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A team of instructors' response to remote learning due to Covid-19. A 10.012 Introduction to Biology case study

Bina Rai[A]

[A] *Senior Lecturer, Science and Math Cluster, Singapore University of Technology and Design (SUTD)*

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In February, Singapore witnessed its first local Covid-19 transmissions and the Disease Outbreak Response System Condition, or DORSCON, level was raised to Orange, just one tier shy of the top category. As local transmissions grew and clusters began to form, Prime Minister Lee Hsien Loong announced the beginning of a circuit breaker that was to last from Apr 7 to May 4. Most workplaces were to be closed, except for those providing essential services, and schools moved to full home-based learning (Baker, 2020). The Singapore University of Technology and Design (SUTD) is a leading research-intensive global university focused on technology and all elements of technology-based design. It will educate technically-grounded leaders who are steeped in the fundamentals of mathematics, science, and technology; are creative and entrepreneurial; have broad perspectives informed by the humanities, arts and social sciences; and are engaged with the world.

As the Covid-19 pandemic dawned upon us suddenly, the university scrambled to move their courses online. The 10.012 Introduction to Biology team of instructors were presented with a sudden and urgent need to transform all learning to home-based learning (HBL). We were in the middle of our course at that time. Most of us were teaching two to three cohort classes a week. The university shared several online teaching resources and organised workshops to help us become familiar with these learning systems. Lucky for us, online learning was not a new phenomenon. We had previously developed flipped classroom content for our course and were familiar with video recording. We decided that we would proceed with an approach that was least disruptive, enabled human connection and was simple but effective.

We realised the importance of structure to the students and decided to keep our timetable as before. This consisted of one hour of flipped (mini-video recordings) lessons and an online quiz at the start of the week. Students found that the pre-class learning activities helped them to stay on track on the lesson material. Several students who had taken biology in college appreciated the flexibility that the flipped classroom offered. This was followed by two two-hour cohort sessions and a mid-week one-hour lecture. This was similar to the pre-HBL timetable, hence not disruptive as students were already used to it. The sessions were carried out using Zoom. Students commented that it was extremely helpful and fun being in Zoom classes. For convenience and safety, instructors used the same personal ID/Zoom link throughout the period of the course. We enabled the waiting room in Zoom so that we could verify the students' identity and take attendance. Recordings of lessons, when required, were only saved on our personal laptops and not on the cloud. Every lesson had typically two instructors, one would lead the class while the other would take charge of the chat box. Students would append their answers, questions and comments into the chat box.

The lesson plan for every class was blended. The rationale for this was we did not want to be overly dependent on online synchronous lectures, taking into the account that the entire nation was experiencing HBL and work from home (WFH). In addition, in the event that Zoom crashed, students could still continue with the class and watch the pre-recorded videos saved in the university's learning management system (LMS). We would start the class with a quiz or announcements, followed by an introduction to the topic of the day and the lesson plan. The lesson plan contained the exact duration they should spend on each mini-video recording for that class. Students would then disperse to watch the recordings created by the instructors. Every instructor was assigned to prepare video recordings for one week of lessons. Students provided feedback that the videos were informative and extremely helpful in helping them understand the lessons, especially because they were able to revisit and pause the videos after class until they understood. After the students had completed watching, they would return to the Zoom meeting room for a wrap-up and a question and answer session. During the video sessions, the instructors made themselves available to answer any questions via the chat box. Students were expected to complete a worksheet at the end of the Zoom class and submitted it via our LMS. This motivated the students to attend, be attentive in class, and to complete the lesson materials. Other than video recordings, we also used free open source tools and interactive online experimental simulations. This allowed the students to carry out lab experiments virtually. Students commented that they absolutely loved it!

Figure 1. Screenshots of free, online lab experimental simulator – StarCellBio. http://starcellbio.mit.edu/

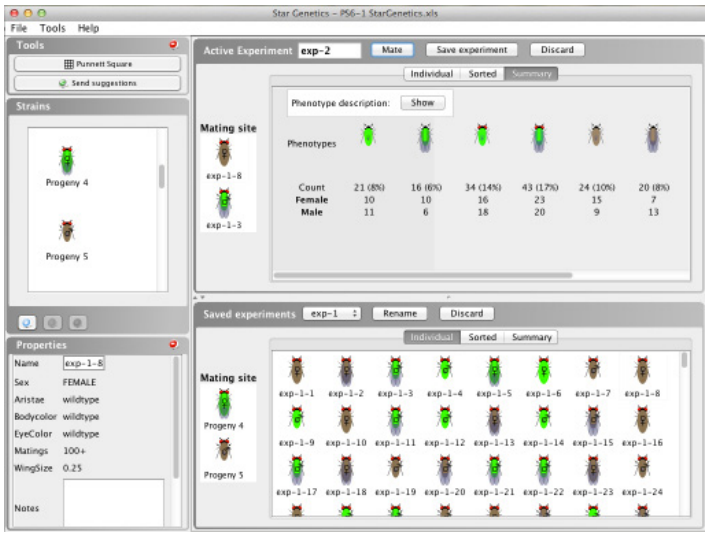

Figure 2. Screenshots of free, online lab experimental simulator – StarGenetics http://star.mit.edu/genetics/

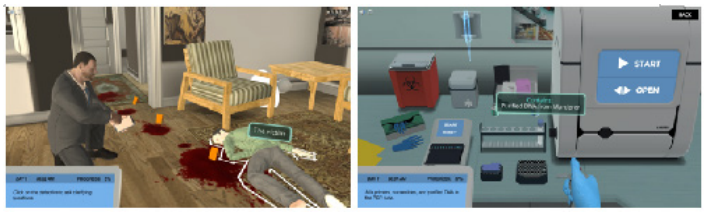

Figure 3. Screenshots of Polymerase Chain Reaction - Virtual Lab Simulations from Labster https://www.labster.com/simulations/polymerase-chain-reaction/

The other major transformation needed due to the Covid-19 situation was the modes of assessment. We decided that we would use our local LMS, specifically Blackboard as a one-stop shop. Instructors placed all the lesson material in Blackboard for self–learning from Day 1. Students appreciated the flexibility of being able to learn at their own pace, and read ahead of class to prepare themselves adequately. Students would assess lesson materials, submit weekly worksheets and homework here using the Assignment Tool. Online quizzes were conducted using the Test tool. We could no longer proceed with our standard hard-copy exams and instead we converted it to a cheat-proof, take-home assignment. The questions were released via Blackboard and the students were given a day to complete and submit via the Turnitin Direct Assignments Tool.

Our team believes firmly in enabling the human connection and made considerable efforts to engage the students during the Zoom sessions. Throughout the sessions, we would show our faces (with good lighting), call out individual student names to answer questions, constantly using the chat and poll function. We compared virtual backgrounds and took multiple screenshots of the class together. As the course lead, I focused greatly on personal and direct communication. This was not an easy task as we had 400 students. The students expressed that they appreciated the very effective and prompt communication from me whenever there were changes to assessments or lessons. I video-recorded myself informing them of the changes, made announcements via Blackboard and cohort instructors repeated these announcements at the start of each cohort. We believe that communication is an integral part of a successful remote learning experience.

Figure 4. My F06 Class.

Figure 5. My F03 Class. With Co-Instructor, Dr Leo Chen Huei.

In conclusion, our approach was well-received by our students who felt that it was well- organised and structured. It was evident that they appreciated the experiences that a blended approach towards remote learning could provide, just as much as the instructors did. I would like to acknowledge the dedication and hard work put in by the 10.012 team of instructors as well as all other teachers who have contributed tirelessly to this new norm of learning.

Figure 6. My F02 Class. With Co-Instructor, Dr Ong Eng Shi.

Figure 7. 10.012 Team of Instructors – Drs Khoo Xiaojuan, Leo Chen Huei, Julia Yajuan Zhu and Lakshminarasimhan Krishnaswamy. Absent: Dr Ong Eng Shi.

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