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Discussions

Interactive comment on "Using PhET™ Interactive Simulation Plate Tectonics on Initial Teacher Education" *by* Bento Cavadas and Sara Aboim

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We would like to thank referee 2 for the analysis of the preprint version of our manuscript and for the time spent revising the paper. We also sincerely think that the paper will benefit from the incorporation of the suggestions from referee 2. In the following lines, we explain our reply: Referee 2: Overall, I recommend this paper be published after minor corrections: 1) adding some more detail to the Methods section, particularly on the methods of data collection and the analysis of the qualitative data Authors: After reflection, we added a more detailed explanation about the methods of data collection, the sources about design in research education that influenced us and the characterization of the study, as follows: 100. We used an exploratory case study research design (Swain, 2017), because our intent was to achieve first insights

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about the contribution of the educational resource CreativeLab_Sci&Math | Plate tectonics to the preservice teachers′ learning about plate tectonics. 135. To answer the research question, we used multiple sources of evidence, a defining feature of case studies (Swain, 2017). One was the PST′ productions about the educational resource collected through a GForm$^{®}$ questionnaire, mainly with multiple choice questions. The questionnaire was implemented with PST of two Portuguese TTI's in science curricular units in an online teaching context. This digital questionnaire has the advantage of producing an output with the global data of all students' answers. This output was the main instrument of quantitative data collection used. Another method of data collection used was PST′ reflections concerning the contribution of the educational resource to their learning, as also the suggestions for its improvement, through a short survey. These reflections were used to collect more qualitative data about PST' learning using the educational resource CreativeLab_Sci&Math | Plate Tectonics. Furthermore, the PST' reflections were also used to enhance the resource. Research teachers course materials were also collected. These materials were used for describing the design and the implementation of the educational resource. Observation of PST' work was also considered, but that method of data collection could not be implemented due to COVID-19 pandemic and the transition to online teaching. 144. At the end of the tasks, a sample of students (19 pairs) was asked to give feedback about the contribution of the educational resource to their learning of plate tectonics, and if they had any suggestions to the improvement of the resource. Through a post-categorization of PST' answers, a qualitative analysis of these data was made using coding categories. During coding, the researchers followed the instruction of Fraenkel et al. (2012). The unit for analysis was PST' sentences (Fraenkel et al., 2012). The coding process emerged two main categories of analysis, "Contributions to learning" and "Improvement suggestions", and three subcategories for each main category. To ensure internal validity, a first analysis made by one of the researchers was followed by a second analysis by the other researcher. When divergences in the categorization process occurred, a discussion was held until a consensus was reached. Extracts of PST′ answers were used to

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better support the analysis.

Referee 2: Overall, I recommend this paper be published after minor corrections: (...) 2) improving the clarity of the written English by correcting confusing grammatical errors- Authors: We completely understand this suggestion because English is not the authors' first language. We are going to proceed to a fully proof-read of the paper.

We expect that the previous clarifications and additions to the manuscript are according to referee 2' suggestions.

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