

SHIFTING PLATES AND CRAZY HEADACHES: TEACHER GUIDE

Subject: Earth Science

Grade Level: Middle School

Last Updated: 5/7/07

Case Summary

A disturbing tremble shakes metro-Atlanta as the school day begins. When a series of unfortunate events occur during the disaster, the students are left without adult guidance and must apply all they know to prevail in what they assume is an earthquake.

Credits

This case was written by Sabrenia M. Parker (PhD candidate, Biochemistry, Clark-Atlanta University, Atlanta, GA), William Harris (teacher, Ronald E. McNair Sr. Middle School, Decatur, GA) fellows of the Emory University PRISM program (<http://www.prism.edu>). Authors may be contacted at sabreniaparker@hotmail.com

Sources of Images:

Physiographic provinces of Georgia. (2006). Retrieved May 7, 2007 from the Carl Vinson Institute of Government, The University of Georgia Web site:
<http://www.cviog.uga.edu/Projects/gainfo/photogallery/physiomap.jpg>

Clark, W. Z., & Zisa A. C. (1976). Physiographic map of Georgia. Georgia Department of Natural Resources. Retrieved May 7, 2007 from the Carl Vinson Institute of Government, The University of Georgia Web site:
<http://www.cviog.uga.edu/Projects/gainfo/physiographic/gaphysio70.jpg>

Learning Objectives

1. Recognize that constructive and destructive Earth forces change the Earth's surface.
2. Explain how earthquakes cause damage and the kinds of damage they cause.
3. Explain what can be done to reduce earthquake hazards to buildings and to people.
4. Explain how movement along faults changes the Earth's surface.
5. Explain how the energy of an earthquake travels through Earth.
6. Identify the different kinds of seismic activity.
7. Name the scales used to measure the strength of an earthquake

Georgia Quality Core Curriculum

- SCSh1*. Students will explore the importance of curiosity, honesty, openness, and skepticism in science and exhibit these traits in their own efforts to understand how the world works. (NSES Content Standard A)
- a. Understand the importance of – and keep – honest, clear, and accurate records in science.

- b. Understand that hypotheses can be valuable even if they turn out not to be completely accurate.
- S6E5.* Students will investigate the scientific view of how the earth's surface is formed. (NSES Content Standard D). Describe methods for conserving natural resources such as water, soil, and air.
- S6E6.* Students will describe various sources of energy and with their uses and conservation. (NSES Content Standard D and F). Identify renewable and nonrenewable resources.

Assessment

Overall grading for the case is based on three components:

1. After each scene, students will work in groups to complete a “boxchart,” generating lists of data, questions, hypotheses, and learning issues (see Scene Analysis Worksheets in *Student Materials* document).
2. Each group will work together to create a brochure that outlines steps that should be taken before, during, and after an earthquake (see rubric in *Student Materials* document). Students will be guided to www.mybrochuremaker.com, a website that provides brochure templates and user-friendly instructions.
3. Each group will also create a poster that describes earthquake hazards and outlines earthquake safety (see rubric in *Student Materials* document).

Grading for each of the three components will be based on a 5-point scale (5=excellent, 4=very good, 3=good, 2=fair, and 1=poor) for each of the following criteria:

- Accuracy and depth of product components; attention to grammar, word usage, and mechanics,
- Individual contribution and participation within the team (see below),
- Individual research ability and effort, i.e. investigative questioning, online exploration, and etc...

Scores on the 5-point scales above and product rubrics are combined and can be differentially weighted. A Peer & Self-Evaluation Form (included in *Student Materials* document) and journaling are used for self-reflection and to maintain working group dynamics. Students’ self and peer feedback are used to determine participation score above.

Implementation Strategy

This case is designed for a class on block scheduling and as such is created to take place over a four-day period. Class time varied from day to day, but averaged 1 hour and 20 minutes per day. After reading each scene aloud through role-playing, students worked in groups to create boxcharts. Informal assessment and debriefing was conducted through class discussion and brainstorming about the information that students wrote into their group boxcharts (instructors can create a compiled class boxchart, by soliciting contributions from each group). Students then research the learning issues they identified for the scene using a

Resource Guide handout (included in *Student Materials* document). To conduct the research, students remained in groups as they referenced the resources provided, i.e. textbook, internet, library, etc. A recorder from each group documented information found. Following the completion of all 4 scenes, each group works together to create two products: a poster and a brochure. Products receiving the highest scores were posted along the hallways of the school for review.

Day One

Read Scene 1 through role-play (10 minutes)

Brainstorm and construct box chart in small groups (25 minutes)

Discuss box charts in large group (20 minutes)

Divide and assign learning issues (15 minutes)

Return to groups and research learning issues using Resource Guide (30 minutes)

Read Scene 2 through role-play and distribute maps (*see Student Materials*) (10 minutes)

Homework: Students will research the risk of an earthquake in their city.

Day Two

Review Scene 2 (5 minutes)

Append to box chart in small groups (15 minutes)

Return to large group and discuss learning issues (10 minutes)

Lab 1: Create Brochure (20 minutes)

Read Scene 3 through role-play (10 minutes)

Begin outlines for posters containing earthquake safety (30 minutes)

Day Three

Review previous scenes (10 minutes)

Read Scene 4 through role-play (10 minutes)

Brainstorm and construct additional box chart in small groups (20 minutes)

Discuss box charts as a class; revisit learning issues (20 minutes)

Continue working on posters and brochures (30+ minutes)

Homework: Students will contact their local government to find out whether the community has any plans in place for dealing with earthquake preparedness.

Day Four

Complete final details on posters and brochures (30 minutes)

Reconvene and poster presentations (60 minutes)

Case evaluation and wrap-up.

Case Notes

Students loved this case. It worked because the character names were those of actual students in our class. The students enjoyed having their names mentioned in the case, and it allowed students to become more engaged in the case. They enjoyed reading the scenes as if the case were a play. Using a famous entertainer worked because at the middle school age, students often have a famous icon they'd like to meet. Beyonce worked for this student population

during the 2006-2007 school year. Also, placing the disaster within the same metro area where the students are from brought things closer to home. Most couldn't imagine an earthquake anywhere near Georgia.

Unfortunately, the students who were not mentioned as characters felt left out, although they know that not everyone can be characters. Allowing students to read the parts of "other-named students" was tricky because we had to be sure that not too much emphasis was made on the characters who didn't know what to do in an emergency situation. It was a little sensitive when students volunteered to read the script of someone they didn't like (without our knowledge, of course) because they wanted to use crazy voices for the character, which made the person feel uncomfortable. Also, no one cared to play the principal...

Our suggestion to anyone using this case is to adapt and revise the script to read as though it is taking place at your own school and invite your own famous icon for a real-life event that takes place. Go with whatever and whoever is popular at the time. Also, if a natural disaster seldom occurs in your area, then you might want to use that to make students aware of what could happen and how to be prepared if it does. If you use the names of your own students, have students read their own parts, and try to include everyone.

Resources

Textbook

Science explorer: Earth science. (2002). Upper Saddle River, New Jersey: Prentice Hall.

Web Resources

Indiana University PEPP Program. (2003, April). Georgia earthquakes: It's a real talker.

Retrieved May 7, 2007 from: http://www.indiana.edu/~pepp/earthquakes/georgia4_29_03.htm

Kloepfel, J. (1996, May). Lessening the earthquake risk: Danger in the east. Retrieved May 7, 2007 from: <http://gtresearchnews.gatech.edu/reshor/rh-sf95/quake.htm>

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