Virtual Simlations
Teaching Remotely: Shared Experiences

Summary of virtual panel event held on March 25th, 2021
[Link to video]

Our shift to remote teaching and learning has encouraged us to explore beyond the physical classroom and to engage in new ways with our learning communities.

There are many opportunities in virtual spaces to experience education from virtual and augmented reality to simulated laboratory environments—there are exciting and innovative opportunities emerging.

Panelists:

Felicia Vulcu – Associate Professor (teaching), Undergraduate Program Advisor, Department of Biochemistry and Biomedical Sciences

Hatem Zurob – Professor, Chair Department of Materials Science and Engineering

Pat Clancy – Assistant Professor, Department of Physics and Astronomy/Science

Elizabeth Doyle – Assistant Professor, Anthropology

Panel Questions:

1. Why is experiential learning important in your discipline? How did you determine that virtual simulation was appropriate for your course?
2. How has having access to virtual learning space(s) changed your learning outcomes and/or your approach to teaching within your course(s)?
3. In what ways has virtual simulation enhanced the student experience?
4. What has virtual simulation added to your course that you couldn't do in-person? What might you keep in the future?

3 Key Takeaways from the panel

1. Virtual lab environments and simulations have allowed more freedom for students to explore areas that were otherwise limited by in-person labs. While virtual labs are not perfect substitutes for in-person labs, they are accompanied by new opportunities for students to have a more comprehensive learning experience and to experiment beyond previous limitations.

2. Microsoft Teams is a popular choice among the panelist to ensure students remain engaged with one another as opposed to only participating in the virtual labs individually.

3. Each of the panelists have opted for virtual lab simulations that are low-stakes and participation-based. This allows students more freedom to play around with the simulations without the intimidation and stress that can accompany a typical lab environment.

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Some key takeaways from each panelist

Felicia Vulcu – Associate Professor (teaching), Undergraduate Program Advisor, Department of Biochemistry and Biomedical

- Felicia uses Labster, a virtual lab simulator as a "pre-lab" to be used by students before going into a physical lab. This provides them with a good understanding of the techniques required for the lab. [16:04 – 16:31]
- Using Labster has allowed students to feel engaged in the lab content and helps to bridge the gap between theory and practice. [17:11 - 17:25]
- Students have expressed that they like how the simulation walks them through the lab and that they are able to understand the equipment and language before going into the physical lab. This provides a sense of familiarity when in the lab and has reduced students' stress surrounding this. [18:28 – 18:50]

Hatem Zurob – Professor, Chair Department of Materials Science and Engineering

- The use of a virtual optical microscope has effectively reproduced the interactive aspect of viewing samples under a microscope. The traditional optical microscope is used to record high resolution images that are stitched together to create an image of the entire sample. When the students use the digital microscope, they select the sample and can interact with it virtually. [26:40 – 28:55]
- A virtual dilatometer reproduces the same inputs and outputs as the physical dilatometer. Students enter information such as heating rates and holding times, and the simulator will output the results. Using the simulator takes a few minutes and provides students with more freedom to experiment with "what if" scenarios. [29:10 – 31:32]

Pat Clancy – Assistant Professor, Department of Physics and Astronomy/Science

- One thing that has been difficult to replicate is the level of student engagement in labs. Providing students with data and letting them focus on data analysis, providing video recordings of labs to them, and designing simple at home experiments each worked to a certain extent, but none were entirely satisfying. [35:53 – 36:59]
- A virtual neutron scattering instrument has been helpful in eliminating the security and administrative hurdles, as well as group size and time limitations that existed when operating the triple-axis neutron spectrometer in person. Students are now able to see the neutrons and interact with the simulation in a way that was not as simple otherwise. [38:36 – 42:22]

Elizabeth Doyle – Assistant Professor, Anthropology

- Elizabeth has implemented the use of 3D virtual simulations using Sketchfab in her Human Osteology and Forensic Anthropology courses. Students are able to view 3D human skeleton models up close and in detail which was a limited opportunity in an in-person setting. [53:40 – 54:47]
- The students would not typically have access to this level of variation in the human skeleton. They are also able to manipulate and annotate the 3D models to highlight certain features that are of importance. [55:20 – 56:37]

Referenced Resources:

- Labster: https://www.labster.com
- Circuitlab: https://www.circuitlab.com/
- A Nobel Prize at Mac – 25 years later: https://brighterworld.mcmaster.ca/articles/a-nobel-prize-at-mac-25-years-later/
- Virtual Neutron Scattering Instrument: https://www.ill.eu/users/support-labs-infrastructure/software-scientific-tools/neutrons4science
- Vancouver Police Museum: https://www.vancouverpolicemuseum.ca/
- Sketchfab - raincity_bones: https://sketchfab.com/raincity_bones/collections
- Palaeopath collection: https://sketchfab.com/raincity_bones/collections/palaeopath
- MorphoSource: https://www.morphosource.org/
- Meshy - open source 3D modelling software: https://0x00019913.github.io/meshy/