Department of Computer Science, Mathematics, Physics, and Statistics, Faculty of Science, UBC Okanagan

On-Demand Student Support with Virtual Labs and Help Desk

Dr. Ramon Lawrence, Sarah Foss, Tatiana Urazova, Dr. Bowen Hui, Dr. Abdallah Mohamed

Improving Lab Attendance

Pre-COVID lab attendance in the database courses in computer science was **10 to 40% with lower attendance early in the day.**

This results in students not learning the lab material as effectively and **considerable wasted computer lab resources and TA time**.

COVID Changed Expectations

Students want **flexible learning in time and space** and will attend lab sessions based on their measure of learning value.

Learning activities previously done in-person in a computer lab can be done on students' computers at their convenience.

Labs should provide real-time feedback and require limited TA grading. Focus on helping students rather than evaluating.

Technology

Virtual office hours utilize Zoom at regular times as well as on-demand by students.

Labs use **virtualization technology** (i.e. Docker) to eliminate use of computer hardware and software at UBC.

Labs use **auto-marking** for programming code with unit tests to eliminate TA marking.

New question types developed for activities such as design and data analysis that improve upon Canvas question types.

Accomplishments

Removed scheduled labs for two courses (COSC 304&404) **freeing up 24 hours per week of valuable computer lab time.**

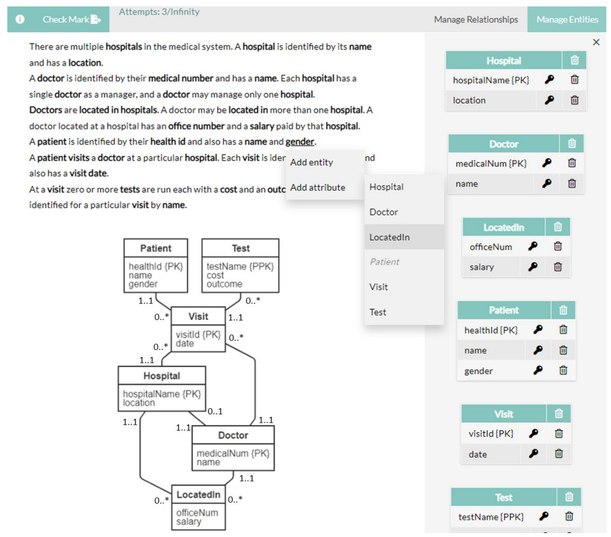
Replaced all in-person labs for database courses with virtual labs allowing completion anywhere at students' convenience.

Reduced overall TA lab hours by 25% by deceasing marking time by 40%. More time spent helping students rather than marking.

Introduced flexible virtual office hours on Zoom for student support on demand.

Developed software for generating new design questions that can be auto-marked and unique for each student.

Auto-Marking Design Diagrams



Student Feedback

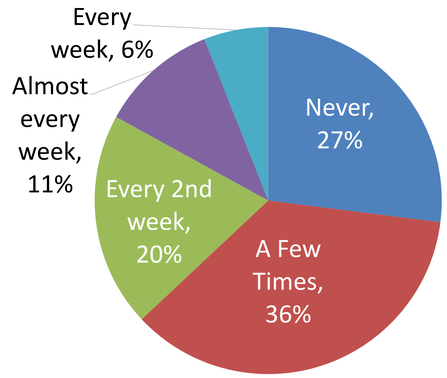
67% of students strongly agreed or agreed that virtual labs/help desk was preferable to scheduled, in-person labs.

89% of students strongly agreed or agreed that virtual labs were beneficial.

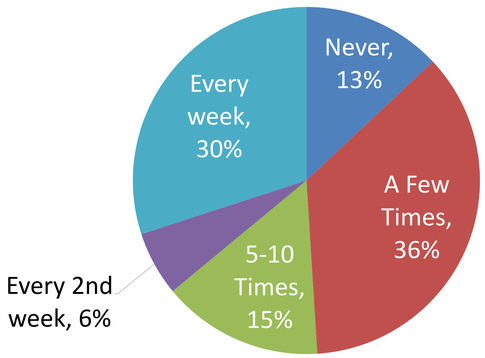
Virtual lab attendance varied widely with 27% not attending at all and 37% attending most weeks. Students appreciated attending only when they needed help.

Performance on labs and overall course was unchanged (within +/- 3%).

Virtual Lab Attendance COSC 304 Fall 2020:



Virtual Lab Attendance COSC 404 April 2022:



Next Steps

Improve some virtual lab content to answer common questions and add video walkthroughs. **Examine new Q+A system.**

Integrate auto-marking system with Canvas.

Discuss virtual lab approach with other instructors that can benefit.

Research Publication

Sarah Foss, Tatiana Urazova, and Ramon Lawrence. *Automatic Generation and Marking of UML Database Design Diagrams*, SIGCSE 2022: Proceedings of the 53rd ACM Technical Symposium on Computer Science Education, Feb 2022, pages 626–632.

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