



the CEED

THE CENTER FOR ENERGY EFFICIENT DESIGN

Title :Land Management Practices Part 2 – Soil Erosion

Grade Level	7 th	Subject	Life Science
Objective(s): Students will examine different types of soil erosion Students will test several different materials to see which one best slows soil erosion Students will create a plan of action for slowing soil erosion on the nature trail at the middle school		SOL Addressed: LS.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which a) data are organized into tables showing repeated trials and means; b) a classification system is developed based on multiple attributes; c) models and simulations are constructed and used to illustrate and explain phenomena; d) sources of experimental error are identified; e) dependent variables, independent variables, and constants are identified; f) variables are controlled to test hypotheses, and trials are repeated; g) data are organized, communicated through graphical representation, interpreted, and used to make predictions; h) patterns are identified in data and are interpreted and evaluated; and i) current applications are used to reinforce life science concepts. LS.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment.	
		Common Core Standards: 6-8.WS.1 Write arguments focused on <i>discipline-specific content</i> . a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that	

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	<p>demonstrate an understanding of the topic or text, using credible sources.</p> <p>c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.</p> <p>d. Establish and maintain a formal style.</p> <p>e. Provide a concluding statement or section that follows from and supports the argument presented.</p>	
<p>Materials Needed Per Class of 30</p> <p>and</p> <p>Prior Knowledge</p>	<p>Samples of dirt, sand, gravel and rocks</p> <p>Plastic bins</p> <p>Watering cans or bottles</p> <p>Bottle caps</p> <p>tissues</p>	
<p>Ways to differentiate this lesson plan</p>	<ul style="list-style-type: none"> • EXTENSION • Students can write a plan of action to slow the soil erosion on the nature at the middle school • Students will create a rain garden to slow erosion on the nature trail • MODIFICATIONS • Students can be given materials (with descriptions of how they work in rain gardens that have already been created) to choose from by the teacher • The teacher should increase scaffolding by providing students with: an outline for the scientific method, appropriate data table templates, and procedures for testing each type of material. • Teacher may need to model soil erosion lab as guided practice before independent practice takes place. 	
<p>Introduction/ Anticipatory Set</p>	<p>Anticipatory Set:</p> <p>Students will take a trip outside to see soil erosion in action on the nature trail at the school.</p> <p>Think-pair-share --- Possible solutions to the problem on the nature trail</p> <p>Questions to ask students:</p> <ul style="list-style-type: none"> • What is soil erosion? • What is causing soil erosion at our school? • What can we do to slow it? 	<p>Introduction:</p> <p>Soil erosion is a very important agricultural problem that must be managed. The productive layer of dirt is called the humus or topsoil. If this layer is eroded away, then the ground is compromised. Soil can be eroded away by wind or water. There are a number of different methods of reducing soil erosion.</p>

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<p>Guided Practice</p>	<p>Allow students to investigate the rain collection and storage data on the CEED website http://dashboard.intellergy.us/ceed/index.php.</p> <p>Discuss the differences between water runoff and erosion at the CEED building versus the Nature trail at the Middle School.</p> <p>Look at pictures comparing the CEED building and the Middle School nature trail</p> <p>Facilitator Questions for the Activity:</p> <ul style="list-style-type: none"> • How can this data aid us in slowing the soil erosion that is occurring on the nature trail? • What materials could help in slowing soil erosion? 	
<p>Independent Practice</p>	<ul style="list-style-type: none"> • Students will work in groups of 3 and will be given the materials listed above • Students will hypothesize which material will slow the rate of erosion • Students must set up a data table to test each material • Students will test each material individually to see which material slows the erosion the most • Students will graph their findings and conclude which material most effectively slowed the rate of erosion 	
<p>Closure (Summary of Lesson)</p>	<p>Students will use their data to present a solution to the erosion problem on the school's nature trail</p>	

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CEED Building Application/ Sensor Data	Students will track rain water collection through the CEED dashboard to compare erosion at the two different buildings as well as to use with Rain garden extension activity
Assessment	<p style="text-align: center;">Students plan of action presentations Completion of data table and graph Student participation</p>

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	Explain	Critical-thinking questions lead to the identification of concepts, and understanding is developed.

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formation		
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