How we are teaching statistical programming online

In this time of coronavirus there is much uncertainty and many of the patterns of our daily life have changed. At St. Luke's International University Graduate School of Public Health (SLGSPH) we have switched entirely to online teaching in order to reduce the risk of coronavirus transmission through in-class learning. As a result we have had to change the way we teach some classes, and potential students may be concerned that our education experience has suffered as a result of this shift. Here we describe how we are teaching statistical programming in the Biostatistics Practicum 1 class. This class is typically a very practical, hands-on class and our ability to teach it entirely online is an important benchmark for our ability to provide online quality education. This class is being taught entirely online to 19 students, 3 of whom are overseas and a few of whom are living outside Tokyo.

How Biostatistics Practicum 1 is usually taught

In this class we teach basic computing and programming skills for quantitative analysis in Excel and Stata. Until coronavirus the class was taught in person, from 6-8:30 pm on Wednesday, in the university computer room (called the media room). This room has rows of desks with computers, facing a project screen. The standard format of the class was a short lecture on specific aspects of programming in stata, followed by practice material in which the students applied the material from the lecture in class. During this time two teaching assistants (TAs), current PhD students, and the lecturer would move around the class, answering individual questions. Where a question arose which could be instructive to the class the lecturer would reproduce the situation on his own computer for the entire class and take students through the problem and its solution. The class was assessed by four assignments, which students work on in class with support from the lecturer and the two TAs. This is a challenging format to deal with in online learning, since much of the contact time in class is spent in one-to-one work with students on their computers, and with regular communication between the lecturer, the TAs and the students about problems and solutions.

How we teach online

We moved this class online using Zoom. Students thus need a computer with Stata installed, and a good internet connection, although students who do not meet these conditions are able to work in the media room. Only two students took this option. The class schedule is similar to previous years, with each class starting with a short lecture and then the students doing practical exercises based on the lecture content. The TAs join the class on Zoom as usual, but now we set up two breakout rooms, randomly dividing the students into two groups with one TA in each room. When a student has a question they can either ask the lecturer, or they can notify a TA and go into the breakout room. Sometimes other students enter too, so that there can be mini lectures happening in the breakout rooms. Each breakout room acts as a separate zoom session, in which students and the TA can interact without disturbing the main lecture. The lecturer can enter and leave these rooms at will, checking on the problem being discussed. If the problem being discussed is important for everyone to see the lecturer or TA will ask all students to return to the main room, and then

the student who encountered the problem will share their computer screen for all to see. The lecturer can then talk the student through the solution and use the problem as a teaching example for the class, before allowing class to continue. There are several advantages to this method over physical classes:

- Students can easily share their screen so that all students can see and we can all see their errors or problems
- The shared screen is easier to view than the physical lecture screen in the media room, especially when viewing examples directly in Stata. With Stata, if the font is made large enough for people in the physical room to see the projector screen, the results become extremely messy and hard to read, but this is not a problem in the shared screen because the font does not need to be enlarged for all students to be able to see it
- Students with small problems that are not of educational value to the whole class can resolve their questions quickly without any disturbance of the whole class
- All of the lecture is recorded so that students can go back to things they don't understand and work through them again in their own time
- Students are more familiar with their own computing environment than that in the media room, and are less likely to lose work due to issues of saving files, finding folders, etc.

An additional benefit of this teaching over physical teaching in the media room is that since the lecturer is at home teaching from his own computer, it is very easy to find examples of solutions to problems or particular programming tasks from other projects he has worked on, and share examples of code from those projects with the students.

Overall we believe that teaching biostatistics practicum 1 online has improved our ability to impart these skills to students. We have not noticed any loss of ability on the part of this year's cohort of students, many of whom started off unable to use any statistical software at all but are now able to write scripts in Stata. There are significant benefits to online teaching of Stata using an interactive system like Zoom, and we believe we have been able to improve our teaching of statistical programming as a result of our response to the coronavirus pandemic. Students joining us in 2021 can expect an enhanced educational program as a result of the changes we have made to deal with the coronavirus epidemic, and we are sure we will be teaching better classes in 2021 than we were in 2019.