

## ***Interactive comment on “Using paired teaching for earthquake education in schools” by Solmaz Mohadjer et al.***

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Received and published: 11 December 2020

This is a paper clearly written by geoscience enthusiasts with a passion for science communication, geoscience education and outreach. I applaud the authors' efforts to develop the videos, and their endeavours to evaluate the effectiveness (on knowledge gain/change) of the information in the videos with students in two culturally diverse countries. Evaluation of science communication is important and so often overlooked. For this alone, the paper is a valuable contribution to the literature.

The videos are basic, and have been seemingly produced with limited (or no) budget, which is deserving of praise. However, in the future I would welcome developed versions which build on an evidence base to address aspects such as cultural relevance (e.g. words, images, language), local context, curriculum timing, trusted and identifiable presenters etc. There are numerous avenues this research could take, and I encourage the authors to explore opportunities to develop this area of study. For example, as Reviewer 1 has also raised, the authors have missed an opportunity to reflect on and share experiences of the cultural aspects of this study.

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For my review of this work, I have provided some moderate-to major and minor points that I recommend the authors address. I have also provided some points for reflection, which may improve the manuscript (and future research) if the authors wish to address these. If these moderate revisions are made, I recommend this article for publication.

Major points to address:

1. Teaching experience: The authors talk about incorporating teaching strategies into the videos but provide no information about the level of teaching knowledge and experience of those developing and presenting the videos. Are any of the authors teachers or researchers in education? They are all based in geoscience departments, but it is not clear about their teaching experience. I believe the lead author may have considerable experience. That being said, were teachers consulted before making the videos? Did the authors understand the curriculum in both countries and seek to co-develop these videos with the teachers and/or curriculum developers with whom they engaged? How did the authors know that earthquake education in schools needed supplementing? These are important reflections that should be in the paper. Beyond seeing making videos as a 'good idea' to them, can the authors demonstrate evidence for need?

The study follows MIT Blossoms protocols and 5E Instructional Model but the authors do not reflect on this in the lessons learned. It therefore comes across as a retrospective 'shoehorning' into a published methodological approach. I was also confused about whether 5E lessons plans or plans developed by Mohadjer (2010) were used. Please clarify in section 2.1.

2. Ethics and consent: Where are the ethics assessments and the consent forms for

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this study? Working with minors and collecting data from them requires consent and ethical assessments. How will the data be used and stored? Could the authors urgently provide some information about this in accordance with GDPR.

3. Cultural aspects: Please could the authors provide some reflections on the cultural dimensions of this study? Empirical evidence is fine. For me, observations would be as useful, if not more so, than the numbers! I am intrigued for example about the student responses to the causes of earthquakes between the countries. Why haven't the authors explored this? More reflections on why the Tajik teachers did not engage would also be useful for readers.

4. Statistical information: The statistics are distracting and not really that helpful for the reader. Whilst I appreciate the authors are trying to demonstrate a rigorous evaluation of the videos, the reader is yearning for an interpretation and discussion. Much of the statistical information could be moved to an appendix, or tabulated simply.

Major points for reflection - An opportunity has been missed to develop science communication theory or incorporate social scientific methods into the study. - The authors throw around the word significant in the paper, but care should be taken as to whether it really is or not. - I like that the videos were broken up into segments, but it would have been beneficial to receive feedback from the teachers and students as to the desired length of the videos – they seem pretty long as a whole (12-24 minutes per video – 10-20 hours teaching time in total) - The study seems to be more focused on evaluating knowledge gain or change and has failed to uncover what it actually was that caused that knowledge change – was it the words, the presentation, the models, the presenter? If the authors have this information, it would be useful to include, or even provide some observations and reflections that might lead to further study. - Regarding the students feeling that the questionnaire was an exam, this is absolutely my experience too, particularly in areas where cultural differences between the students and the visitor are quite obvious. It would be really useful for the authors to reflect a bit on this, and ideally put it in the paper – might it be related to perceived or actual power,

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positionality, cultural norms etc?

Minor points to address: Line 10 The opening line of the abstract is conjecture. Suggest a rewrite. Line 13 "coupled with activities carried out by local classroom teachers". Suggest a rewrite – the teachers aren't carrying out the activities, and what do you mean by local classroom? Isn't teachers enough? Line 21 I'd suggest replacing views with knowledge – you weren't evaluating their opinions. Although that would have been interesting. Line 25 What makes a classroom culture suitable? Who says so? Suggest a rewrite. Line 46 empowerment of communities Line 66 Be consistent with language – choose either teaching-duet or paired teaching Line 75 Typo on through Line 87 How did you develop an iterative process? There did not seem to be any iteration in the UK example – did the video teacher actually talk to the teacher in-situ and tweak approaches? In the Tajik example the video teacher was the in-situ teacher, so again, no iteration. Line 128 How do you know that the teacher continues to keep the students interested? Line 160 You collected data on the first and last days of video implementation but the testing periods were very different between the UK and the Tajik studies (50 and 5 days respectively). Can you reflect a bit on this, maybe in a later section? Line 214 Section 2, not 3. Line 293 How can you have a 20% increase in student understanding of the Earth's interior. Please clarify or omit this. Line 303 Might be a personal thing, but the word naïve feels a belittling – can the authors just say a basic conceptual framework? Lines 328-29 I like where the authors have put numbers of students in brackets, it really helps the reader. Consistency with this throughout the paper would be welcome. Lines 397 I'd argue that the authors have not produced a series of DRR educational materials, only a few related to DRR and most were about hazard education Line 409 constraints (typo) Line 411 Fix non-structural hazards? Could a more appropriate word be found? Line 411 non-seismically active regions Line 420 "Nearly all Earth scientists agree that public outreach is important." How do the authors know this? Where's the evidence/reference? Otherwise just conjecture. Line 460 I'd suggest changing the word ensure to support. Line 460-466 These examples are ok, but are they really related to K-12 and higher education? How about researching some

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serious games such as Earth Girl and Hazagora?

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Interactive comment on Geosci. Commun. Discuss., <https://doi.org/10.5194/gc-2020-43>, 2020.

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