

Review of de Paz-Alvarez et al. 2021- Virtual field trip...

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I enjoyed reading the paper by de Paz-Alvarez et al. It is well written, well organized and well illustrated. However, I found that the authors were not sufficiently critical of the results of their experiment. When they asked the students to rate how well the Virtual Field Trip prepared them to face a real mapping project on their own, and their answer was 3.7/10. Frankly, this is a failing grade. De Paz-Alvarez et al. should conclude that this was not the right approach. Notice that that example of student work presented in Fig. 3 is very nice looking, but (according to the authors) the descriptions are copied from the lithologic tags illustrated in Fig. 2, and the cross section is wrong! The main structure should be a recumbent syncline (Fig. 6A), not an anticline. So, what did that student really learn?

Covid posed a dilemma to all of us who teach field geology. We could either attempt to reproduce the field experience virtually (which is the approach taken by de Paz-Alvarez et al.) or we could use the opportunity to do something entirely new that fulfilled some of the same learning outcomes as the field experience. The problem with the virtual field trip approach is that it becomes fundamentally a cookbook exercise, an artificial puzzle. It can teach the students certain skills, such as keeping neat notes and drawing cross sections at their desk. But it will not prepare them for real field work any more than playing *Fortnite* would prepare you to take part in the landing in Normandy. The point of a field experience is precisely learning to deal with those elements that the authors acknowledge to be missing from the virtual field trip: route-finding, orienteering, the size of the world, its slopes, its messy outcrops, its hard rocks that you need to hit with a hammer, its prickly bushes, its noisy complexity, its changing weather, plus our annoying companions, etc. In other words, field work is about experiencing the difference between a neat sketch on a piece of paper and an imperfect outcrop in the woods.

I think the preferable approach is not do a virtual field trip but to teach the students how to use the tools that a professional would use to solve a real geological problem remotely. In other words: teach them to use remote sensing data, GIS, geodetic data, potential field data, or to interpret geological data collected by others for a realistic reason (not just to make a virtual field trip). In order to apply this to the Esla Nappe project the students would need to learn how to use QGIS, a step considered by the authors but rejected as impractical. Teach them how to use slope and aspect of a DEM to collect strike and dip data. Teach them how to draw the contacts in the GIS. Those are examples of skills that are applicable in a professional setting. Copying data from somebody else's field stops has very limited value.

I recommend that the authors revise their abstract, conclusions and discussion to more clearly acknowledge the limited success of virtual field trips in teaching field skills. This was not a successful experiment; it is foolish to promote it as such.

Specific Comments on the Manuscript

103 EMP- Please spell it out: Esla Mapping Project or Esla Project. Non-standard acronyms are the bane of scientific writing. They save virtually no space but make papers hard to read.

Fig. 2 Insets are labelled A, B, C but the caption says a,b,c . Be consistent!

195 I think GE means General Electric.

Figure 4- What is the number of students? N= ? I notice that you did not grade the cross sections for structural correctness. That seems strange. Isn't that the point of a cross section?

Figure 5. N=? Some of those questions are awfully similar to each other. If I were taking this poll, I would have been confused.

Figure 7 N=?

260 The evidence presented in line 257 shows that the virtual field trip did not accomplish what it set out to do. Delete this line.

Figure 6. The student did not map the fault, did not recognize the overturned beds and did not identify the syncline. I don't see how you can claim that this is a satisfactory result.

321 I do not think your paper demonstrated that virtual mapping trains "numerous field geological skills". It does train some office skills.