

SHAKE, RATTLE, AND ROLL: TEACHER GUIDE

Subject: Earth Science

Grade Level: Middle School

Last Updated: September 16, 2008

Case Summary

In the near future, a major earthquake may occur in the Atlanta area. The United States Geological Survey has commissioned a Geological Research Team to research the causes of earthquakes. In addition, this research team will help in designing an earthquake proof school and an evacuation plan.

Credits

This case was written by Elizabeth Sheehan (PhD student, Psychology, Emory University, Atlanta, GA) and Antione L. Ford (teacher, Bethune Middle School, Atlanta, GA) fellows of the Emory University PRISM program (<http://www.prism.emory.edu>). Authors may be contacted at Elizabeth.sheehan@emory.edu

The student evaluation sheet in the *Student Materials* was reproduced from *Out of Breath* (DeLoney, 2006).

DeLoney, D. Y. (2006). *Out of breath*. Retrieved October 03, 2006 from Emory University, CASES Online Web site: http://www.cse.emory.edu/cases/casedisplay.cfm?case_id=543

Learning Objectives

1. Define earthquakes
2. Research causes of earthquakes
3. Compare and contrast the Mercalli scale and the Richter scale
4. Identify proper safety procedures for earthquakes
5. Describe the ways geologists monitor earthquake risk
6. Identify types of materials and procedures for earthquake proofing.

Georgia Performance Standards

S6CS6. Students will communicate scientific ideas and activities clearly.

S6E5. Students will investigate the scientific view of how the earth's surface is formed.

d. Recognize that lithospheric plates constantly move and cause major geological events on the earth's surface.

e. Explain the effects of physical processes on geological features including oceans.

Assessment

Student work will be assessed in a couple of different ways. First, each group will turn in a box chart from Day 1. Each group will also need to design a poster or model to present their earthquake proof building and a pamphlet about their evacuation plan. At the end of the case, students will fill out a self-evaluation form to indicate their participation in the group.

Implementation Strategy

This case is designed for use with a sixth grade class with about 25 – 30 students. Students will work in small groups of 4 or 5 and 2 or 3 facilitators (teacher, PRISM graduate student, and sometimes an additional teacher) will be available. During library time, an additional adult was available to help the students find books and use the internet. A webpage was created with links to the approved sites the students could use for the case (see **Resources** section).

DAY 1	Everyday class activities	10 minutes
	Read case as a class	10 minutes
	Box charts as a group	10 minutes
	Class discussion of Learning Issues	15 minutes
	Assign Learning Issues	5 minutes
	Library Time for research	45 minutes
	Discussion of Homework – tell students to bring craft materials	10 minutes
DAY 2	Library Time for research	45 minutes
	In class time to prepare materials	1 hour
	Self evaluation	15 minutes

- Materials needed for project: butcher paper, markers, rulers, protractors

Case Notes

What went well:

1. After brainstorming in their groups, we handed out a sample box chart (included in *Student Materials*) to guide their research. We found that some of the groups had come up with some of the learning issues on their own and some groups had additional learning issues, facts, and hypotheses to add. Providing the learning issues kept them on task while they were completing their research.
2. When we handed out the box charts that were filled in – we only handed out one per group. We required them to hand in this box chart at their presentation to be graded. We had found in past cases that the students had a hard time keeping up with their papers so this required them to be responsible for their materials.
3. We also had them divide up their learning issues and assign them to students in the group BEFORE they were allowed to go to the library to start their research. Having the students divide up their research before we left for the library cut down on the time they

used to “get organized” once they got there and allowed them to use the entire block of time to research.

4. We had two librarians who helped the students while they completed their research. We provided the students with a webpage to guide their research at home. The librarians also made a website for use while in the library and posted this on the teacher’s website so students could access it at home. The extra facilitators helped keep the students on task and the websites by giving the students specific links to guide their research. We found that they did not stray much from the links provided.
5. On the second day of the case, only the groups who had not complete their research went to the library. We split the class up so that the groups who had finished could go ahead and get started on their poster. This set-up allowed the groups to focus their attention and be less distracted. As students finished up in the library then returned to the room and started working. If some of the group had already finished their research, the group was split.
6. The students were explicitly told that their ability to work in a group would affect their grade in this assignment. At the end of the 2nd day, we had the students complete a self evaluation which had space at the bottom where they were encouraged to let us know how the group worked as a whole. Providing an evaluation helped us let them know that their individual contributions to the group were important.

What could change:

1. If a student did not finish their learning issues the first day, they were instructed to complete them at home. We found that quite a few students did not have computer access at home, which made it difficult to complete the homework. In the future, we could stress the importance of using their own textbook and figuring out whom in the group has a computer and assigning them the learning issues that require computer research.
2. During the presentations on the final day of the case, a few groups simply recited the research they had completed when investigating the learning issues. To find out more about their building and evacuation plan, they needed to be prompted with questions. In order to avoid this, students could be instructed to report only the necessary information and to share their research on the learning issues within their group.
3. Time needs to be allotted for sharing learning issues within the group once their research is completed. We found that individuals knew about their own research but not as much about the research and learning issues of the others in their group.
4. Although we had the groups brainstorm before we gave them a filled in boxchart, we felt that they did not own the learning issues as much as they could. In the future we would cut down on the learning issues and facts that we provide them so that they have the opportunity to provide more of the important issues and come up with them on their own.
5. As with all group work, some groups work better than others. If there are students who are not being productive in a group, we found it helpful to assign them a specific task. We will also consider moving individuals to other groups if they are acting up or not contributing.

Facilitator Guide:

Facts	Hypotheses
<ul style="list-style-type: none"> • 14 major earthquakes worldwide • Earthquake occurred recently in Indonesia that killed a large number of people • Increase in earthquakes • Georgia is a part of the Tennessee Seismic Zone, which is showing increased activity 	
Learning Issues	Questions
<ul style="list-style-type: none"> • What is an earthquake? • What is the Richter Scale? • Where is the Tennessee Seismic Zone? • What does increased activity in a seismic zone indicate? • What causes earthquakes? • What building materials can be used to construct an earthquake proof building? • What is an evacuation plan? And How do you create one? • What is the USGS? 	

Resources

The Media Specialists/Librarians at Bethune Middle School pulled a selection of books for the students to use. They also created a website for the students with links for research that can be found at <http://www.cse.emory.edu/prism/Ford/SRR.html>

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Glasscoe, M. (1998). Earthquakes. Retrieved September 15, 2008 from <http://scign.jpl.nasa.gov/learn/eq.htm>

Novak, G. (1999). What's an earthquake? Retrieved September 15, 2008 from <http://www.sciencecourseware.org/VirtualEarthquake/VQuakeExecute.html>

Louie, J. (2001). Plate tectonics – the cause of earthquakes. Retrieved September 15, 2008 from <http://www.seismo.unr.edu/ftp/pub/louie/class/100/plate-tectonics.html>

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The Learning Channel. (2008). Tremor tech. Retrieved September 15, 2008 from <http://tlc.discovery.com/convergence/quakes/articles/tremortech.html>

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