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The use of virtual outcrops to enhance undergraduate geology students' learning through field work and field observations – using 3D digital photography in conjunction with gaming software.

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The purpose of this study is to determine the best methods in creating virtual field trips to aid and enhance the learning experience for first year students who are generally unfamiliar with the subject of Geology, since this is not taught in our schools.

The Department of Earth Science offers its first-year Earth Science course to a large number of students. This large class size places strain on the departmental human resources and makes teaching effective field-based practicals a labour-intensive and ineffective process, as too many people are needed to instruct the students adequately in the field. This has led to the need to find innovative ways to improve the efficacy of the essential field-based learning process.

Advances in virtual environments and reality augmentations, as well as their realized potential to facilitate learning through blended learning, make the generation of virtual field trips a viable addition to the traditional real-world field trips. To create these virtual outcrops, high definition, panoramic images of outcrops are produced for overview purposes, with high-resolution detail images that can be viewed stereoscopically in a Highly Immersive Visualization Environment (HIVE) on a 6x3 meter screen. Closeup images of key features are incorporated to highlight key features for closer investigation, progressing to detailed images of hand-specimen and from there thin sections where appropriate. These images are set up in such a way that it becomes a virtual and interactive tour of the various features that students are able to access wherever they have a reliable internet connection.

The analytical framework for the project is based on geology education literature which uses an expert/novice perspective to examine the development of students' understanding of geological concepts. By looking into the reasoning processes of the students, the virtual environment can be designed so as to enhance the students' ability to interpret geological rock types and features.