LEARNING SET 1 INTRODUCTION

Learning Set 1

What Does My Earth Structure Look Like? What Can It Tell Me About the Movements and Changes in the Region Around it?

t ***6 class periods****

Groups build three-dimensional models of their Earth structure using topographical maps and then compare the topography of their Earth structure with another group's Earth structure.

Overview

Students begin with exploring their Earth structure by considering its topography. Students build a three-dimensional model of their Earth structure using topographical maps. Then using data maps from the software *My World,* students compare the topography of their Earth structure with another group's Earth structure. Students look for patterns in their observations and the data provided, and begin to explore the possible processes that shaped their Earth structure and structures similar to theirs. They then begin to explain the changes that have occurred at their Earth structure based on their topographic map, their three-dimensional model, the facts sent by their pen pal, and the data map they created. By studying the shape of the land, students will begin to recognize and describe structures of the crust that will help them interpret the patterns of earthquake and volcano data distributed around the world. During this *Learning Set,* students add their claims and supporting evidence to the class's *Project Board*. These early modeling and sharing activities help students set the stage for the kinds of thinking they will be doing around complex data.

*A class period is considered to be one 40 to 50 minute class.

Targeted Concepts, Skills, and Nature of Science	Section
Scientists often work together and then share their findings. Sharing findings makes new information available and helps scientists refine their ideas and build on others' ideas. When another person's or group's idea is used, credit needs to be given.	1.1, 1.2, 1.3, BBQ
Scientists must keep clear, accurate, and descriptive records of what they do so they can share their work with others and consider what they did, why they did it, and what they want to do next.	1.1, 1.2, 1.3, BBQ
Graphs and tables are an effective way to analyze and communicate results of scientific investigation.	1.2, 1.3
Identifying factors that lead to variation is an important part of scientific investigation.	1.2, 1.3, BBQ
Scientific investigations and measurements are considered reliable if the results are repeatable by other scientists using the same procedures.	1.2, 1.3
Scientists make claims (conclusions) based on evidence obtained (trends in data) from reliable investigations.	1.2, 1.3, BBQ
Explanations are claims supported by evidence, accepted ideas, and facts.	BBQ
Scientists use models to simulate processes that happen too fast, too slow, on a scale that cannot be observed directly (either too small or too large), or that are too dangerous.	1.2, 1.3, BBQ
Scientists use models and tools such as *Geographic Information Systems,* and a variety of maps to develop claims and explanations from evidence in the data.	1.2, 1.3, BBQ
Earthquake activity, volcanic activity, and topography are all evidence that Earth's crust is moving and changing.	1.2, 1.3, BBQ
Interactions between Earth's crustal plates can result in mountain-building, rift valleys, and geologic activity such as earthquakes and volcanoes. Underwater volcanic activity may form underwater mountains, which can thrust above the ocean's surface to become islands.	1.2, 1.3, BBQ

Students' Initial Conceptions and Capabilities

- **Students may think that the world was always as it is now, or that any changes that have occurred must have been sudden and comprehensive. (Freyberg, 1985.)**
- **Some students may have difficulty constructing explanations about the causes of volcanoes and earthquakes. (Duschl, Smith, Kesidou, Gitomer, & Schauble, 1992.)**
- **Some students might believe that the continents drift around the Earth or float. Others may believe that the continents do not move at all. (Phillips, W.C., 1991.)**
- **Some students may believe that volcanic island chains result from a hot spot moving beneath them.**
- **Some students believe that mountains are created quickly. (Phillips, W.C., 1991.)**
- **Some students may believe that Earth is liquid rock except for its crust. (Phillips, W.C., 1991.)**
- **Whether from the news, a fictional setting, or from personal experience, students probably have some ideas about earthquakes and volcanoes. Fictional settings could be anything from a deadly earthquake causing a crack in the Earth that swallows people up to lava rushing out of a volcano destroying everything in its path. However, they probably do not know what causes an earthquake to occur or a volcano to erupt. They don't have the understanding or the vocabulary that would allow them to explain why they occur or the evidence to predict future occurrences.**

Understanding for Teachers

Fact versus Opinion

Students may have difficulty separating facts from opinions in their pen-pal letters. Some students may pick out opinions or myths rather than facts to form their explanations. The Aleutian Island pen-pal letter should be used to model how to go through each task during this Unit. Model for students the difference between fact and opinion, pointing out the need for scientific evidence to back up a fact.

Topographic Maps

Topographic maps (called "topo" maps for short) are provided and used to construct a three-dimensional map. Topographic maps are maps that show lines of constant elevation. These lines are usually chosen with a convenient increment such as every 100 feet or, as is shown with the example in the student text, every 1500 feet. When the elevation changes rapidly the contour lines are close together. When the change in elevation is gradual the lines are spaced further apart. From these contour lines, one is able to ascertain the slope of the land structure.

*1 class period** u

Learning Set 1

What Does My Earth Structure Look Like? What Can It Tell Me About the Movements and Changes in the Region Around it?

10 min.

Introduce the Learning Set *to the class.*

LEARNING SET 1 IMPLEMENTATION

Learning Set 1

What Does My Earth Structure Look Like? What Can It Tell Me about the Movements and Changes in the Region around it?

The *Big Question* you have to answer in this Unit is *How can you explain the changes happening around the regions of certain Earth structures?* To answer this question, you will break it down into smaller questions. There are many smaller questions you might ask. You recorded some of those questions on the *Project Board*. You will answer those questions about your assigned Earth structure. Others in your class will answer the same questions about their Earth structures. When you share your answers, you will be able to see the big picture and answer the *Big Question*.

Think about your Earth structure and what it looks like. Does it look like it has been built up or worn down? What does the surrounding region look like? You will answer two smaller questions in this *Learning Set*. The first is *What does my Earth structure look like?* The second is *What can my Earth structure tell me about the movements and changes in the region around it?*

ES 41

EARTH STRUCTURES AND PROCESSES

Engage

Begin by asking a few students of places they have been that have interesting Earth structures and why they think they are interesting.

Then ask groups to describe a feature of their Earth structure.

TEACHER TALK

"Describe a feature of your Earth structure. For example, is it a mountain, a valley, a plain, an island? Is it rocky? Sandy? Muddy?"

△ Guide

Then remind students of the Unit's *Big Question: How can you explain the changes happening in the regions around certain Earth structures?* and let students know that they will be answering this through smaller questions.

TEACHER TALK

"You've already begun to think about your Earth structures and changes that may be occurring to them. Trying to figure out the processes that change Earth's land is a big question. We will begin answering this by considering smaller questions such as: *What does my Earth structure look like? What can my Earth structure tell me about the movements and changes in the region around it?* These are the questions that this *Learning Set* focuses on. You will break down these questions too, to find answers as you work through this *Learning Set.*"

NOTES