

1. Essential Element

Activity/Lesson Title: Earth Systems Interactions

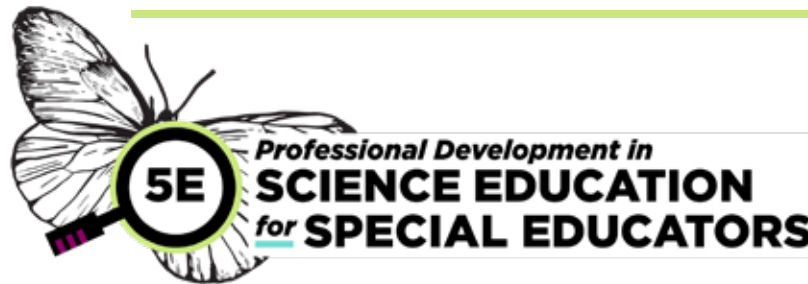
EE.5.ESS2-1: Develop a model showing how water (hydrosphere) affects the living things (biosphere) found in a region

Teacher: Malia

Grade Level: Elementary 3-5

Student: Matt

Level: Precursor



2. Science and Engineering Practice

SEP 2: Developing and Using Models

SEP description: Supports students as they develop and use models (such as diagrams, physical replicas, mathematical representations, analogies, and computer simulations) to understand the world, develop questions and explanations, and communicate ideas to others.

3. Disciplinary Core Idea

Earth Materials and Systems

Core Idea description: Earth's major systems are the geosphere, the hydrosphere, the atmosphere, and the biosphere. These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather

4. Crosscutting Concept

Systems and System Models

Concept Description: A system can be described in terms of its components and their interactions. A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot.

5. Linkage Level Descriptors

Initial: Anticipates routine (e.g., clothes to wear, activities to do) to follow when it is raining.

Precursor: Recognize how water (hydrosphere) affects people in a region (e.g., floods, droughts, mudslides, tourism, and recreation).

Target: Develop a model showing how water (hydrosphere) affects the living things (biosphere) found in a region.

6. Student's Typical Accessibility Supports

- Tablet
- Book on PowerPoint
- Videos and photographs
- Models and manipulatives (e.g. Legos)
- Visual schedule
- Labels applied to diagrams
- Graphic organizers (e.g. T-chart)

7. Student Prior Experiences, Prior Knowledge

- The student likes to build Legos and puzzles.
- The student likes to work independently.
- The student likes routines and predictability but can be distracted.
- The student understands how weather can impact him.

8. Phenomenon to Explore

Question: Can water move rocks or soil?

9. Possible Alternative Conceptions

Some students may think (incorrectly) that

- Clouds are like containers that hold water, and rain happens when clouds become too full.
- Water molecules only reside within clouds, not in the air around them.
- Mountains, rocks, and rivers are the same today as they've always been, or that rivers have always looked the same.

- Wind and water can't affect such large and seemingly permanent land features as rivers or mountains.
- Humidity and air temperature are the same all over the Earth, no matter how much water or the type of Earth's surface is nearby.
- The speed and direction of air can't be measured.

10. UDL Options and Solutions to Potential Barriers

- Use an iPad to show videos.
- View a PowerPoint to showcase books.
- Complete hands-on activities.
- Use interactive and assistive technology (e.g., selecting and manipulating answers).
- Use materials to build a model of a food/animal relationship).
- Use a visual schedule.
- Use a variety of formats (e.g., videos, photographs) and materials (e.g., models and manipulatives such as Legos).
- Use a graphic organizer (e.g., T-chart).

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

- Share a video with students that depicts a mudslide.
- Pose questions to students about the impact of water on rocks and soil.
- Help students connect what they see in the video with their life experiences (e.g., mud, rain, moving water).

Students Will

- Watch a video about a mudslide.
- Share ideas based on teacher questions about how water impacts rocks and soil.

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

- Adapt a stream model from a recommended general education lesson (e.g., "[Do-it-yourself experiments-Landslide](#)").
- Assist students in exploring a stream table model (containers filled with sand) that uses Lego houses placed on a slope sand surface.
- Probe with questions like, "What will happen if we pour the water at the top of the hill?" "What if we pour it at the bottom of the hill?"
- Assist students with pouring the water into the models and noticing the results.

Students Will

- Build stream model with assistance.
- Pour different amounts of water at different places in the model.
- Make observations about how different amounts of water, location, and speed of the pour impact homes, rocks, and soil.

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 questions like, "What do you think caused the house to fall?", and "Why don't all houses fall when it rains?"
- Introduce new vocabulary using a graphic (e.g., mudslide, rain, dry soil, grains).
- Assist students in completing a "Claim-Evidence-Reasoning" (or C-E-R) statement.

Students Will

- With teacher assistance, explain their findings using the C-E-R strategy:

Claim: I think water can move soil and sometimes damage homes.

Evidence:

- » I think this because I saw it in the video
- » I tested it out in the Lego model I built.

Reasoning: heavy rains can cause mud and rockslides.

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 to discuss another way that water affects people (e.g., flooding).
- OR conduct more investigations about conditions for mudslides- why doesn't every location have a mudslide?
- Assist the student in labeling the model after doing the experiment and in completing a new CER statement.

Students Will

- Brainstorm ways that water affects people.
- Conduct an investigation to test their new ideas.
- Complete a new 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 must I gather to inform my teaching as I move through the lesson?

Teacher Will

- Provide an exit ticket at the end of the lesson asking about the phenomenon and about what happened during the investigations.
- Use the student responses to inform the evaluation.

Students Will

- Respond to questions posed by the teacher summarizing the investigation, what they did, and what they learned from it.
- Complete a graphic organizer (t-chart) to organize data.
- Complete the CER.
- Complete an exit ticket to have students identify which types of impacts occur in what types of regions (for example, you need a stream or river for a flood; you need a lake, stream or ocean to fish, etc.).