1. Essential Element

Activity/Lesson Title: Plant Growth Conditions
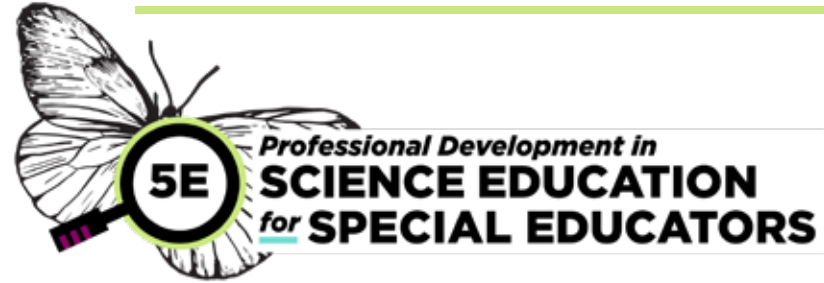
EE: EE.5.LS1-1: Support an argument that plants get the materials they need for growth chiefly from air and water

Teacher: Kayla

Student: Julia

Grade Level: Elementary (Grades 3-5)

Level: Target

Professional Development in SCIENCE EDUCATION for SPECIAL EDUCATORS (5E)

2. Science and Engineering Practice

SEP 7: Engaging in Argument from Evidence

SEP description: Support an argument with evidence, data, or a model. Supports students as they distinguish between opinions and evidence in making scientific arguments.

3. Disciplinary Core Idea

Organization for Matter and Energy Flow in Organisms

Core Idea description: Plants acquire their material for growth chiefly from air and water. [Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.]

4. Crosscutting Concept

Energy and Matter

Concept Description: Matter is transported into, out of, and within systems.

5. Linkage Level Descriptors

Initial: Distinguish things that grow from things that don't grow.

Precursor: Provide evidence that plants grow

Target: Provide evidence that plants need air and water to grow.

6. Student's Typical Accessibility Supports

- Communication device
- Visual schedule
- Graphic organizers
- Communication: picture-supported text
- Access materials with support of peers due to limited use of hands
- Provide enlarged pictures, highlight with yellow (a color she is more easily able to see), and provide increased lighting due to visual impairment
- Counting supports: counters to represent number of days that have passed since adding water, since seed sprouted, etc.

7. Student Prior Experiences, Prior Knowledge

- The student took a nature walk and collected, sorted and labeled items.
- The student categorized items that grow or do not grow.
- The student participates in planting, watering, and caring for plants in her family's garden and house.

8. Phenomenon to Explore

Question: What do seeds need to be able to grow into a plant?

9. Possible Alternative Conceptions

Some students may think (incorrectly) that:

- Things that are "large" got there because they have grown (e.g., a big rock "grew" from a smaller rock)
- Plants need human food or tending to grow

10. UDL Options and Solutions to Potential Barriers

- For students with visual impairments:
- Use enlarged and highlighted photographs and images; increase lighting to assist with vision.
- Enlarge or magnify videos
- Use preferential seating to be closer to the projection
- Use tactile measurement tools
- Use sequential photos or time-lapse video of plant growing.
- Collaborate with peer for measuring objects.

11. Engage

Think

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

Teacher Will

- Show time-lapse videos of a corn cob sprouting and of seeds sprouting in a baggie containing only a wet paper towel.
- Clarify that some plants use soil to grow, but not all. Use this as a prompt to lead into the Explore phase investigation: "What do you think plants need to grow?"

Students Will

- Respond to teacher prompts about what plants need to grow (air, water, and light) while watching the video
- Talk about the video and share experiences about seeing plants grow or experiences when plants didn't have what they needed to stay alive (e.g., no water, no light)

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 encourage students' careful observation and asking good questions vs. looking for only the "right answer"?*

Teacher Will

- Ask students to predict if they think seeds will grow using only light, air, and water. Do they need soil?
- Help students set up an investigation of having seeds sprout using only a plastic bag and a wet paper towel (no soil).
- Prepare 2 bags of bean seeds; place one bag in a dark place (no light) and another in the windowsill; compare the bags daily to see if seeds are growing.
- Assist students as they measure the length of the sprouts in each bag after a week.

Students Will

- Conduct investigations, make observations, and ask questions
- Use measurement tools to measure materials that have grown
- Record measurements in a data chart
- Communicate what they observe and relate the data to what they saw in the video

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 record their results from investigating what conditions the seeds grow or do not grow using a graphic organizer, whiteboard, or Smartboard (graphic projected).
- Assist students in finding evidence in the class data table that plants did not need soil to grow, but did need light, air, and water.

Students Will:

- Complete a CER statement

Claim: Plants need light, air, and water to grow.

Evidence:

- » Seeds sprouted in bags with light, air, water. Seeds did not sprout without water or light.
- » The seeds that got light, air, and water grew; they did not need soil to grow.

Reasoning: I used results from the investigation; I saw that some seeds grew. I measured the sprouts and saw that the seeds that got light, air, and water grew longer over time. I also saw that the corn cob in the video and beans in the baggie investigation did not need soil 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:

- Provide students with new seeds so that they can use the same investigation to see if seeds will grow with water and without water (focusing on a different variable).
- Monitor students to allow them to do as much of this second set of examples as independently as possible

Students Will:

- Add the new information to their graphic organizer.
- Complete a CER statement.

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 will inform my teaching throughout the lesson?*

Teacher Will:

- Monitor students' responses to questions during the lesson for prediction of conditions of growth and statement with evidence in CER;
- Monitor data collection for accuracy during observations
- Provide a T-chart for students to complete for what conditions are needed for seeds to grow/not grow.

Students Will:

- Respond to questions posed by teacher.
- Make measurements and observations, organize data they gather, complete a CER statement using data as evidence.
- Complete T-chart of conditions.