**Earthquake Education Package**

by Solmaz Mohadjer

Earthquakes are among the most terrifying and fascinating natural phenomena occurring on the Earth. They terrify us because they are powerful enough to destroying civilizations and turn cities into ghost towns. But they have fascinated us since the dawn of recorded time. Like other natural phenomena, earthquakes have played an important role in triggering our curiosity about the natural world we live in. They are the spoken words of our planet. We need to hear them to better understand our home, the Earth, and ourselves, the inhabitants of the Earth.

One must not forget that we live on a very unique planet. The Earth, unlike any other planet in the solar system, is dynamic and alive, and because of this we are alive. The livelihood of the Earth can be appreciated in part through the study of earthquakes and other natural phenomena. It is by the knowledge we gain from studying earthquakes that we can start to understand their impact on societies and to find ways to mitigate damage.

In this course packet, there are a number of hands-on and interactive scientific lesson plans, each inviting students to learn what is known about earthquakes, earthquake hazards, and hazards preparedness. The lessons are developed for Grade Levels 6-12. However, lesson contents can be easily modified for younger students. Lessons are adapted from published and unpublished materials developed by a number of Earth scientists, science teachers and aid and emergency agencies all around the world. Please refer to the bibliography section for more details.

Prior to the start of lessons, it is important to assess students' knowledge of earthquakes and hazards. The pre-assessment activity creates a means to do this. Lessons 1-6 target physical processes related to earthquakes. Lessons 7-11 focus on hazards associated with earthquakes and mitigation strategies. Lesson 12 provides a unique means for reinforcing concepts covered during previous lessons. For Celebration Day, held after completing all lessons, students' accomplishments are acknowledged. The post-assessment activity, held a few weeks after the Celebration Day, provides a means for assessing students' learning and for receiving feedback from students to improve future course curriculum.

**Pre-assessment**

To establish a starting point for moving forward with the lesson plans, students are invited to be interviewed by their teacher. Individual interviews allow the teacher to assess each student's understanding of the topic prior to the lessons. During the interviews, students are invited to share earthquake experiences, answer simple questions, and share any concerns they might have.

**Lesson 1-6: Physical Processes of the Earth**

In Lesson 1 students learn about the Earth's interior and plate tectonics, which is the driving mechanism for earthquakes. Lesson 2 allows students to focus on plate boundaries where a large fraction of all earthquakes, volcanic eruptions, and mountain building occur. In Lesson 3, students learn about plate motions and the different kinds of

faults that can be produced as a result. Lesson 4 introduces the behavior of Earth's materials in relation to earthquakes. By Lesson 5, students should have enough background information to learn about what happens during an earthquake. Lesson 5 encourages students to use the knowledge gained from previous lessons to describe an earthquake event step by step. Students also explore the topic of earthquake prediction. Lesson 6 focuses on the properties of seismic waves and introduces students to earthquake measuring scales.

**Lesson 7-11: Earthquake Hazards and Mitigation Strategies**
For each lesson in this section students learn about an earthquake hazard and mitigation strategies to reduce the debilitating effects of each hazards. In Lesson 7 students learn about liquefaction. Lesson 8 focuses on landslides and how they can be triggered by earthquakes. Lesson 9 focuses on structural hazards, why some buildings collapse, and small scale structural reinforcement. In Lesson 10, students learn about non-structural hazards and how to identify and fix such hazards in their schools, homes, and communities. In Lesson 11, students participate in an earthquake drill where they explore the wide range of possible immediate responses to an earthquake and analyze the advantages and disadvantages of each response. Students also learn about what can happen after an earthquake and how one can prepare for a long-term response in its aftermath.

**Lesson 12: Curriculum Codification**
This lesson invites students to write short stories about individuals or communities affected by an earthquake using information from previous lessons. In this lesson, students write, edit, and illustrate their stories, and finally make a single signature book which can be presented to the community or be placed in the school's library.

**Celebration of Accomplishments**
Upon completion of Lesson 12, students are given certificates as reminders of their accomplishments throughout the lessons. Students are encouraged to read and share their stories with other students, parents, and their school and community members during the Celebration Day.

**Post-assessment**
One or two weeks after Celebration Day, students are invited to attend a discussion on how the lessons can be improved upon. The discussion also provides a means to assess students' understanding of the lessons sometime after lesson completion.