Earthquake Education Workshop

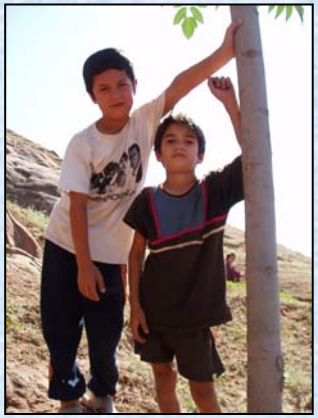
Dushanbe, Tajikistan
8-23 February 2008

"There is a cow inside the Earth with two mosquitoes flying around his horns. Every time the mosquitoes land on his horns, he swings his head around, and that's when the earth starts to shake."

Monira, 8th Grade

Inspiration

Epoxy in Tajikistan is not like the instant-bonding binary mixture found in the US. It takes about five hours of waiting, patiently, for it to cure properly. It was while waiting for epoxy to dry during her geology field season, and chatting with two Tajik children, that Solmaz Mohadjer was inspired to begin a geohazards education and outreach program in Central Asia. "It wasn't what they knew or did not know about earthquakes, it was their enthusiasm, persistence, and hunger for knowledge about the natural world that made a tremendous impression on me," she said.



Children of Cheheltoot village who were curious about earthquakes.

Learning from Pakistan's Experience

Solmaz Mohadjer (far left) speaks to the survivors of 2005 Kashmir earthquake, Bagh District, Pakistan 2006

Besides the children who had shown so much interest in her field research, Solmaz was also driven by other previous field season experiences, particularly by her interactions with the survivors of 2005 Kashmir Earthquake who were rebuilding in its aftermath.

"These interactions made me realize that although much scientific research has been conducted in the area concerning seismic hazards, very few earth scientists have communicated their understanding of the hazards with the public, particularly with school children, " Solmaz describes. "This is very unfortunate because it is these people who live or die by the knowledge of what to do before, during, and after an earthquake."

To increase earthquake hazard awareness in the region, and to ensure that research results are explained accurately and directly to the public, Solmaz believes that the visiting scientist must be an integral part of the earthquake hazard facilitation process.

1	***Graduate Student***
2	***Middle Schools***
60	***8th and 9th Graders***
180	***Stories***

Earthquake Education

After returning to the U.S. to resume her graduate program at the University of Montana, Solmaz set to work organizing another field season in Central Asia. But this time, the focus would be earthquake hazards education, not data collection.

Why Dushanbe, Tajikistan?

Solmaz selected Tajikistan for a number of reasons: Earthquakes represent a substantial threat in many parts of Tajikistan, particularly in urban areas like Dushanbe. Dushanbe is built on unconsolidated material and on the boundary of major geologic structures. A large earthquake in Dushanbe is capable of destroying most of its Soviet-era residential buildings and causing significant damage due to subsidence deformation. It is extremely important to bring this information to the public's attention so that they (together with the scientists) can put more pressure on policy makers and the government officials to make their city safer in the event of an earthquake.

"Because of my previous collaborative work in Dushanbe, and my participation in ongoing tectonic research in the country, I was in a good position for initiating an outreach project like this. I am also fluent in the Tajik language, so I can complete the organizational and educational tasks with minimal difficulty," adds Solmaz.

"There are dead people and dogs buried in the earth. When there's an earthquake, they all come out of the ground and create huge mountains."

Shahnaza, 8th Grade

Pre-workshop Interview

Prior to the workshop, Solmaz interviewed the students to assess their knowledge and to establish a starting point for moving forward with the curriculum. During the interviews, students shared earthquake experiences and answered simple questions, such as why they think the earth shakes. The students also had the chance to ask questions that they wanted to investigate through the workshop.

"Students shared a fascinating mix of myths and facts that comprised their knowledge of earthquakes" Solmaz said of the interviews. "We can cover more ground in the workshop if we build on existing preconceptions, rather than outright destroying them."

First week

earth interior and hard-boiled eggs
plate motions and modeling clay
material properties and tootsie rolls
an unpredictable earthquake machine
seismic waves and flying slinkies…

During the first week, students learned about the scientific concepts describing earthquakes, such as earth's interior structure, plate motions, the properties of earth materials, and seismic waves. "I boiled over 60 eggs, one egg for every kid, to learn about the earth's interior structure," Solmaz said, "but I had a few kids who ate their eggs right away because they were hungry."

Students operated a simple earthquake machine using wooden blocks and sand paper. "The kids became very competitive. Each wanted to create the biggest possible earthquake, but they soon realized that earthquakes are complicated and so is earthquake prediction."

Solmaz teaches while a student operates an "earthquake machine".

Students use modeling clay to learn about plate motions near Tajikistan.

Students test their building model on a shake table.

Second week

building challenge
strong vs. weak walls
sinking buildings
find and fix the hazards
school earthquake drill
plan ahead

During the second week of the workshop, students learned about the region-specific earthquake hazards such as structure collapse and liquefaction. Students constructed structural models and tested them on a shake table to simulate earthquake response, so that they may assess design mitigation concepts of buildings and other vital pieces of public infrastructure.

Students build and reinforce a wall that would withstand earthquake shaking.

Other activities such as holding earthquake drills, finding and fixing non-structural hazards in schools, homes, and in the community, developing emergency family plans, and putting together a family first aid kit were crucial parts of this workshop.

Students identify non-structural hazards in example houses.

Learning from the Alternative Spring Break Project's Experience

During her University of Washington undergraduate years as a Pipeline volunteer, Solmaz participated in the Alternative Spring Break Project for three consecutive years where she discovered the power of story writing and bookmaking with children. During her one-week spring breaks at UW, Solmaz traveled with a group of UW students to rural Washington to help young students brainstorm for story ideas, write and edit them, and finally make a single signature book which they later would illustrate and present to their community. "Bookmaking allows children to dream imaginatively and to write stories they can be proud of, " said Solmaz.

Inspired by this, Solmaz couldn't wait to share this activity with the children in Tajikistan. "I thought this would be an excellent way of wrapping up the earthquake workshop. It provided a unique means of assessing and reinforcing concepts covered during the workshop activities."

Bookmaking Workshop

To evaluate students' understanding of the material covered throughout the workshop, Solmaz asked each student to use the information learned from workshop activities to write about a hypothetical earthquake from three different points of view: that of a news reporter, a scientist, and an individual directly affected by the earthquake. Students were asked to feel free to make up information and/or quotations, but to keep the basic facts consistent from one essay to another. This activity contrasted how the styles and benefits of technical communication change, depending on the audience they are trying to reach.

Students then made books of their own by binding and illustrating their writings. These writings were combined, along with a self-written 'About the Author' section, into a book that the students presented to their friends and teachers on the last day of the workshop. Students kept the books, along with beautiful commemorative certificates, as reminders of their accomplishments throughout the workshop.

Students bind their books.

A student work on the author page of his book,

Students with their books and certificates.

Post-workshop Interview

Two weeks after the workshop, Solmaz interviewed the students to assess their understanding of workshop materials, and also to receive feedback from the students on how to improve the workshop. "Most students found the bookmaking activity to be the best part of the workshop since they got to make something they could keep and be proud of," said Solmaz. Some students found it difficult to understand the mechanisms behind plate motions. "That's something I must work on next year."

The post-workshop interview also allowed students to share personal stories. "One student told me that she explained plate tectonics and faulting to her neighbor, but her neighbor didn't believe her," said Solmaz," while two other students shared their concerns with the school principle about their safety in school in the event of an earthquake."

"Stories like these give me hope that the students are not only aware of how to deal with disasters, but are also taking active steps to keep disasters from becoming tragedies."

Acknowledgments

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