

Geosci. Commun. Discuss., author comment AC2
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Reply on RC2

Natalie Bursztyn et al.

Author comment on "Virtual strike and dip – advancing inclusive and accessible field geology" by Natalie Bursztyn et al., Geosci. Commun. Discuss.,
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Thank you for your constructive and helpful comments, you echoed several points made by Reviewer 1, which indicated for us the major points of clarification that we need to address within the manuscript to improve it.

Introduction section

We agree with both reviewers regarding the length of the introduction section. We can still reference the key issues with fieldwork and the motivation for virtual tools like SaD with more concise phrasing and some reorganization of some material to the discussion.

L82-83

We agree with the sentiment and appreciate the suggestions for improving the phrasing here.

L92-107

The reviewer is correct, we started the discussion about developing the SaD tool before Covid and it was originally conceptualized as an immersive virtual reality tool. However, by the time software was developed sufficiently for pilot testing, we were already deep in Covid-19 lockdowns and remote learning. We quickly pivoted, recognizing that it was not feasible to test iVR with headsets under early pandemic conditions, and pushed onward with a web-based dVR version. We do have the SaD tool ready as iVR and we intend to make it available and also assess it in the near future. We will address the wording in the manuscript to make this clearer. However, we do truly believe that 3D information is best assessed and learned within a 3D interactive medium and there are more studies emerging which indicate the benefits. Immersive technologies make such experiences possible and as they are entering main-stream, it is important to conceptualize their role in geoscience education and to plan for future empirical studies to document their advantages.

L208-210

We are not entirely in agreement that we understand what the reviewer means here, however, we are in agreement that our phrasing in the manuscript must not be sufficiently clear and needs some refining. What we mean here is that the SaD tool provides an opportunity for students to practice and gain experience with taking strike and dip measurements (remotely), generating learning through the virtual, but intentionally interactive, experience rather than only the passive information intake from reading and watching video. Interactivity and practice are well documented pedagogies that foster learning.

General comment about iVR

This is a fair comment (that agrees with the first reviewer as well), given that this study only examines the web/desktop-based VR experience. We should make clearer, and perhaps reduce some of the emphasis on, the iVR goals of the project – as mentioned in our response to L92-107 above.

L506-508 and following comment regarding Procedure

These comments indicate to us that we need to improve some clarity in the way we documented the procedure of our study. It is important to note here a couple of items. First, the activity that was developed to use the SaD tool as a lab exercise is a digital replica of an existing lab that was conducted in person (with staged outcrops) prior to Covid-19. This is indeed the whole lesson, including SaD software. However, what we examined was specifically the replacement of the in-person staged outcrops with the digital environment within SaD. Second, in our assessment we did not examine student learning (this was addressed to some degree in our preliminary study Bursztyn et al., 2021 – full citation in references), but rather the students' experiences using the SaD tool for the mapping exercise. Our survey included ranking and open-ended questions that targeted the students' senses of perceived control, usage, representation, and learning efficacy. Our study did not include pre-post surveys nor a control, instead we considered the tool itself and compared student responses with their familiarity with gaming experience and other navigational software. The goal of the SaD tool was to replicate the pedagogy we had previously developed with staged outcrops (from classroom theory to hands-on practice) and evaluate the potential of SaD as a virtual replica of the original experience. We will certainly make the effort to clarify this in the manuscript, but would also love to be able to compare using a controlled experimental design in a future study. We especially would love to be able to compare student learning between the real world and the iVR experience!