



the CEED

THE CENTER FOR ENERGY EFFICIENT DESIGN

Erosion and the Effects of Erosion

Grade Level	Third Grade	Subject	Science
Objective(s): -TSW identify different ways erosion can happen -TSW determine the different causes of erosion -TSW identify ways to correct erosion and prevent it from continuing to happen		SOL Addressed:	VA SOL 2.7 TSW investigate and understand weathering and erosion on land surfaces VA SOL 3.1 TSW demonstrate understanding of scientific reasoning by conducting experiments in which: *observations are made and repeated *predictions are formulated *questions are developed to formulate hypothesis *data is gathered and analyzed *inferences are made and conclusions are drawn VA SOL 3.10 TSW investigate and understand the effects of erosion on organisms
		Common Core Standards:	4 - ES 5-1 Students will investigate that some changes in earth are due to slow processes, such as erosion 4 - ES 5-3 Students will know that water erodes landforms, reshaping the land by taking it away from some places 4 - IE 6 Students will conduct and investigate experiments

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Instructional Activities

<p>Materials Needed Per Class of 30</p> <p>and</p> <p>Prior Knowledge</p>	<ul style="list-style-type: none">-large bucket-2 large bags of dirt-5 large measuring cups-handheld fan or blow dryer- book "Erosion", by Joshua Rutten-1 bag of sand-student spiral notebooks-5 saucers or plates-5 pipettes/dropper-5 tubs for storage of team materials-digital camera (with video feature)-10 aluminum pans-2 ice cube trays <p>Prior Knowledge:</p> <p>Students should understand from previous lesson the term "weathering" and be able to identify an example of weathering. Students should also be able to discuss how land changes based on natural events (flood, fire, hurricane, tornado, drought), human impact, and weather (precipitation, wind)</p>
<p>Ways to differentiate this lesson plan</p>	<ul style="list-style-type: none">• EXTENSION for Higher Level Learner <p>Students will take digital camera around school grounds and photograph real-life erosion examples. Students will come back and describe what type of erosion possibly caused the movement of the soil and what changes could take place to prevent this from worsening.</p> <ul style="list-style-type: none">• MODIFICATIONS <p>Students will be grouped with stronger students to show all strengths in group and cooperative learning setting. Students will also be given an instruction sheet to help explain how to set up their models.</p>

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Instructional Activities

Introduction/ Anticipatory Set	Anticipatory Set: Take a bucket of dirt and dump it onto the table. With a hand-held fan and large measuring cup filled with water, ask: -What will happen if I turned on the fan or dumped the water out? -What are some problems that may happen because of this? -Can you relate this to anything similar in nature?	Introduction: Show students several pictures on Activboard of many eroded areas. Have students Think-Pair-Share what they notice in these pictures and predict what cause these pictures to happen. Ask students if they've ever seen land around us like this?
Guided Practice	<p>-Read aloud, <u>Erosion</u> by Joshua Rutten</p> <p>-Place students in teams of 4 or five, with no more than 5 in a team. Each group will be given their own tote with different bags filled with their experiments.</p> <p>-As a class, explain they will be completing four different representations of erosion using all the materials in each of the four bags. Students will show their models using the camera.</p> <ul style="list-style-type: none">- Model 1: Students will be given a dropper/pipette, a saucer, and dirt- Model 2: Students will be given a blow dryer or hand-held fan, dirt, and an aluminum pan- Model 3: Students will be given an aluminum pan, measuring cups, a small water bottle, and sand- Model 4: Students will use dirty ice cube trays, an aluminum pan, and dirt	
Independent Practice	<p>-After the completion of the four models, students will work with their partners on the following questions:</p> <ol style="list-style-type: none">1 - In model 1, when would this little amount of erosion take place? Name an example.2 - In model 2, what happened to the sand as the speed of the wind was	

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	<p>increased?</p> <p>3-In model 3, what would happen to the sand if the speed of the movement of water increased?</p> <p>4- If I took the measuring cup in model 3 and dumped the water directly out of the cup, what would happen to the sand? Would I see something like this in real-life where the water would pour at that speed and rate?</p> <p>5 - What happened to the ice and the pieces of pebbles and dirt as time passed? What happened to the sand? Can you think of anywhere in the world where this happens?</p>
Closure (Summary of Lesson)	<p>-Students will watch www.discoveryeducation.com "Weathering and Erosion"</p> <p>-Having their pictures of each of the four models in front of them, students will discuss the different causes of erosion.</p> <p>-Students will work with partners to define "erosion" in their own words.</p>
CEED Building Application/ Sensor Data	<p>Students will look online at the website to see how the CEED building can help prevent erosion</p> <p>-the green roof collecting water, the rain garden to capture rain, the tank that stores water to be processed, and permeable sidewalk to collect water</p> <p>Students will also view the student-made videos under "How It Works" to learn more about the building</p>
Assessment	<p>-Students will write independently the answer to the questions:</p> <ol style="list-style-type: none">What are the different types of causes of erosionDoes one cause of erosion effect land more than another cause? Explain why or why not.What problems result from erosion?Do you believe there are any other types of erosion we didn't investigate today?

INQUIRY LEARNING RESEARCH PROCESS GUIDELINES

The following table is just one guideline to use for developing your own inquiry materials. The seven steps in the Learning Research Process include not only how people learn but also how research is conducted. The heart of the design, the three-stage learning cycle of exploration, concept invention or formation, and application is embedded in the middle. In addition to these three stages, this design takes into account that learners need to be motivated to spend the time required for understanding complex subjects and that learners need to build this new knowledge onto prior knowledge. These are similar to the 5E and 7E learning models.

The Learning-Research Process

Steps in the Learning-Research Process	7E Equivalent	Component of the Activity
1. Identify a need to learn.	Engage	An issue that excites and interests is presented. An answer to the question <i>Why?</i> is given. Learning objectives and success criteria are defined.
2. Connect to prior understandings.	Elicit	A question or issue is raised, and student explanations or predictions are sought. Prerequisite material and understanding is identified.
3. Explore	Explore	A model or task is provided, and resource material is identified. Students explore the model or task in response to critical-thinking questions.
4. Concept invention, introduction, and formation	Explain	Critical-thinking questions lead to the identification of concepts, and understanding is developed.
5. Practice applying knowledge.		Skill exercises involved straightforward application of the knowledge.
6. Apply knowledge in new contexts.	Elaborate and Extend	Problems and extended problems require synthesis and transference of concepts.
7. Reflect on the process	Evaluate	Problem solutions and answers to questions are validated and integrated with concepts. Learning and performance are assess

Hanson, D. (2006). POGIL Instructor’s Guide to Process-Oriented Guided-Inquiry Learning. Lisle, IL: Pacific Crest