Conventional vs VR Field Education in the Biogeosciences: Comparing Student Perceptions and Performance

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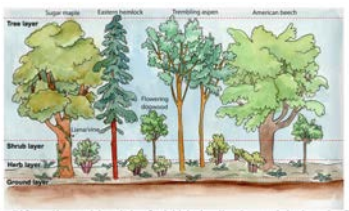
a place of mind

UBC Geography



Introduction

Field education is fundamental to learning in the biogeosciences, providing benefits such as affective domain learning[1], student retention and inclusion[2]. However, The recent pandemic forced teaching and learning online, accentuating the need to offer, and evaluate the effectiveness of, digitally facilitated experiential education. Before the pandemic, the first author developed an augmented reality (AR) version of a conventional forest ecology field trip to a local forest reserve in a large undergraduate course about climates and ecosystems (GEOS 102) [3,4]. In March 2020 Hewitt created a Virtual Reality (VR) version of the trip. This study evaluates relative effectiveness and engagement level of the VR field trip when compared to a conventional in-person version of the same ecosystem science trip in a large 1st year geoscience class.

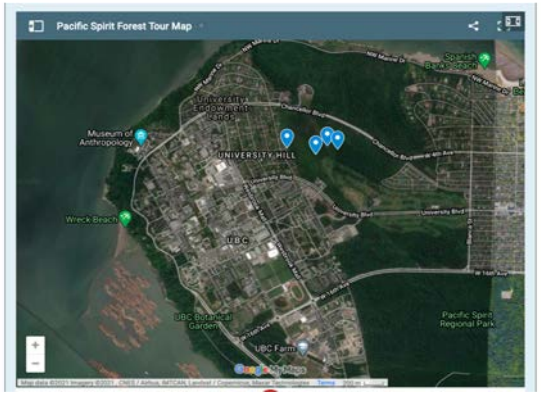


Fig. 1: GoogleMap indicating the stops visited on the tour along Spanish Trail, Pacifiic Spirit Park, Point Grey

The Educational Tool

The VR tour is a digital experience to explore species, stand structure, ecosystem processes and soils in Pacific Spirit Park (Fig. 1). It leads students through a sequence of stops where 360 photos, 2D and 360 videos, images and other media allow users to explore the forest structure and function (Figs 2 and 3). Text, a species ID key, and other annotations throughout the tour (Fig. 4) allow students to "debrief and think more deeply." (Stoddard 2009).

Methodology

"I enjoyed walking the trails of Pacific Spirit Park when classes were in-person, but didn't really pay attention to the different types of trees. I'm motivated to go back again and explore further with what I have newly learned on this virtual field trip!." (Anon. comment, GEOS 102 2021)

- Preliminary surveys were run during pilot versions of the tour in Winter 2020-21 (see comment above).
- In 2021-22, we designed a more formalized, BREB approved, project evaluation, with the aid of a SoTL Seed Fund.
- The Virtual tour and the conventional field trip will be assessed using surveys, a knowledge quiz, focus groups, and student performance data on a related assessment. These will occur in course sections in which the tour runs, either virtually (winter 1), or in person (winter 2).
- Graduate TAs will be invited to provide feedback.

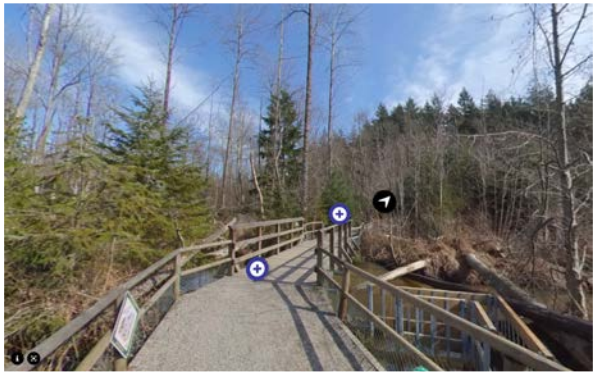


Fig. 2: 360 photo at a wetland site along the tour.

Fig. 3: 2D video interpreting a needleleaf forest site and constituent species.

Next Steps:

While preliminary student feedback suggested that the VR was a valuable alternative to in person trips during pandemic conditions, the viability of this tool for more sustained deployment and as a supplement to in field learning will be investigated in the upcoming research. The tour involved is openly available online (CC) and adaptable (SA) (see UBC Geog Virtual Spatial Experiences).

Invasive species: Another species highlighted in the video is non-native. As you may infer from Figure 11.4, below, this European invader has been very successful at colonizing the hardwood forest, with several individuals visible in the photo. Consider the adaptations that have made it so successful in this ecosystem (what might they be?). Another introduced invasive species present in the park is European laurel (*Prunus amygdala*). Note that both of these European invaders are evergreen woody species adapted to environments with mild rainy winters, so they have been introduced in a place with a climate that closely matches their origin (you will revisit the issue of invasive species in the Reflection Questions, below). They also produce many berries that animals disperse. If you wish to explore the topic of invasive species, see e-flora BC's Invasive plant species page (Klinkenberg 2020).

Figure 11.4. Left: A botanical illustration of the European invader referred to in the video. Right: The same species growing along the trail. Photo courtesy of N. Hewitt

Fig. 4: One of the text and image pieces providing context on ecosystem processes.

Selected References

1. Kuo et al 2019. Front. Psychol.
2. Beltran et al 2020. Ecol and Evol. 10: 5184-96
3. Hewitt, N. 2019 (TLEF)
4. Hewitt N. and B. Wilson Feb 2020 "*Using Immersive Technology Field Trips to Bring the Class to the World and the World to the Classroom*", UBC 1st Yr Experience Educators' Symposium
5. Stoddard, J 2009 Contemp. Iss. Tech. Teacher Ed.

Acknowledgements

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