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# Using a simple approach in creating and using Virtual Field Experiences to promote learning and bridge knowledge gaps in classes and labs: An example from the University of Waterloo Dean of Science Undergraduate Teaching Initiative Project

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## Summary

The use of virtual field experiences (VFEs) are becoming more common in undergraduate teaching. Although we do not envision VFEs as a replacement of taking our students to the field, we see value in these experiences and have begun to integrate VFEs into our lectures and laboratories. We are integrating VFE to bridge a gap that we currently recognize in our first and second year students who frequently struggle connecting geoscience knowledge learned in classes and in labs to specific locations on outcrops or landforms in the field that are part of larger, more complex geological systems.

One perceived hurdle initiating this project was the high initial cost and time involved in developing VFEs (i.e. using drones and digital photogrammetry to capture data and produce 3D computer models of outcrops). To address this, our approach at first was to use a simple system that was versatile, inexpensive, and employed a relatively easy way of capturing and manipulating data and creating VFEs. As such, we chose 360-degree photospheres (easily captured with any smartphone in Google Street View or similar apps) and Google Expeditions Tour Creator (free) to augment the photospheres in scenes with text and additional images to create VFEs. The VFEs can then be viewed through Google Poly or Google Expeditions (both free).

We piloted using this simple system to create VFEs in a 2$^{nd}$ year Earth History and Stratigraphy course, and 3$^{rd}$ year Metamorphic Petrology course. In both cases, we are using VFEs to allow students to virtually travel to different locations on Earth and connect samples or knowledge learned in class to outcrops and landforms, hopefully allowing the students to gain a deeper geological understanding and context. In the 2$^{nd}$-year class student applied their stratigraphic knowledge of southern Ontario to outcrops in VFEs and in the 3$^{rd}$-year class students view photospheres of outcrops where rock samples were collected from. This 3$^{rd}$-year class VFE augments otherwise very traditional labs where students are making observations and interpreting metamorphic rock histories from thin section analyses.

Results of our simple approach in implementing VFEs will be presented, as well as potential future plans. Having some initial success and issues with our simple approach, we plan on further testing our simple approach as well as investigating other technologies to capitalize on the educational value of VFEs.