

Interactive comment on “An innovative STEM outreach model to foster the next generation of geoscientists, engineers and technologists (OH-Kids)” by Adrián Pedrozo-Acuña et al.

Anonymous Referee #1

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1. The problematic approached in the study is actual and has interest concerning the development of 21st century skills in young learners through their involvement in STEM activities.

2. The paper presents an innovative didactic model (OH-Kids) to approach the water cycle and the urban water cycle. The didactic model has many hands-on and minds-on activities. It has also an interesting approach to engage primary school students in science and the scientists work. All major STEM components are present in the activity. However, the activity was not organized in a STEM cycle, but only in a linear and sequential way. It is also not clear how S&M components are linked in an interdisciplinary

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way.

3. The work should present the research question that oriented the study.

The model OH-Kids reached a reasonable amount of 6-12y old students. Though, one major weakness of this work is the questionnaire applied to the students. The questionnaire applied before and after the workshops does not measure the knowledge of the students, but only their perceptions. This is a major limitation of this study and should be referred.

Concerning the didactical sequence of the OH-Kids activities, what was the framework that organized it? I kindly suggest that the authors read: Pedaste, M., Mäeots, M., Siiman, L. A., Jong, T. de, Riesen, S. A. N. van, Kamp, E. T., Manoli, C. C., Zacharia, Z. C., & Tsourlidaki, E. (2015). Phases of inquiry-based learning: definitions and the inquiry cycle. *Educational Research Review*, 14, 47-61.

4. The results of this study are correct when it is mentioned that this work has the advantage to present a real collaboration between a scientific institution and primary school students. Though, this study lack stronger evidence that the students learn concepts and processes related to the water cycle and other related concepts.

5. The authors gave proper credit to related work.

6. The title is clear; however, I suggest that the expression (OH-kids) should appear this way: “An innovative STEM outreach model (OH-Kids) to foster the next generation of 2 geoscientists, engineers, and technologists

7. The authors mentioned in the abstract that this study was designed to empower educators. However, it's not clear how this study has accomplished that because it is focused in 6-12y students and not in the formation of the educators.

8. The objectives of the OH-Kids model are very clear, however, the goals of the study (68-71) are not clear yet. The focus of the study is on engaging students, teachers, or both in STEM trough the outreach model OH-kids? How the “positive effects” are going

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to be measured? That should be expressed in form of a goal. Concerning the section "2. OH-Kids: a STEM outreach model", I suggest that table 3 and the sequence of OH-Kids should be presented early, after 41-42 lines. These questions should also be clarified: The activities were elaborated by the team or adapted from elsewhere? The activities are related with the science curriculum of Mexico? What is the constitution of the scientific project team that developed the activities? Concerning the section "2.1. Water bingo and memory games", it should be clarified if the cards are organized in themes, as the hydro-thon game. In relation to the section "2.2. Urban water physical model" and figure 4., It could help the interpretation of the figure if the parts of the model were captioned. Add some affirmations of the students concerning their argumentation about causes and consequences of floods could help to present evidences about their interest about science. About the section "2.5 Water and technology quiz", what application was used to deliver the quiz? The quiz was answered by each student individually or in small groups?

9. The language is clear and precise.

10. The work presents in p.5 a reference to an OECD study from 2016. This study was not in the references, but only "OCDE (2015)". The authors use a quite old work of Bacon (1987) to approach gamification. There are many other contemporary works about this issue that could be addressed.

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