

Comment on gc-2021-37

Paul Nesbit (Referee)

Referee comment on "Virtual field trips utilizing virtual outcrop: construction, delivery and implications for the future" by Jessica H. Pugsley et al., Geosci. Commun. Discuss., <https://doi.org/10.5194/gc-2021-37-RC3>, 2021

This manuscript presents a case study of virtual fieldtrips (VFTs) to highlight the workflow and assessment of VFTs as an alternative to traditional in-person field trips. The authors document development and delivery considerations using modern techniques and a novel visualization platform and report the effectiveness via rigid course assessment and open-ended response from student course evaluations. The manuscript is relevant to the Special Issue it has been submitted to and is timely as it reports on methods and assessment of alternative educational resources/approaches globally adapted by geoscience educators due to the COVID-19 pandemic.

Although the manuscript has its strengths in highlighting the potential benefits of implementing VFTs with Virtual Outcrops to enhance student learning, there are a few key considerations that should be addressed in order add substantial knowledge to the existing literature and maximize impact:

- The authors report assessment and effectiveness of VFTs, however much of the research aims and conclusions (i.e., benefits and limitations of VFTs, etc.) have been documented by previous studies. In my opinion, this does not reduce the novelty of this investigation. Instead, I think the authors have an opportunity to highlight the differences between their study and the existing literature – the use of photorealistic 3D virtual outcrop (VO) models integrated with various datasets in a novel visualization platform for VFTs (as opposed to previous VFTs reported using largely static forms of media and/or limited resolution digital globes, such as Google Earth). Establishing this difference (advances in VFT methods) and citing foundational VFT research in education would contribute to substantial knowledge gains and progress of methods in geoscience education.
- Evaluation methods – assessment of the efficacy of a particular method in pedagogical research is challenging. There is no 'silver bullet' or perfect means of assessing how well a particular teaching method worked or how well students learned. The authors use surveys of student experience through standard university and specialized questionnaire with both quantitative responses and open-ended free responses. In my

opinion, it would be ideal to perform deeper investigations into learning outcomes (specified as outside the scope of this study), but I do believe the methods used by the authors offer new insight into student perception of VFTs using VO. However, the authors need to further elaborate on the limitations of their methods and situate their findings relative to previous work (i.e., how do these results compare to previous VFT investigations using different forms of media and similar evaluation methods?)

- Discussion and Conclusions - many of the conclusions and discussion points (i.e., advantages and disadvantages) are not fully justified from the evaluations performed or main body of the text (at least they are not fully expressed and clear from the data). I think the data may show sufficient evidence in this study, but it will need to be made more clear within the text and should also be situated in the current literature (as mentioned above). Related to this point – the conclusion section ‘fizzles off’ and would greatly benefit from a stronger statement that brings this study into a broader context and/or suggests future steps.

The written English and style are clear and the structure of the paper follows a reasonable flow, though there are several minor grammatical errors/inconsistencies (see attached document and points below). There are also a few areas where the authors could consider minor reorganization to improve clarity and potentially reduce text to be more concise and expand potential impact for the readership.

- End of introduction (2 paragraphs) feels a bit misplaced and tagged onto the introduction as an afterthought. I think the paragraphs provide important context and should be included/adapted earlier in the introduction to help readers understand the different types of VFTs and modes of delivery. This would better contextualize the scope of this study.
- Section 3.1 and 3.2 - Sections are a bit drawn out. Perhaps consider as supplementary material or appendix and keeping only the most important info concisely here.
- Section 5.1 - This section is a bit hard to follow and doesn’t add much. I wonder if it is worth considering shortening this and focusing on the platforms/activities and modes of delivery and contrasting with how it was/would have been presented in traditional format.
- Several small grammatical errors/typos – I tried to highlight most of the areas where there may be typographic errors and where some punctuation may be required in the attached PDF.

Overall, I believe this manuscript has a lot of potential and is not far from being a strong contribution. Hopefully the authors find these comments helpful towards the revision of their manuscript and help to achieve the research aims.

Please also note the supplement to this comment:

<https://gc.copernicus.org/preprints/gc-2021-37/gc-2021-37-RC3-supplement.pdf>