

Suzanne Jensen

Grade: 7th

Title: An Ounce of Prevention

GLEs Addressed

Science Content GLE [7] SD2.1

The student demonstrates an understanding of the forces that shape the earth by identifying strategies (e.g. reforestation, dikes, windbreaks, off road activity guidelines) for minimizing erosion.

Science Process GLE [7] SA1.1

The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring and communicating.

Writing GLE [7] 3.2.2

The student writes for a variety of purposes and audiences by writing in a variety of nonfiction forms (e.g., letter report, biography, and /or autobiography) to inform or describe.

Cultural Standard B4

Culturally knowledgeable students are able to build on knowledge and skills of the local cultural community as a foundation from which to achieve personal and academic success throughout life. Students who meet this cultural standard are able to identify appropriate forms of technology and anticipate the consequences of their use for improving the quality of life in the community.

Science Concept: A variety of strategies can be used to prevent or minimize erosion.

*****The scoring guide and assessment task are located at the end of the lesson. Please share them with your students before beginning the lesson.**

Materials (for each group)

Bin or tub

Water bottle with holes (for “raining” on the models)

Modeling clay (3 inch cube)

2 cups gravel

2 cups sand

3 cups water

3-5 larger rocks

3 paper cups

1 pair scissors

2 hollow tubes

Cotton balls

Nylons (knee highs or pieces)

Straws

1 ruler

1 plate or cookie sheet
“Model” vegetation (felt, potpourri, dried moss, etc.)
Science journal –one per student

Resources:

Earth’s Changing Surface by Michael J Padilla, Uiabbus Miaoulis, and Martha Cyr; Pearson Prentice Hall 2005
Earth Science for Every Kid: 101 Easy Experiments that Really Work by Janice VanCleave; John Wiley and Sons, Inc. 1991

Vocabulary

Erosion: the process by which water, ice, wind, or gravity moves weathered rock and soil

Weathering: the chemical and physical processes that break down rock at Earth’s surface

Deposition: process in which sediment is laid down in new locations

Permeable: characteristics of a material that is full of tiny connected air spaces that water can seep through

Abrasion: the grinding away of rock by other rock particles carried in ice, water or wind

Sediment: Earth materials deposited by erosion

Gravity: A force that moves rock and other materials downhill

Mass Movement: any one of several processes by which gravity moves sediment downhill

Runoff: water that flows over the ground surface rather than soaking into the ground

Slope: shape of land related to how steep the gradient is

Volume of Flow: volume of water that moves past a specific point in a given amount of time.

Note: All definitions are from Earth’s Changing Surface

Gear Up Process Skills: observing, predicting

In science journal, have students respond to the question: “How can you prevent or reduce erosion?” Discuss student entries as a class.

Teacher demonstrates one way to test a material for severity of erosion by using beach glass. The beach glass is piled up in the middle of the tub/tray on top of the overturned plate. The teacher makes a prediction about the dispersal of the beach glass, and then the teacher pours water over the beach glass. Student volunteers can describe through observation the movement of the beach glass. Students can also predict several strategies that will prevent erosion of the beach glass.

Explore Process Skills: observing, describing, predicting

In groups, students will design and test methods to simulate the effects of water erosion on a variety of materials. Students will also design and test possible solutions to erosion on these different materials. Review or introduce vocabulary words.

Ask: What happens when sand is eroded? What happens when rocks or other substances are eroded? Ask students to brainstorm a list of materials that might be eroded. Write the list on the board and then ask students to predict which materials are most severely affected by erosion. Students may also volunteer ideas for controlling the effects of erosion on specific materials. If not ask: What might we do to stop erosion of sand or gravel?

Introduce the materials that will be tested in class (sand, gravel, large rocks, clay, etc.). Give students time to make predictions on the severity of erosion for each of these materials and to list

some strategies that they predict will be effective in controlling erosion. The predictions will be written in each student's science journal.

Explain that students can devise their own strategies for testing and controlling erosion. Before passing out materials, discuss lab safety rules and emergency procedures. Distribute materials and allow students to begin exploration. Students should record their observations and results in their science journal.

Circulate and observe student groups in action. Begin asking the Generalize questions listed below to student groups as appropriate.

Generalize Process Skills: inferring, communicating, making generalizations

How did you test materials for severity of erosion?

What were some challenges that your group experienced?

Which materials were most severely affected by erosion?

What strategies did you find for controlling the effects of erosion on these materials?

Which strategies worked well? Which ones did not?

Having heard about some of the other groups' methods, what would you try or do differently if we went back to the explore activity?

How does the type of material affect the severity of erosion?

What are some factors, in addition to the type of material, which affect the severity of erosion?

Where in the local area might you find water erosion of some of these same materials (sand, rocks, gravel, and/or clay)?

Which materials acted as sediment?

What were some of the variables you tested in this lab?

How could we graph information from this activity?

**Note that each group may have different answers to some of the generalize questions as their explore activities were different. But, the whole group will benefit from hearing about other groups experience and should share small group results with the whole class. They will also be able to compare their explore and results to other groups.*

Apply Process Skills: observing, inferring, making generalizations, asking questions

The teacher will present a slide show of photos that detail the negative effects of erosion (e.g. flooded homes, mudslides, eroded road systems, etc.). Ask: What can be done to prevent erosion in these situations? Allow student pairs time to think, discuss their ideas, and write their solutions on mini-dry erase boards. Student pairs volunteer to share their solutions with the large group.

Extensions

Take a short walk around the local area with science journals and writing utensils. Look for real-life signs of erosion during your walk and sketch the scenarios you see in your journal. Try to pinpoint causes of erosion in each scenario and draw arrows to show the direction of forces. Brainstorm and/or make note of any current strategies for minimizing erosion in each scenario.

Take a class field trip to the beach. Create a diagram of the beach in your science journal and explain at least three causes/forces of erosion that you see. Use arrows to show the direction of forces and describe the impacts that these forces have on the various materials at the beach.

Choose one material and one force of erosion and design your own experiment in which you test the severity of erosion on that material and find the most effective way to minimize erosion (e.g. material = sand; force of erosion = wind; How severely does wind cause erosion of sand? What is the most effective strategy for minimizing the wind's erosion of sand?).

A further explore activity could be designed to model beach erosion and erosion prevention.

Scoring Guide

GLE/Standard	Below Proficient	Proficient	Above Proficient
Science Content GLE [7] SD2.1	Student identifies at least 2 strategies for minimizing erosion.	Student identifies 3-4 strategies for minimizing erosion. Each strategy is described with 1-2 details.	Student identifies 5 or more strategies for minimizing erosion. Each strategy is described with 3 or more details.
Science Process GLE [7] SA1.1	Student makes 1 or no predictions about the impact of erosion.	Student makes 2 predictions about what will happen to the local environment if erosion is not prevented.	Student makes 3 or more predictions about what will happen to the local environment if erosion is not prevented.
Writing GLE [7] W3.2.2	Student writes a letter that includes 2 or fewer suggested strategies to prevent erosion and omits how it will benefit the community. Has 5 or more grammatical, spelling or convention errors.	Student writes a letter that includes 3 suggested strategies to prevent erosion and how it will benefit the community. There are fewer than 4 grammatical, spelling, or convention errors.	Student writes a letter that includes 4 or more suggested strategies to prevent erosion and how it will benefit the community. Spelling and grammar is correct writing conventions are used.
Cultural Standard B 4	Student identifies at least one strategy appropriate for our community.	Student identifies at least 2 strategies that are appropriate for the local community. At least one of these strategies is connected to a specific aspect of the road construction project.	Student identifies at least 3 strategies that are appropriate for our community. At least two of these strategies are connected to a specific aspect of the road construction project.

* Please note that scoring guide criteria such as appropriate, conventions, strategies, etc. may need to be discussed and explained before the task is given.

Assessment Task

Construction has begun on a new road. This road will connect the main road to a new development on the other side of a local mountain. Part of the new road will cross a salmon stream. Another part of the road will cut through the hillside. The builders anticipate that construction of the road will require several months.

Local citizens and government officials are concerned about the effect of the construction and the road on the environment. You are an erosion expert. You have been hired to help the city prevent erosion during this construction project. Write a letter to the city council that describes at

least 3 erosion prevention strategies that should be used for this project and also predicts at least two things what will happen if erosion is not prevented. At least two erosion prevention strategies need to be appropriate for the local community and at least one of those strategies should be connected to a specific aspect of the road project.

Correct letter format should be used with four or fewer spelling, grammar, or convention errors.