to group scheduling templates and student instructions for using Flipgrid and Screencast-O-Matic
- Group discussion assignment instructions (example from Christine Bakke)
- Lab assignment instructions (example from Marta Shore)
- Completed Collaborative Key (example from Marta Shore)
- DataCamp (Recommendation for configurable stats modules by Marta Shore)

Google Group Email List

- If you are a member of the UMN community and would like to be part of a Google Group email listserv to ask questions or share resources with others teaching or supporting these courses, please request to join the UMN Programming and Problem Solving Lab Instructors group.

Considerations

There are a number of ways to restructure lab sessions for programming or problem-solving oriented courses. What makes the most sense for your class will depend on a number of factors:

- Number of students
- How spread out your students are across time zones
- Goals for the labs. i.e. whether the labs are designed for students to accomplish tasks, work together as a team, build skills in low-stakes environments, provide immediate feedback, troubleshoot skills/code

Synchronous Sessions

With the quick transition to online this spring, there became the option to continue synchronous labs with students. Two approaches were shared:

Synchronous sessions with small group work

Some continued to use Zoom to hold optional or required sessions where students continued to the in-person lab components. For the best experience, they encouraged:

- **Focus on the interactive or coding portions of your class** - Take advantage of other tools for the didactic/lecture portion of your class and use this class time for coding instruction where they can be simultaneously trying it out and interactive activities.
- **Use breakout rooms -** Breakout rooms can be used to put students in randomly assigned or pre-assigned groups. Instructors can go in and out of break out rooms and also call all students back to the main room to discuss. Students can also ask for help and call you to their room. You can also broadcast a text message to all groups while they're working.
- **Share activity instructions in a document all students can access -** When students go into breakout rooms, they can no longer see the slides in the main room. Make sure students have the instructions, documents and code they need so they know what they are supposed to do.
- **Use screen sharing -** Share your screen and ask students to share theirs to guide them and understand difficulties.
- **Avoid Zoom Bombing**

Office hours during class time

Another approach to labs was to have students do them as independent or group assignments but continue to use class time for office hours. Most instructors who did this found students came regularly to request help and ask questions.

- **Consider utilizing Zoom's waiting room feature** - This has a student go into a waiting room rather than jump right into the meeting. If a student is discussing something personal or their grades, this affords you the option to finish your conversation with that student before allowing others into the room with you.

Asynchronous Alternatives

Independent Student Groups

Christine Bakke shared that in some of her online courses, she has students work in groups to complete labs in order to allow students to have a "study group" even though they don't meet in person. To do this:

- Students use a shared Google spreadsheet to form groups of 3-5 based on availability (class of 60 worked fine for a single spreadsheet). This process takes 1-2 weeks to complete.
- Each group has to meet once a week to complete a particular task (example instructions) and record 5 minutes of their meeting that they turn in for credit.
- Christine has students use Screencast-o-Matic or PowerPoint to record themselves talking about their code while showing it and then submit their videos via Flipgrid so others can comment and see.
- For grading purposes, only one recorded submission is needed per group.

Students have appreciated working with other students from their class "in-person" and having the sessions scheduled at their convenience (which for most is between 9pm and 2am)

Another participant suggested that creating team "charters" for student team/group work can be helpful as well re: communication processes, holding each other accountable etc. An example of this is available under "Create a team process document" in the CEI Faculty Guide to Teamwork.

Collaborative Keys

Marta Shore (and colleague, Laura Le) asks graduate students to complete lab assignments for Biostatistics courses that are ungraded. "Challenge questions" from the labs appear on a weekly quiz.

Students also work together as a class to create a collaborative answer key online using a Google doc:

- During a 3-4 period, students contribute to a Collaborative Key for the week's assignments. They comment on each other's responses and make suggestions for improvements.
- Instructors/TAs guide the discussion and keep the tone supportive and positive.
- Marta and Laura have used two keys for a class of over 100 students (one key for those using R and one for those using SPSS).
- Students get points for contributing something.

- Typically used in graduate classes, but they have been used as a substitute for undergraduate labs, where instructors require a separate analysis to be turned in afterward that is similar to, but not the same as, the work in the collaborative key.
- Students *love* these because they can get faster feedback than turning in the assignment and waiting a week to get it back.

One instructor in the discussion imagined dividing the whole group into teams who develop keys, and then sharing those keys with a chance to vote for the cleanest code, best explanation, best visualization.

Resource for Learning Coding

Marta Shore shared that Data Camp has been a great resource for creating asynchronous practice and instruction for students learning code (e.g. R, python, java). You can create modules which include resources with partially filled code that the students have to complete correctly in order to move on.

Building community among students

Participants recognized that creating community among and with students can be more challenging in a fully online environment. Some suggestions that emerged from the conversation:

- **Have a clear communication strategy** - Make clear when you'll communicate with students, when they are expected to communicate with others. Also, a very intentional use of videos (activities, introductions, personal information).
- **Set expectations** - State that collaboration is an expectation as well as modeling collaborative approaches.
- **Use a variety of modes -** Providing information in multiple modes (visual, verbal, written) helps to make it easy for students to interact with you and the course content in ways they prefer.
- **Continue to utilize group work** - Zoom breakout rooms can provide a semi-private space for students to discuss among themselves, with instructors popping in to guide the discussion and offer help. In using asynchronous groups, make expectations clear and help students to join groups based on availability.
- **More ideas -** Guidelines for Online Teaching and Design and ACUE's Online Teaching Toolkit