



the CEED

THE CENTER FOR ENERGY EFFICIENT DESIGN

Title: SEED SUCCESS!

Grade Level	Third	Subject	Science
<p>Objective(s): The student will demonstrate understanding of scientific reasoning by conducting experiments in which:</p> <ul style="list-style-type: none"> * Observations are made and repeated to ensure accuracy, * Predictions will be formulated * Distance will be estimated and measured in metric units <p>(This also goes with Math SOL 3.9)</p> <ul style="list-style-type: none"> * Data is gathered to formulate hypothesis * Data are gathered, charted, graphed, and analyzed <p>(This also goes with Math SOL 3.17)</p> <ul style="list-style-type: none"> * Unexpected or unusual quantitative data are recognized * Inferences are made and conclusions are drawn 		<p>SOL Addressed: Science: 3.1 a, b, c, e, g, j 3.8 b – Plant life cycles</p> <p>Math: 3.9, 3.17</p> <p>Common Core Science Standards: 2-LS2-1 - Plan and conduct an investigation to determine if plants need sunlight and water to grow.</p> <p>2-LS4-1 - Make observations of plants and animals to compare the diversity of life in different habitat.</p>	
<p>Materials Needed Per Class of 30</p> <p>and</p> <p>Prior Knowledge</p>	<p>Materials:</p> <ul style="list-style-type: none"> *Potting Soil *Plant Pots (1 per group) *Grass seed (enough for each group to plant 20-30 seeds in their plant pot) *Rain Gauge (to place outside-this will be used to measure the rainfall for our area each week) *Tray (to catch excess water underneath their plant pot) *Graph paper (for bar graph) *IPAD (for recording pictures of their grass growth) *Plant Journal *Centimeter ruler (for measuring your grass growth each week) *Graphic Organizer (for comparing and contrasting ending results) 		
<p>Ways to differentiate this lesson plan</p>	<ul style="list-style-type: none"> ● EXTENSION *Writing Extension: The student can extend this activity by writing a narrative about My Plant’s Journey: From Seed to Plant. Students will use their team’s photos printed from the IPAD to chronicle the life of their plants. Students must have six to eight pages describing the days of their recorded growth in this experiment. *Math Extension: Students will create a line graph on the rain fall collected each week at Ferrum Elementary, and at the CEED building. Students will write a paragraph describing the results of the line graph. ● MODIFICATIONS *Students will be placed in small groups and will helping each other with their data collections and relying on their group members for assistance. The groups will be diverse (including higher level math students mixed with students who struggle with math instruction). 		

CEED
Instructional Activities

<p style="text-align: center;">Introduction/ Anticipatory Set</p>	<p>Anticipatory Set: Students will watch the video segment from United Streaming entitled “How Plants Grow” (2minutes and 40 seconds).</p> <p>Questions to ask students:</p> <ul style="list-style-type: none"> • What does a plant need to survive? • How do parts of plants interact with the environment to meet their needs? • How would different amounts of rainfall affect or change plant growth? • How would a plants life change from one location to another? 	<p>Introduction:</p> <p>I will open the discussion by asking students to view the Plant PowerPoint that includes different pictures of plants. Students will make observations and infer how the plants in the pictures are alike and different. What are the things a plant needs to grow and survive in any type of environment? What are some of the factors that you have seen or observed that have harmed plants or prevented them from growing in their environment?</p>
<p style="text-align: center;">Guided Practice</p>	<ul style="list-style-type: none"> • Students will need to be placed into teams of 4 people. Each team has a small bag of potting soil (about 2 cups), a pot that has holes in the bottom with a tray to catch excess water, 20-30 fescue grass seeds, a spoon, and a rain gauge. • As a class, discuss briefly how to correctly plant a seed. Students work in teams to plant their grass seeds ½ inch into the soil, then carefully cover with loose potting soil. • Students will set up the rain gauge and discuss how to measure the water is collected twice a week. • 2 times during the school week, students will use their Plant Journal to measure how much water is collected in the rain gauge, and how much it has grown. Measurements will be done in centimeters. • Predictions need to be made and recorded by student teams: <ol style="list-style-type: none"> 1. What would a perfect day for growing look like to your plant? Why? 2. What are some factors that could cause our plant to grow quicker than a plant at the CEED building? Why? 3. What are some things that could harm our plant or keep it from growing? Why? 4. What could too many cloudy days mean for our plant? Why? 5. If the plant stays in the shade, will it grow at all? Why or why not? 	
<p style="text-align: center;">Independent Practice</p>	<ul style="list-style-type: none"> • Students will study and record the amount of rain fall twice at the CEED center by using the dashboard. • At the 2 chosen times weekly, everyone goes outside. Teams of students use their Plant Journals to record data. • They measure the growth of their plants in centimeters and the amount of rain fall in the rain gauge. There should be a recorder for each team. Teams will use school IPADS to photograph their plant’s progress twice weekly. • At the end of each day or at the end of the week, have teams discuss and compare and contrast the results to their predictions. Then have them explain possible reasons for their results. 	

CEED

Instructional Activities

	<ul style="list-style-type: none">• At the end of the project, students could graph their data using a bar graph and graphing paper.• At the end of this project, students will work with another group to compare and contrast their results. Students will use a graphic organizer to compare and contrast ending results.• During the testing times, the teacher should be monitoring and questioning students about their results and why they believe these results happened the way they did.
Closure (Summary of Lesson)	<p>*Was the data you collected between our school and the CEED building the same, similar, or completely different? Explain.</p> <p>*Do you think that your plant would have grown differently at the CEED building? Explain.</p> <p>*Is there anything that you could have done differently to change the outcome of your plant growth?</p> <p>*Students will infer and discuss why there were differences in rainfall and amounts and sunlight from the CEED building and our school.</p>
CEED Building Application/ Sensor Data	<p>*The students will access the CEED dash board real time weather data weekly.</p> <p>*Students will compare the rainfall and sunlight at the CEED building to the rainfall and sunlight at Ferrum Elementary. They will discuss and document the differences between the two locations and reflect on how their plant would have grown differently if it were being grown at the CEED building.</p>
Assessment	<p>*Students will be informally assessed by teacher observation, student participation, and student discussion.</p> <p>*Students will also be assessed by the completion of their Plant Journal's and compare and contrasting activity sheet.</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 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