

Grade 2 Science, Quarter 4, Unit 4.1
Earth Materials and Processes of Change

Overview

Number of instructional days: 10 (1 day = 45 minutes)

Content to be learned

- Record observations and data about physical properties of earth materials (rocks and soil).
- Use attributes of properties to state why objects are grouped together (e.g., rocks can be shiny or dull).
- Conduct tests on how different soils retain water.
- Identify earth materials (rocks and soil) that are best for different uses.

Processes to be used

- Make and record observations.
- Collect and analyze data.
- Demonstrate safe practices during classroom and field investigations.
- Use science processes such as predicting, making and recording observations, communicating, comparing, and conducting investigations, and controlling variables.

Essential questions

- If you had a pot of soil and a pot of sand, which would be better suited for growing a seed? Why?
- In what ways can rocks be sorted and grouped?

Written Curriculum

Grade Span Expectations

ESS1 - The earth and earth materials as we know them today have developed over long periods of time, through continual change processes.

ESS1 (K-4) INQ –1

Given certain earth materials (soils, rocks or minerals) use physical properties to sort, classify, and describe them

ESS1 (K-2)–1 Students demonstrate an understanding of earth materials by ...

1b recording observations/data about physical properties.

1c using attributes of properties to state why objects are grouped together (e.g., rocks that are shiny or not shiny).

ESS1 (K-4) INQ –2

Use results from an experiment to draw conclusions about how water interacts with earth materials (e.g., percolation, erosion, frost heaves).

ESS1 (K-2) –2 Students demonstrate an understanding of processes and change over time within earth systems by ...

2a conducting tests on how different soils retain water (e.g., how fast does the water drain through?).

ESS1 (K-4) FAF -6

Given information about earth materials explain how their characteristics lend themselves to specific uses

ESS1 (K-2) –6 Students demonstrate an understanding of properties of earth materials by...

6a identifying which materials are best for different uses (e.g., soils for growing plants, sand for the sand box).

Clarifying the Standards

Prior Learning

In kindergarten and first grade, students described, compared, and sorted rocks and soil using physical properties. Students used attributes of properties to state why earth materials are grouped together, and they identified which materials are best for different uses. First-graders recorded observations and data about physical properties, and they explored weight as a physical property. Beginning in first grade, students conducted tests on how soils retain water.

Current Learning

At the Reinforcement Level of Instruction

Second-graders continue to record observations and data about physical properties of rocks and soil. They conduct tests on how different soils retain water.

At the Drill-and-Practice Level of Instruction

Grade 2 students use the attributes of properties to state why objects are grouped together. Students also identify which materials are best for different uses, including which soils are best for growing plants.

Future Learning

In grade 3, students will identify water, soil, rocks, and air as the four basic earth materials. They will continue to describe, compare, and sort rocks and soils by physical properties; however, they also begin to use temperature, hardness, and composition to describe earth materials. They will record and analyze observations and data about physical properties, and will begin to cite evidence as to why rocks and soils are or are not classified together. Third-graders will conduct investigations and use observations to describe how water moves rocks and soils. They begin to use models to understand and explain erosion, sedimentation, deposition, and glaciation. They will identify that there are sudden as well as gradual changes that affect the earth. Third-graders will identify which materials are best for different uses and will determine and support explanations of their uses.

Additional Research Findings

Children come to school knowing that earth's surface is composed of rocks, soils, water, and living organisms. Looking closer will help them identify many additional properties of earth materials. By observing the physical properties of many rocks, children will see that some rocks are made of one substance but most are made of several substances. Only in later grades will these substances be identified as minerals. Soils have properties of color and texture, capacity to retain water, and ability to support the growth of many kinds of plants, including those in our food supply (*National Science Education Standards*, p. 130, 134).

Teaching facts about how the surface of the earth changes serves little purpose in the primary grades. Students should, instead, become familiar with all aspects of their immediate surroundings, including what things change and what seems to cause change. By the end of second grade, students understand that change is something that happens to many things, and that rocks come in many sizes and shapes, from boulders to grains of sand (*Benchmarks for Science Literacy*, p. 72).

A common misconception that students may have is that the world was always as it is now, or that changes that have occurred must have been sudden and comprehensive (*Benchmarks*, p. 336). According to *Making Sense of Secondary Science*, children often get confused when deciding whether a rock sample is *natural*. They consider it to be natural if it is untouched by man. They also consider that soil is just dirt or any stuff in the ground. They think soil is just used for plant growth, and that soil is different from dirt by stating that soil has more "goodness" to it (pp. 112, 114).

Playgrounds and nearby lots are convenient study sites to observe a variety of earth materials. As students collect rocks and observe vegetation, they see that soil varies from place to place. They can also compare

the effect of different soils on plant growth by planting seeds in a variety of soil samples. If they continue to revisit these sites, they will develop an understanding that earth's surface is constantly changing (*National Science Education Standards*, p. 130).

Notes About Resources and Materials

- Various types of rocks
- Various types of seeds (e.g., grass, beans, sunflowers, etc.)
- Various types of soil (soil, sand, clay, peat moss, etc.)

Trade Books

- Flanagan, A. (2001). *Soil*. Mankato, MN: Compass Point Books.
- Gans, R. (1997). *Let's Go Rock Collecting*. New York, NY: Harper Collins.
- Hiscosk, B. (1999). *The Big Rock*. Fullerton, CA: Aladdin.
- Knapp, B. (2002). *Rocks and Soils*. United Kingdom: Atlantic Europe Publishing Co.
- Rosinsky, N. (2002). *Dirt: The Scoop on Soil*. Mankato, MN: Picture Window Books.
- Richardson, A. (2003). *Soil*. Mankato, MN: Capstone.

Websites

- Foss Web—K-2—Pebbles, Sand, and Silt
<<http://www.fossweb.com/ca/modulesK-2/PebblesSandandSilt/index.html>>

Grade 2 Science, Quarter 4, Unit 4.2

Characteristics of Plants

Overview

Number of instructional days: 10 (1 day = 45 minutes) **The 10 instructional days may be spread out across the quarter to allow time for plants to grow.*

Content to be learned

- Observe and record external features of plants.
- Identify and sort plants based on external features.
- Identify the functions of the physical structures (external features) of a plant.
- Identify how the physical structures of a plant allow it to survive in its environment.
- Care for plants by identifying and providing for their needs.
- Experiment with a plant's growth under different conditions.
- Observe, scientifically draw, and label the stages in the life cycle of a plant.

Processes to be used

- Identify, describe, and sort plants using physical characteristics.
- Identify and describe the structures found in a simple system (e.g., a plant is a system with a variety of external structures, such as roots, leaves, stem, etc. Each structure has one or more functions that help the plant survive).
- Describe the functions of the structures found in a simple system.
- Observe and describe patterns of change within a simple system.
- Demonstrate safe practices during classroom and field investigations.
- Use scientific processes, including observing, comparing, sorting, drawing and labeling, conducting investigations, and drawing conclusions.

Essential questions

- How do plants grow and change over time?
- How do the parts of a plant help it survive?

Written Curriculum

Grade Span Expectations

LS1 - All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).

LS1 (K-4) - INQ+POC –1

Sort/classify different living things using similar and different characteristics. Describe why organisms belong to each group or cite evidence about how they are alike or not alike.

LS1 (K-2) –1 Students demonstrate an understanding of classification of organisms by ...

1c observing and recording the external features that make up living things (e.g. roots, stems, leaves, flowers, ~~legs, antennae, tail, shell~~).

1b identifying and sorting based on a similar or different external features.

LS1 (K-4) FAF –4

Identify and explain how the physical structures of an organism (plants or animals) allow it to survive in its habitat/environment (e.g., roots for water; nose to smell fire).

LS1 (K-2)–4 Students demonstrate understanding of structure and function-survival requirements by...

4a identifying the specific functions of the physical structures of a plant ~~or an animal~~ (e.g. roots for water; ~~webbed feet for swimming~~).

LS2 - Matter cycles and energy flows through an ecosystem.

LS2 (K-4) SAE –5

Recognize that energy is needed for all organisms to stay alive and grow or identify where a plant or animal gets its energy

LS2 (K-2)–5 Students demonstrate an understanding of energy flow in an ecosystem by ...

5a caring for plants ~~and/or animals~~ by identifying and providing for their needs; experimenting with a plant's growth under different conditions, including light and no light.

LS1 – [See above]

LS1 (K-4) POC –3

Predict, sequence or compare the life stages of organisms – plants and animals (e.g., put images of life stages of an organism in order, predict the next stage in sequence, compare two organisms).

LS1 (K-2)–3 Students demonstrate an understanding of reproduction by ...

3a observing and scientifically drawing (e.g. recording shapes, prominent features, relative proportions, organizes and differentiates significant parts observed) and labeling the stages in the life cycle of a familiar plant ~~and animal~~.

Clarifying the Standards

Prior Learning

In kindergarten and first grade, students distinguished between living and nonliving things. Students observed and recorded the external features of plants, and identified the function of the physical structures of a plant. Students in kindergarten and first grade learned to care for plants by identifying and providing for their needs, and they used a given set of pictures to sequence the life cycle of a plant. First-graders observed, drew, and labeled the stages in the life cycle of a plant, and learned to experiment with a plant's growth under different conditions.

Current Learning

At a drill-and-practice level of instruction, students observe and record the external features of plants. They identify the specific functions of the physical structures of a plant. (For example, the roots absorb water and anchor the plant into the ground.) Students care for a plant by identifying and providing for its needs.

At a reinforcement level of instruction, students experiment with a plant's growth under different conditions. They observe, draw, and label the stages in the life cycle of a plant. It is important that these drawings are scientifically accurate and that they take into account such things as prominent features and relative proportions.

Future Learning

Students in third grade will cite evidence to distinguish between living and nonliving things. They will also identify, sort, and compare based on similar and different external features. They will begin to cite evidence in order to draw conclusions about why organisms are or are not grouped together. Third-graders will identify the physical structures of plants, and explain how these structures allow plants to survive in their environments. Students in third grade will demonstrate an understanding of energy flow by identifying the sources of energy needed for the survival of organisms. They will demonstrate their understanding of the life cycle by sequencing a given set of pictures or data, and will begin to compare the life cycles of two plants.

Additional Research Findings

When learning about plants and animals, students at this level are capable of understanding that a living organism is a system; that each living organism has parts or structures; and that each structure has a function, enabling the plant or animal to survive in its environment. All organisms, like any system, change following predictable patterns.

Many students have limited interaction with nature, and therefore need multiple opportunities to observe a variety of plants in the classroom, on the school grounds, in the neighborhood, at home, and in parks, streams, and gardens. Students should be encouraged to ask questions for which they can find answers by looking carefully at plants, using hand lenses when needed. By the end of second grade, students should know that some plants are alike in how they look and what they do, while others are very different from one another. They should also know that plants have features or structures that help them live in different environments (*Benchmarks for Science Literacy*, p. 102). When learning to distinguish between living and nonliving things, elementary students typically use criteria such as movement, breathing, reproduction, and death as characteristics of living things. Therefore, some young children believe that fire, clouds, and the sun are alive while others believe that plants are not living (*Benchmarks for Science Literacy*, p. 341).

According to *Making Sense of Secondary Science*, only 30 percent of six-year-olds regard particular plants as living, whereas they recognize all animals as living things. Children in all age groups do not consider a tree to be a plant, however, many believe a tree is a plant when it is in its early stages of growth. Over half of students do not consider a seed to be plant (p. 23). Therefore, it is important to provide opportunities for students to observe the plant embryo within seeds, to observe and compare various plant life cycles, and to compare and describe various types of plants at various stages of growth.

According to *National Science Education Standards*, it is important for students to understand that all plants have structures that serve similar functions in growth, survival, and reproduction. It is also important for students to understand that many plants closely resemble the parent plant; many plants have life cycles that include germination, growth, reproduction, and death; and that the details of the life cycle vary among different plants (p. 129).

Notes About Resources and Materials

Houghton Mifflin *Discovery Works Science: Unit A* (Interactions of Living Things)

- Lesson 3 (Experiment can also be done)

Science Materials

- Living plants (assorted)
- Magnifying lens
- Potting soil (various types)
- Seeds

Websites

Glen Hills School's Library (for other trade books that are available)

Trade Books

- Bulla, C.R. (2001). *A Tree is a Plant*. New York: Harper Collins.
- Cole, J. (1995). *The Magic School Bus Plants Seeds: How Living Things Grow*. New York: Scholastic.
- Gibbons, G. (1993). *From Seed to Plant*. New York: Holiday House.
- Gibbons, G. (2002). *Tell Me Tree*. New York: Little Brown Books.
- Rosinsky, N. (2002). *Dirt, the Scoop on Soil*. Mankato, MN: Picture Window Books.