



Lesson Plan for “Erosion Challenge”

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Introduction/Background Info

Have you ever found a smooth river stone and wondered how it became so smooth? Have you heard of landslides, and how they can sweep away entire houses? Both of these are caused by erosion, which is a natural shaping force in our world. Erosion is natural, but it can also be a problem. Engineers are working hard to find ways to slow down erosion, which can be caused by things such as wind and water. Today we will be splitting up into teams to try to prevent erosion, and understand how this force can be a problem and what we can do to help prevent it from destroying our buildings.

Student Objectives

Students will leave with an understanding of:

- What erosion is, and the different forces that cause it
- How erosion shapes our environment
- Why erosion can be a problem
- Problem solving skills when faced with a scenario in which they must apply their understanding to prevent erosion

Topics

Erosion: common phenomenon where solids, such as rock and sediment are transported by water, wind, or ice to other locations. This process can be reduced as well as increased by human activity and engineering.

Examples of erosion include wind, water, ice, people hiking, vehicles, etc.

You can see erosion especially in cliffs, beaches, trails and roads, smooth river stones, etc.

Erosion can be prevented through natural measures such as trees, grass, and vegetation, as well as manmade structures such as walls, reinforcements, sandbags, etc.

Overview of Lesson Process

The intro will be 10 minutes, and consistent of a brief discussion on erosion. Introduce the activity, and then break out into small groups. The next ten minutes will be devoted to the planning phase, in which students decide what materials they want to purchase and discuss their “plan of attack”. The actual creating and testing will take up most of the lesson, clocking about 20 minutes. During this students will place objects and subsequently have the tutor test the design with water to see what happens. The lesson wrap-up will take up the last 10 minutes, and during this students will debrief on what worked and what didn’t, as well as discuss with the class real world applications and scenarios. This will help tie in the lesson to the real world.

Materials

Material	Purpose	Price
1 box of plastic forks	To act as "trees"	\$2
At least 30 pieces of plastic/plastic lids	Anything flat, thin and waterproof that can serve as a barrier, maybe cut up plastic plates or cups?	~\$3
One bag of Cotton swabs (optional)	To serve as sandbags	\$2
Shallow plastic tubs/boxes - one per group (2-3 students per group)	To serve as a tray for water and to build sand onto	If five groups, \$15, but BEAM might already have these
Sand	The "soil" which gets eroded	\$5
Water	The "rain" which tests erosion	From tap
Play-doh	To ground forks, barriers, will go underneath sand, make using: 1/4 cup salt 1 cup flour 1/4 cup water	\$4
One cup per group	For pouring water	Can use some of cups not cut up (above)
One printed out worksheet per student	See next page for example	-
Total		\$16 \$31 including tubs

Procedures

Phase 1: Intro – 10 min

This part is the brief class “lecture” on erosion, and the planned activity. Have one (or several) students at the front of the class explain what erosion is and examples of what causes it. Ask class to name a few examples of erosion that they may see around them (see Background for examples.) Introduce the activity, and then break out into small groups.

Phase 2: Planning – 10 min

Give your group the materials “purchasing” worksheet and make sure you have one of each object. Briefly go over the items on the sheet with them, showing them an example of each item and discussing what it is and how they think it can help with erosion. For example, for the fork explain how it represents a tree (the prongs are like roots that hold together the soil). Then, explain how the purchasing works, their limit, and let them decide what objects they want to buy, giving advice when appropriate. Once they have totaled up their sheet and what they want, have them “purchase” those objects.

Phase Three: Design, Create& Test – 20 min

Allocate a few objects to each student, and have them plan where they will put each one. This should be an engaged process, and will alternate between placing objects and “testing”. For the testing stage, the tutor will gently pour water down the slope at their discretion. The nature of the sand will change as it gets more and more wet, but this is okay. After each pour, have the students change what they think didn’t work, and point out what is working. At an agreed point with other tutors, encourage students all together to look at other groups to see what designs are working and which aren’t.

Phase Four: Debrief – 10 min

This is the end wrap-up of the lesson. Poses questions such as “what would you have done differently?” and “what objects worked best/worst?” Point out visible effects of erosion, such as water pollution, landslides, and have them imagine how this would be a problem if there was a road, house or even city built on the slope. Briefly mention that this is why engineers care what kind of ground there is before they build these kinds of structures.

Resources

1. “Riprap: It’s not hip hop but erosion stop.” Science Buddies. Accessed 27 Dec. 2010.
<http://www.sciencebuddies.org/science-fair-projects/project_ideas/EnvEng_p024.shtml?from=Home>

Erosion Challenge

Scenario:

50 years ago, farmers removed all the trees near a lake so that they could grow crops. Now, the farm is gone and there are still no trees. With no roots to hold together the ground, every time it rains soil is getting washed down into the lake, polluting the water. Fish are dying, and the water is getting too dirty to drink or swim in.

The City of Los Angeles has hired you to help decrease the erosion happening. They are giving you a \$1,000 budget to find a solution to help stop the erosion. Decide with your group what are the best materials to buy, calculate the total price and then build before the next rainstorm hits! Don't go over budget!

Rules:

- 1) Don't go over budget! Choose your purchases wisely!
- 2) You may only place objects in the sand, you cannot touch or move the sand.

Purchase	Looks Like:	Price	How many?
Tree	Fork!	\$150	
Barrier	Plastic Piece	\$200	
Sand Bags	Cotton	\$100	
TOTALS	-	Total Price:	Total Purchases: