1. Essential Element

Activity/Lesson Title: Food Energy Cycles for Plants and Animals

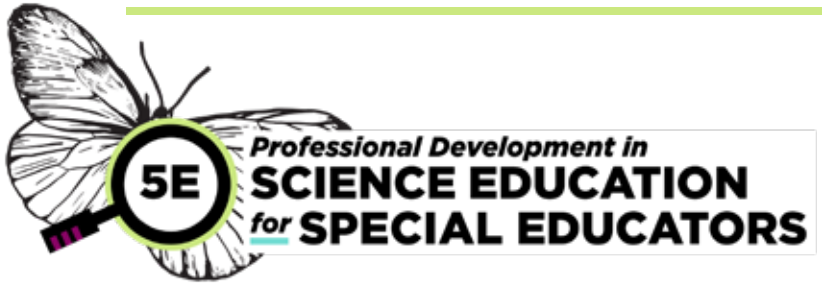
EE: EE.5-PS3-1: Energy in animals' food was once energy from the sun

Teacher: David

Grade Level: Elementary 3-5

Student: Kevin

Level: Initial



2. Science and Engineering Practice

SEP 2: Developing and Using Models

SEP description: Supports students as they use models to describe phenomena.

3. Disciplinary Core Idea

Energy in Chemical Processes and Everyday Life

Core Idea description: The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water).

4. Crosscutting Concept

Energy and Matter

Concept Description: Energy can be transferred in various ways and between objects.

5. Linkage Level Descriptors

Initial: Identify simple models that show that plants grow and need sunlight to grow.

Precursor: Use models to demonstrate that plants capture energy from sunlight.

Target: Create a model to describe that energy in animals' food was once energy from the Sun.

6. Student's Typical Accessibility Supports

- Tactile models
- Adapted ruler
- AAC device to respond and draw images
- Visual graphs created on a computer to show growth over time

7. Student Prior Experiences, Prior Knowledge

- The student has prior knowledge of when a change takes place.
- The student has prior knowledge of the sun and that it provides heat and light.
- The student likes being outside.
- The student likes taking care of plants.

8. Phenomenon to Explore

Question: What do you think would happen to sunflower seeds if we tried to grow them in a dark closet?

9. Possible Alternative Conceptions

Some students may think (incorrectly) that

- Food chains have a start and an end (and that matter moves through them in a straight line) vs. seeing them as a continuous cycle.
- "Food" is only a thing that animals eat (vs. the definition of food as any substance that provides energy and nutrients to an organism).
- The direction of arrows in visual models of food webs indicates "what eats what" instead of indicating the flow of matter/energy.

10. UDL Options and Solutions to Potential Barriers

- Use an appropriate number of hands-on investigations to simulate the flow of energy between the flower and the sun.
- Use a checklist that outlines steps for data collection during a hands-on experiment.
- Use a variety of formats (e.g., enlarged photographs, textured diagrams).
- Use a variety of materials (e.g., models, manipulatives, tactile representations).

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11. Engage

Think

- *How can I make sure to access students' prior learning?*
- *How can I use the CCC to connect everyday language with the scientific language of the phenomenon?*
- *How can I support student participation by scaffolding the SEP?*

Teacher Will

- Take students outside on a sunny day and help them understand how the sun feels on their skin.
- Ask students to identify differences between how it feels to be in the sun and to be in a shadow.
- Ask students to look toward the sun (but not directly at the sun) and look away from the sun.
- Ask students guiding questions like, "How does it feel?" and "Why does it feel different in the shade?"
- Ask students to watch a short video about sunflowers and how they follow the light.

Students Will

- Observe differences in how it feels to be in the sun and in a shadow.
- Watch a video showing how plants react to sunlight on a windowsill.
- Discuss their walk in the sun and connect it to how plants react to the sun.

12. Explore

Think

- *What is difficult or inaccessible about the phenomenon, and how can I make it more accessible in the Explore phase?*
- *How can students collect data in a way that helps answer a scientific question?*
- *How can I stress students' careful observation and asking good questions vs. looking for only the "right answer"?*

Teacher Will

- Ask students what they think plants need to grow based on what they viewed in the video.
- Adapt the investigation shown in a video to answer the question about plants needing light to grow.
- Help students plant seeds and observe their growth if placed in a windowsill vs. placed in a dark closet.

Students Will

- Plant seeds in jars containing soil.
- Place their seed jars on the windowsill; place one jar in a dark closet.
- Water and observe seed growth daily for 2 weeks.
- Answer questions and make a prediction about what they think will happen with each seed.
- Use a visual graph to record the seeds' growth; compare jars.

13. Explain

Think

- *How can I help students connect science topics, phenomena, data, and everyday experiences? How can I help my students differentiate everyday language from scientific language? What reasoning helps students see or explain the invisible?*

Teacher Will

- Ask students to make connections between the sunflower, the phenomenon they observe, their everyday experiences, and the data they record.
- Compare differences between plant measurements over time.
- Compare predictions with data they gathered about what plants need to grow.
- Discuss with students how plants get energy from light.

Students Will

- Complete a CER statement

Claim: Plants need light to grow.

Evidence:

  - » I watched a video that showed plants responding to light.
  - » I also planted seeds. Seeds sprouted on the windowsill but did not grow in the dark closet.

Reasoning: Plants need sunlight to grow.

14. Elaborate

Think

- *How can I enrich or extend student ideas? Are there related science concepts or processes that would support student learning?*

Teacher Will

- Extend the lesson by assisting students as they plant different seeds and observe their growth in light vs no light
- Extend the lesson by planting seeds in a room with artificial light; does the type of light matter in plant growth?
- Ask students to think about what essential thing that plants get from sunlight (energy)

Students Will

- Conduct additional investigations or read books that explain that plants get energy from sunlight needed for growth

15. Evaluate

Think

- *What do I need to see or hear from my students that assures that they have learned the science content? What information do I need to gather to inform my teaching as I move through the lesson?*

Teacher Will

- Provide an exit ticket asking about the accuracy of their prediction regarding which plants will grow in what condition during the investigation.
- Check accuracy of student measurements of plants by students.
- Use the student responses to inform the evaluation.

Students Will

- Take accurate measurements of plant growth
- Verify predictions during the investigation.
- Respond to questions posed by the teacher summarizing the investigation, what they did, and what they learned from it.

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