

## Peer Review Report

# Review Report on Learning and Teaching Geological Field Skills in a Virtual World: Insights from an Undergraduate Virtual Fieldtrip in Kinlochleven, Scotland

Original Research, Earth Sci. Syst. Soc.

Reviewer: Jessica Pugsley

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### EVALUATION

#### **Q 1** Please summarize the main findings of the study.

This paper presents an original and well-planned field trip for undergraduate students prior to their summer mapping projects. The field trip looks very interesting and well designed. The paper outlines why and how the VFT was designed and delivered.

#### **Q 2** Please highlight the limitations and strengths.

While the virtual field trip is well designed and the paper documents it well there is not a great deal of evaluation into the learning outcomes and strengths and weaknesses of the trip. The paper would benefit greatly from this.

#### **Q 3** Please comment on the methods, results and data interpretation. If there are any objective errors, or if the conclusions are not supported, you should detail your concerns.

The general conclusion that learning outcomes were met is not clearly evaluated.

#### **Q 4** Check List

Is the English language of sufficient quality?

Yes.

Is the quality of the figures and tables satisfactory?

Yes.

Does the reference list cover the relevant literature adequately and in an unbiased manner?

Yes.

Are the statistical methods valid and correctly applied? (e.g. sample size, choice of test)

No.

If relevant, are the methods sufficiently documented to allow replication studies?

No.

Are the data underlying the study available in either the article, supplement, or deposited in a repository? (Sequence/expression data, protein/molecule characterizations, annotations, and taxonomy data are required to be deposited in public repositories prior to publication)

No.

Does the study adhere to ethical standards including ethics committee approval and consent procedure?

No.

If relevant, have standard biosecurity and institutional safety procedures been adhered to?

Yes.

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**Q 5** Please provide your detailed review report to the editor and authors (including any comments on the Q4 Check List):

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This paper presents an original and well-planned field trip for undergraduate students prior to their summer mapping projects. The field trip looks very interesting and well designed. However, there are some paper changes I believe are required before this paper is accepted for publication. My main concern is the claim that the learning outcomes were met, without any quantitatively or qualitative evaluation of individual learning outcomes. If this is out with the remit of this paper, I would not include the claim that learning outcomes were met. Section 2 would benefit from being broken down into geological setting and learning outcomes as it currently mixes the two. It would be nice to see some more screenshots from within the virtual field trip presented specifically the geological locations. Finally, was ethics approval gained to allow use of the questionnaires and observations of student behaviour?

Line 43-44 and 49-49: In text referencing not in chronological order, occurs again so maybe intentional?

Line 59: COVID19 missing the '-'

Line 69: overly strong general statement, I would suggest narrowing to state 'undergraduate structural mapping' or similar as opposed to 'conventional fieldwork'.

Line 85: By goal do you mean learning outcome?

Line 94, 99 to 106: perhaps more references?

Section 2: For clarity, I would consider some slight restructuring so first you discuss the geology with appropriate references, then discuss objectives (i.e. development of skills and positive mental health), then the specific intended learning outcomes. It may even be best to split this section into two, so you have: 2.

Geological Setting 3: Intended Learning Outcomes and Fieldwork Objectives. Therefore, being clear what is an intended learning outcome and what is an objective, you could use 'goal' as you have or 'aim' if that works better.

Line 169: where the learning outcomes/objectives fully identical? e.g. how were "(5) to promote efficient mapping through good traverse selection and work time-management; (6) to foster good positional awareness and mapping reading abilities; and (7) to reinforce good practice in field safety." addressed? There are some sections of text which address some of these (e.g. cars on road, line 614), but I think some could be clearer, and included within discussion.

Line 229: This section (3.2.1.) could be far more concise

Line 476: Was there a reason why Agisoft Metashape was not used? It would reduce the issues of artefacts, which can also all be removed in a single action if 'floating' unconnected to main model. Also, given the significant advances in outcrop collection (e.g. LiDAR smartphones) and processing times over the past 5 years it would be worth mentioning. If you were to do the same now, would it take 500 hours?

Line 662: was the course run online or in a classroom?

Line 676: was ethics approval gained? Some of these observations and claims contain human subjects. Did these students know their observations were being observed/recorded for research? In addition, the use of surveys for research would typically require ethics approval.

Line 709: this is an important point, an increased cognitive load is often regarded a major negative for VFTs but as you point out any of the "digital generation" is used to gaming!

Line 745: this is an interesting task, however, is this implying that the external was assuming that the virtual field trip maps would be a lower quality? Surely a simple external remarking of all and observing the scatter or results would be more accurate and assume less bias?

Section 4.1: while there is certainly value here it is not clear to me how the learning outcomes compare, as most do not seem to be mentioned here? What is mainly discussed is grades and submissions. It would be nice to see more detail.

Section 4.4: Many of these benefits of VFTs are listed elsewhere and should be referenced.

Line 885: Additional field trips seem a little out of place to first be mentioned here

901: again, it's not clear to me how you met the learning outcomes you listed in section 2.

**Q 6** Originality

**Q 7** Rigor

**Q 8** Significance to the field

**Q 9** Interest to a general audience

**Q 10** Quality of the writing

**Q 11** Overall quality of the study