

Best Practices of Technology Integration

Title: *Geology with Peanut Butter and Jelly*

Rye bread = brown sandstone

Jelly or jam = limestone

Whole wheat bread = shale

Chunky peanut butter = conglomerate

White bread = white sandstone

Subject: Earth Science, Earthquakes, Layers of the Earth

Intended Grade Level: 4-6

Description:

This is a project that may be eaten by students. Students will enjoy smashing the two tectonic sandwich plates together in faulting and compression fashions! They may even desire to capture their instructional destruction in a slideshow. Students will understand that the layers of the earth's crust are changing over time. Students will simulate the various geologic forces that shape the earth's exterior.

Narrative:

After we had studied movements of the earth's crust and the layers of the crust, I wanted the kids to have something hands on and cheap that the kids could each explore with. The total cost of materials for two classes was just under twenty dollars. The first time I taught this lesson I was fortunate to teach it on a half day. This way the kids who had to ride the bus for an hour and a half to get home wouldn't be supper hungry upon arrival. This project was a hit with all students. At the year's end I surveyed the students as to what they enjoyed most about the year, I was pleasantly surprised at the number of kids who wanted to do the activity again!

Curriculum Benchmarks:

[MI.SCI.V.1.E.4](#)

Describe natural changes in the earth's surface. (*Key concepts:* Causes of changes—volcanoes, earthquakes, erosion, rivers. Results of change—valleys, mountains, cracks. *Real-world contexts:* Places around the school where erosion has occurred, such as gullies formed in down-hill gravel areas, cracks in asphalt.)

[MI.SCI.V.1.MS.3](#)

Explain how rocks and fossils are used to determine the age and geological history of the earth. (*Key concepts:* Time lines, rock layers, fossils, relative dating. See Waves and Vibrations benchmarks. *Real-world contexts:* Places where rock layers are visible; fossils, such as Petoskey stones.)

ML.SCI.V.1.MS.4

Explain how rocks are broken down, how soil is formed and how surface features change. (*Key concepts*: Forces—gravity, pressure. Erosion by—glaciers, waves, wind, streams, weathering, plant roots. Decomposition by—bacteria, fungi, worms, rodents, other animals. See Ecosystems benchmarks. *Real-world contexts*: Local areas where erosion by wind, water, or glaciers may have occurred, such as along the shoulder of roads, under down-spouts; chemical weathering from road salt, formation of caverns; physical weathering, such as potholes and cracks in sidewalks from frozen water.)

Total time for this lesson: 45 - 60 minutes

*However creating the slide show will take some extra time on the student's behalf.

Materials / Hardware / Software:

For each pair of students you will need:

Utensils etc.:

- pen or pencil and half sheet of paper
- worksheet
- two paper plates
- two napkins (at least) or paper towels
- plastic knife or a wooden tongue depressor
- plastic spoons for scooping jelly and peanut butter
- various cleaning supplies

Food items:

- one slice of white bread
- one slice of whole wheat bread
- one slice of dark rye bread
- two tablespoons of jam or jelly
- two tablespoons of crunchy peanut butter mixed with raisins

*To keep the cost minimal, have designated students bring in the sandwich materials.

For reporting information and saving the sights of the activity:

digital camera (check batteries!)

computer with necessary software, HyperStudio® or PowerPoint®

For teacher use:

- Blackboard and colored chalk
- or overhead with various colored pens

Teacher Preparation:

Preview and preread instructional material.

Make a blank diagramed worksheet for students to fill in as they learn.

Purchase sandwich materials.

Practice with your materials. Difficult to spread peanut butter, runny jelly, etc.

Know which students have special eating or handling allergies.

Prerequisite Student Skills:

About the subject

My students read Prentice Hall Science, Dynamic Earth Chapter 1.

(Any material that discusses the movements of plates to change the earth's surface may be used.)

Internet sites that may be of interest:

<http://geohazards.cr.usgs.gov/welcome.html>

<http://www.infoplease.com/index.html>

<http://www.mms.gov/mmskids/>

<http://www.kidsvista.com/Sciences/geology.html>

<http://www.consrv.ca.gov/dmg/pubs/cg/teacher/faults.htm>

Student Activities / Procedures:

*Have preselected students take digital photographs at each step of the process.

Write key questions on blackboard or overhead.

Key Questions:

1. How do natural forces shape the rock layers of the earth's crust?
2. How do the layers of rock compare to the layers of a peanut butter and jelly sandwich?

Procedure

*You will need to designate students to use the digital camera during the day.

Have students work in pairs to build their model sandwiches.

Have them start out with the white bread and work their way up. I've used colored chalk to help distinguish between layers while building. (Tony Brewer would be proud!)

Pass out materials.

While passing out the materials have the students come up with imaginative names for the layers such as "wholesome shale" for the whole wheat bread and "jammin' jellystone" for the jelly layer. Choose students to record the names on the board or paper.

Sandwich construction

Place the white bread on the paper plate.

Next spread the peanut butter on the bread.

Add the whole wheat bread, jelly or jam, and rye bread.

All students should have identical three layer sandwiches.

*As the students build their sandwiches keep track of their progress by drawing each layer on either the blackboard or overhead.

Discussion

It took about ten minutes to build our sandwiches. How long would it take the earth to form the layers of the crust?

Which layer would be the oldest layer? (bottom) How did you arrive at that conclusion?

What is the youngest layer called in our sandwich?

What is the age of the shale or wheat bread? (Since the layers might not have taken the same time to

build, it is better to say it is younger than the conglomerate and older than the limestone.)

Participation

Have the students draw pictures of their sandwich for each of the four terms, anticline, syncline, lateral fault and vertical fault.

Geologists rarely find layers that are flat and horizontal. Many times the layers are bent or even broken.

Keeping the oldest layer on the bottom, have the students bend their sandwich to form a hill. This is called an ANTICLINE. Have the students then bend their sandwich to form a trough. This is called a SYNCLINE. Mountains and valleys are often formed this way. (Where have you seen these layers?)

Sometimes the crust of the earth moves up or down causing earthquakes.

Carefully cut the sandwich in half and move one half up or down. You can see the layers moving past one another. This is called a VERTICAL FAULT.

Slide the two parts of the sandwich past one another on the same level. This is called a LATERAL FAULT. Sliding past one another causes the rocks to break apart some of the other side. This breaking would cause earthquakes.

Now students may enjoy eating their rock layer sandwiches.

Assessment / Evaluation:

Because this is a participatory lesson, students will be graded on how well they behave themselves while making their sandwiches. During the discussion and the slamming of the sandwiches students may be randomly checked to see that they move the “plates” in the proper directions. You may want to grade their answers to the *Key Questions* and check to see if they made any creative names for the layers. How well they cleaned up is a big factor for me.

Follow up activities:

Kids will be required to write a short paragraph about the picture they took of PB&J Geology. They may type directly into a power point document so we can show all the pictures in slide show format.

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