Phenomenon Based Learning (PBL) Project
Cameo Lakey

Lesson 1: Engage

1. The "hook":

a. Each student had previously planted their own bean plants and learned how to plant the seeds in soil, how often they should water their plant, and the importance of placing the plants in the window in order for them to receive sunlight.

b. Currently, the bean plants have sprouted and every couple of days the students produce a drawing of what their plants look like and they use a ruler to measure how tall their plant is and record this information with their drawing. The students have additionally compared the growth of their bean plant to those of their peers' bean plants. This had made the students interested in as to why the bean plants are growing at different rates, even though they were all planted at the same time.

2. Divergent Question:

a. What have we learned about plants?

3. Generate Investigation Questions:

a. Based on what we have learned about plants so far, what are some questions you have on plant growth that we can investigate?

-How long does it take plants to grow?
-Why do some plants grow faster than others?
-Why do seeds have a coat?

4. Build a question that can be investigated:

a. Does the amount of sunlight and water affect the growth of plants?

Lessons 2-3: Explore and Explain

1. Lesson 2 - Experiment Set Up:

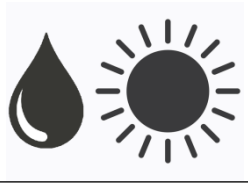
a. Five plants were obtained and each one was prepared to undergo a different environmental condition:

-Plant 1: Control (will receive both sunlight and water)
-Plant 2: No Water (will receive sunlight, but no water)
-Plant 3: A lot of Water (will receive sunlight and a lot of water)
-Plant 4: No Sunlight (will receive water, but no sunlight)
-Plant 5: A lot of Sunlight (will receive water and a lot of sunlight)

b. Students were divided into five groups, in which each group was provided with one of the plants and students had to draw a picture of, measure the height of, and take notes on, how the plant looked before performing the experiment:

Names:_____

Date: _____

1. Control 
Drawing:
Height:
Notes: _____ _____ _____ _____ _____

Names:_____

Date: _____

2. No Water 
Drawing:
Height:
Notes: _____ _____ _____ _____ _____

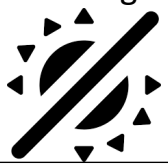
Names:_____

Date: _____

3. A lot of Water 
Drawing:
Height:
Notes: _____ _____ _____ _____ _____

Names:_____

Date: _____

4. No Sunlight 
Drawing:
Height:
Notes: _____ _____ _____ _____ _____

Names:_____

Date: _____

5. A lot of Sunlight 
Drawing:
Height:
Notes: _____ _____ _____ _____ _____

c. Students developed an educated guess on what they think will happen and why (evaluation).

Name: _____

I think the plant _____ will _____
(plant title)

_____
(what do you think will happen?)

because _____

_____

_____

(why do you think that will happen?)

2. Lesson 3 - Experiment Observations and Conclusions:

a. Students drew a picture of and took notes on how the plants looked after performing the experiment for several days, noting the differences between the before worksheet they completed during Lesson 2 and the after worksheet they completed during this lesson (similar worksheet to the one shown above for Lesson 2).

b. Students made conclusions from their findings and, using their drawing and notes, presented their conclusions and findings to the class.

c. Students justified why they made the conclusion that they did (evaluate).

Does the amount of sunlight and water affect the growth of plants?		
1. Science and Engineering Practices	2. Cross Cutting Concepts	3. Disciplinary Core Ideas
-Asking questions -Planning and carrying out investigations -Analyzing and interpreting data -Obtaining, Evaluating, and Communicating Information	-Cause and Effect	2-LS2 Ecosystems: Interactions, Energy, and Dynamics

Lessons 3 - 7: Extend

1. Lesson 3 - Physical Education:

a. Students performed a physical education activity in order to strengthen their understanding that both sunlight and water are needed in order for plants to grow as well as for students to meet the following Physical Education Standards for second grade:

-Standard 1.1: Move to open spaces within boundaries while traveling at increasing rates of speed.

-Standard 5.1: Participate in a variety of group settings (e.g., partners, small groups, large groups) without interfering with others.

-Standard 5.2: Accept responsibility for one's own behavior in a group activity.

-Standard 5.4: Encourage others by using verbal and nonverbal communication.

-Standard 5.5: Demonstrate respect for self, others, and equipment during physical activity.

-Standard 5.7: Participate positively in physical activities that rely on cooperation.

b. The activity proceeded as follows:

1. Students were divided into groups of four in which one student was the plant, one was sunlight, one was water, and one was a blocker.

2. The students who were plants lined up in a row on one side of the field while the students who were sunlight and water lined up on either side of the field in the middle. The blockers stood between those who were plants and those who were sunlight and water.

3. The object of the activity was for those who were sunlight and water needed to get to their plant and tag them. If the plant was tagged by one of the sunlight or water, then they get to walk; however, if they were tagged by both the sunlight and the water then they get to run. If the plant is not tagged at all, then they cannot move. The blocker's job was to tag the sunlight and water from opposing teams. If the sunlight or water was tagged by a blocker, then they cannot move and cannot tag their plant. The end goal was that whichever group was able to get their plant to the other side of the field first was the winner.

2. <u>Lesson 4: Visual/Performing Arts</u>

a. The students had previously learned about the color wheel in which they learned about the primary colors, how secondary colors are created, and why the colors on a color wheel are in a specific position.

b. For this lesson, the students strengthened their knowledge of plants and the color wheel by learning about the anatomy of a plant leaf (blade and vein) while learning how to draw leaves and what warm and cool colors are on the color wheel. Students then created a warm or cool colored painting by using water colors to paint the leaves they drew.

c. Students completed an assessment which involved them looking at their partners painting and indicating whether it was a warm or cool painting and how they know this.

Name: _____

1. Is the painting warm or cool?

_____

_____

_____

2. How do you know that the painting is warm or cool?

_____

_____

_____

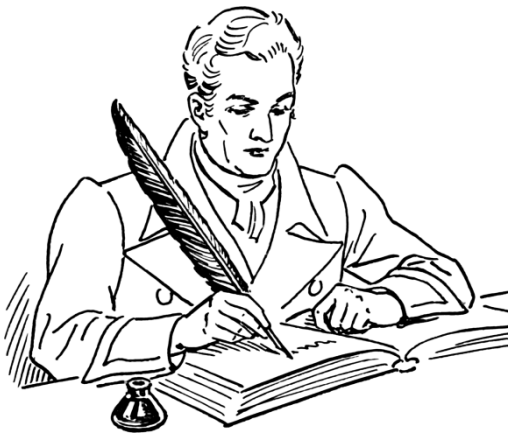
3. Lesson 5: History/Social Science

a. The students connected their learning about growing plants by learning about producers and consumers in this lesson with a specific focus on how farmers are producers who grow crops for us (the consumers) to eat and use. The students additionally analyzed what would happen if there was a lack of water and/or sunlight by transferring their knowledge of how this affects plant growth in order to analyze how this would affect the growth of crops as well as the producers of these crops (farmers) and the consumers of these crops.

b. Students completed an assessment which involved them being provided with images of producers and consumers where students had to circle the images that showed a producer and put a box around the images that showed a consumer. Students had to additionally write one example of a producer and one example of a consumer (note: struggling learners were solely provided with images they had to circle or put a box around).

Name: _____

1. Circle the producers and but a box around the consumers.



2. Write an example of a producer.

_____

_____

_____

3. Write an example of a consumer.

_____

_____

_____

4. Lessons 6 and 7: Additional Experiments

a. Based on what the students observed and concluded from their experiments on "Does the amount of sunlight and water affect the growth of plants?" the students adjusted their experiments in order to observe "Does the type of soil used affect the growth of plants?" The students captured their experience of the experiments by producing before and after drawings of the plants and writing about their analysis of the outcomes of the experiments.

Name: _____

Soil Type: _____

Before	After
Drawing:	Drawing:

Height:	Height:
Notes: _____ _____ _____ _____	Notes: _____ _____ _____ _____

Based on my observations, I found that _____
(name of soil)
makes seeds grow_____
(fast/normal/slow/not at all)
because before, the plant _____
_____
and now, the plant _____
_____

b. Lesson 6 consisted of students working in groups to plant bean sprouts within five different soil types (Potting Soil, Soft Sand, Gravel, Rocks, and Paper). Students then drew a picture of the planted sprouts within their soil type, measured the height of the plants using a ruler, and recorded any important notes. Lastly, the students predicted if the sprouts would be able to grow within their soil type and analyzed why they predict that outcome.

Name: _____

Prediction

Do you think your seeds will grow in your soil type? Why?

I think the seeds in _____will grow _____
(soil type) (fast/normal/slow/not at all)
because _____
_____
_____

c. Lesson 7 consisted of students observing and concluding if their sprouts were able to grow within the different soil types after several days. The students drew a picture of how the bean plants look now, measured the height of the plants using a ruler, and recorded any other important notes. The students compared their before and after drawings and data in order to analyze and conclude if the plants were able to grow within the different soil types and presented their group findings to the rest of the class. Lastly, the students wrote if their plant was able to grow in their group's soil type and why (by using the evidence) and also selected the soil type of a different group and wrote about if the plant was able to grow within that soil type and why. The lesson concluded with a class discussion about how the soil type does not affect plant growth as much as water or sunlight does.

Name: _____

The seeds in the _____ _____ grow
(soil type) (did/did not)
because _____
_____
_____