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Overcoming challenges in earthquake education: A case study from Tajikistan

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Disaster education in schools can raise awareness among students, teachers, and parents, leading to more accurate risk perception and better understanding of protective measures. For a disaster education curriculum to be effective, particularly in the context of earthquakes, the curriculum must be science-based. For example, to prepare for earthquakes, it is crucial to understand the physical processes that cause them. This is particularly important in communities that hold a fatalistic attitude towards earthquakes where instructing students to "drop, cover, and hold on" during an earthquake will not be effectively practiced if community members have no scientific knowledge of earthquakes. Unfortunately, most teachers lack the knowledge, resources and expertise required for teaching a science-based earthquake education curriculum. Our paired teaching approach is one way to support school teachers in bringing earthquake science into their classrooms.

To address this challenge, we have created a series of free (Attribution-NonCommercial Creative Commons license) interactive geosciences video lessons for school teachers and their students. The videos are designed to engage geoscientists, students and teachers in earthquake science, hazards, and safety. The paired teaching approach is used to supplement the standard school curriculum with virtual lessons instructed by geoscientists from around the world and activities carried out by local classroom teachers. The videos introduce students to fundamental scientific concepts behind earthquakes (e.g., Earth's interior, plate tectonics and faulting) as well as topics related to earthquake hazards (e.g., landslides, liquefaction, structural and nonstructural hazards) and safety strategies (e.g., drills and planning). All concepts are taught through hands-on learning where students build and test models to visualize and investigate the causes of earthquakes and learn how to reduce their societal impact. The videos are available on the YouTube channel of the European Geosciences Union (https://www.youtube.com/user/EuroGeosciencesUnion).

In October 2018, three videos were implemented with 38 sixth grade students (12 years of age) at a public school in Dushanbe, Tajikistan. To examine the effectiveness of each video, students completed questionnaires before and after video implementations. Questionnaires probed students on topics covered by each video including the Earth's interior, tectonic plate boundaries, and nonstructural hazards. Prior to video implementation, 58% of students demonstrated no conceptual framework about the Earth's interior. When asked about the causes of earthquakes, no student mentioned plate tectonics, faulting, or plate boundaries. Instead, 55% of them made references to mountains and volcanoes in their responses. Most students demonstrated some knowledge of nonstructural hazards found in typical school classrooms. Following video implementation, a notable portion of students (74%) showed an increased level of understanding of the Earth's interior. However, they showed little improvement in their understanding of the causes of earthquakes, with 34% demonstrating no scientific knowledge of the causes of earthquakes. Some students (29%) showed improvement in identification of nonstructural hazards in classrooms. Despite students' positive excitement during video implementation, there are a number of challenges impeding curriculum testing such as low levels of local teachers' participation, poor classroom scheduling, and difficulties in using interactive whiteboards. In this presentation, we discuss these challenges and offer solutions.