Have You Ever Wanted to Play in the Dirt? Learning about Soil

Author	Elissa Gonzalez
Grade Level	1
Duration	3 class periods

National Standards	AZ Standards	Arizona Social Science Standards
GEOGRAPHY **Essential Element: Places and Regions** 4. The physical and human characteristics of places **Environment and Society** 15. How physical systems affect human systems	**SCIENCE** **Earth and Space Science** **1.E1U1.5** Obtain, evaluate, and communicate information about the properties of Earth materials. Key Concepts include but are not limited to materials such as water, air, rocks, soils, and sand.	**GEOGRAPHY** **Human-environment interactions are essential aspects of human life in all societies.** 1.G2.1 Compare how human activities affect culture and the environment now and in the past. Such as agriculture, industrialization, urbanization, and human migration.

SIOP Elements		
Preparation Adapting content **Linking to background** **Linking to past learning** Strategies used	**Scaffolding** **Modeling** Guided practice Independent practice **Comprehensible input**	**Grouping Option** **Whole class** **Small groups** Partners Independent
Integrating Processes Reading **Writing** **Speaking** **Listening**	**Application** **Hands on** Meaningful **Linked to objectives** **Promotes engagement**	**Assessment** **Individual** Group **Written** **Oral**

Arizona English Language Proficiency Standards

Grade 1
Basic
Speaking and Writing
Standard 3 By the end of each language proficiency level, an English learner can speak and write about grade appropriate complex literary and informational texts and topics.
B-1: communicate simple messages about a variety of topics, experiences, or events.
B-3: compose short written texts using appropriate conventions (narrative and informational).
B-4: produce writing with appropriate organization on a variety of topics, experiences, or events using sentence frames.
B-5: identify and describe similarities and differences within a text.
Listening, Speaking, Reading, and Writing
Standard 7 By the end of each language proficiency level, an English learner can conduct research and evaluate and communicate findings to answer questions or solve problems.
B-1: record information and observations in guided notes.
B-2: respond to a question or problem based on gathered information from provided source.

ARIZONA GEOGRAPHIC ALLIANCE

Have You Ever Wanted to Play in the Dirt? Learning About Soil

Overview

Soil is important to all things that grow on land including, plants, animals, and humans. Soil is an important resource to protect and use sustainably.

Purpose

In this lesson, students will conduct an investigation to obtain, evaluate, and communicate the properties of soil. Students will then apply their understanding of soil properties to learn how Native Americans used soil to make pottery.

Key Vocabulary

soil: the upper layer of Earth in which plants grow

clay: a sticky kind of soil that can be molded to make bricks and pottery

silt: dirt that is carried by water and is larger than clay but smaller than sand

sand: tiny, loose pieces of rock that cover deserts and beaches

Materials

- 1 bag or bucket of soil (a mixture of nursery soil and dirt from your yard works well)
- Plastic containers
- Magnifying glasses
- Clear Mason jars
- Funnels
- Water
- Spoons
- Paper plates
- Paper towels for clean up
- Soil Observation Sheet 1
- Soil Observation Sheet 2
- Soil Assessment
- The Hohokam." Use the sections titled: Artifacts and Ceramic Production. https://arizonamuseumofnaturalhistory.org/plan-a-visit/mesa-grande/the-hohokam
- Do You Want to Play in the Dirt: Learning About Soil PowerPoint

Objectives

Student will be able to:

1. Observe and describe information about soil.
2. Use key words and phrases to respond to questions.
3. Describe why soil is important.

Procedures

SESSION 1

Engage:

1. Display the soil in containers. Explain to students that soil can be dirty when we touch it, play with it, or even step in it. And dirt can be so hard to clean! However, at the same time, soil is also one of the most important resources humans, animals, and plants that live on land need in order to survive.
2. Create a KWL chart on chart paper or on the white board. Ask students these guiding questions and write their responses in the "K" column:
   - What do you know about soil?
   - Why do you believe soil so important?
   - What do humans use soil for?
3. Then ask students the following questions and fill in the "W" column:
   - What are you wondering about soil?
   - What more would you like to know about soil?
4. *Note: Keep the "L" column blank. At the end of the lesson, you will revisit this KWL chart.* Then write the guiding question on the chart paper or white board: "What is in soil that makes it so valuable?" **(Preparation: Linking to background or Past Learning, Application: Promotes engagement, Grouping Option: Whole class)**
5. Divide class into groups of four. **(Grouping Option: Small groups)**

Explore:

6. Explain to students, they will be working in groups to answer that question. Distribute soil in plastic containers or paper towels, magnifying glasses, Mason jars, funnels, water, spoons, and paper towels to each group. Give every student the Soil Observation Sheet 1. Explain to students that in just a minute, they will be using the following materials to help them discover what is in soil.
7. First, allow students to explore the soil in the containers with their senses only, no tools. If you want, let them use their hands. (**Application: Promotes engagement, Hands on)** Have students discuss some of the things they see and feel. Add their descriptions of soil

to a vocabulary word bank. Students should add several descriptive words to the first box on the Soil Observation Sheet 1. **(Integrated Processes: Speaking, Listening, Writing, Application: Linked to objectives)**

8. Then, using their funnel, have students fill their jars halfway with soil. Have students then fill their jar almost to the top with water. Have them place the jar carefully on the work surface without shaking the jar. Discuss any observations. Add their descriptions to the vocabulary word bank. Students should add several descriptive words to the second box on the Soil Observation Sheet 1. **(Integrated Processes: Speaking, Listening, Writing, Application: Linked to objectives)**
9. Tell students put the lids on the jars (if they haven't already) and tightly screw on the lid. Then shake well. Discuss any observations. Add their descriptions to the vocabulary word bank. Students should add several descriptive words to the third box on the Soil Observation Sheet 1. **(Integrated Processes: Speaking, Listening, Writing, Application: Linked to objectives)**
10. If necessary, use the following sentence starters to help guide EL students in responding. **(Scaffolding: Modeling)**
    - I see _____.
    - It looks like _____.
    - I think soil is made out of _____.
11. Explain to students that they will leave the jars on the tables overnight.
12. End the session by having students predict what their soil will look like tomorrow. Add their descriptions to the vocabulary word bank. Students should add several descriptive words to the fourth box on the Soil Observation Sheet 1. **(Integrated Processes: Speaking, Listening, Writing, Application: Linked to objectives)**

SESSION 2

Let the jars sit still overnight. By the next day, the water should have settled down and students should be able to clearly see the different layers that appeared.

13. When students come back the next day, have them discuss their observations in groups. **(Integrated Processes: Speaking, Listening, Application: Linked to objectives, Grouping Option: Small group)**
14. Tell students they are going to separate the soil layers to inspect each layer to see what it is made of. Go from table to table and pour out as much of the water as you can without spilling or moving the layers. Distribute Soil Observation Sheet 2.
15. Explain that as they use their spoons to slowly scoop out one layer at a time, they will spread each layer's contents onto a paper plate and use the magnifying glasses to inspect each layer. Model using one of the Mason jars of soil on one of the tables. **(Scaffolding: Modeling)**
16. As you are modeling how to take out of the jar a layer of dirt and examine it, talk about its properties: What do you see? How does it feel?
17. Demonstrate how to record their observations on the Soil Observation Sheet 2 in the first box. Remind them that the vocabulary word bank will have words that were used in Session One and might help with their work today.
18. Have students continue to scoop out one layer at a time and complete this process for every layer represented in the jars. There should be 4 layers so all four boxes of the Soil Observation Sheet 2 should be filled in with 1-2 words of description. . **(Integrated Processes: Speaking, Listening, Writing, Application: Linked to objectives)**

Explain:

19. Show the Do You Want to Play in the Dirt PowerPoint (slides 1-6) and explain to students that:
    - Soil is formed from plant and animal parts as well as broken down rock parts. Air and water are also parts in soil. All of these parts become compacted over time making up the ground beneath our feet. Soil is often referred to as the skin of Earth.
    - Soil is made out of different sized particles. Soil textures, refers to the size of the particles that make up soil. Soil can be separated into three separate particles called sand, silt, and clay. These make up the soil texture. They are present in all soils in different proportions.
    - Clay holds a lot of water but not much air. Clay soil feels sticky and smooth. Clay often looks red or tan in color. Clay can be found near mountains.
    - Silt is a dust-like mixture of rock and minerals. Silt is transported by water, ice, and wind. Then deposited. Silt is larger than clay but smaller than sand. Silt can be found on farmlands.
    - Sand is dry and holds very little water. Sand can be gritty. Sand can be found near beaches and in deserts. **(Scaffolding: Comprehensible input)**

- Continue to explain that: Soils are not all the same. (slide 7) Not all soil is brown. Soil can be many colors. Some soils can be red, white, or even blue. The color of soil depends on the rock type from which it was formed over time. Students may think that soil is always brown. Show pictures of different colored soils in the PowerPoint. **(Scaffolding: Comprehensible input)**

Elaborate:

20. Ask the following questions to test their knowledge of the kinds of soil: "How Do Humans Use Soil?" (slides 8 and 9)
    - What layer would a farmer use? (top layers of soil)
    - What kind of soil would you use to make adobe bricks? (top layers and clay)
    - What kind of soil would a potter use? (clay)
    - What kind of soil would you use on a playground? (sand) **(Assessment: Oral)**

SESSION THREE

21. Explain that humans use soil for many important reasons. Display the Native American primary source photo. (slide 10) Discuss the details in the photo. https://www.loc.gov/item/2016802720/
    Tell students that this Hopi woman's photograph was taken about 100 years ago. What does she make? Go back to slide 9. Can anyone describe how one makes a ceramic pot? **(Scaffolding: Comprehensible input, Integrated Processes: Speaking)**
    Display or print the article "The Hohokam." Use the sections titled: Artifacts and Ceramic Production. https://arizonamuseumofnaturalhistory.org/plan-a-visit/mesa-grande/the-hohokam
22. Read aloud the section which focuses on how soil contributed to the success of the Hohokam culture by the production of clay ceramics/pottery. **(Integrated Processes: Speaking, Listening, Application: Linked to objectives, Grouping Option: Whole group)**
23. Ask the following questions after reading the article:
    - Who used clay to create ceramics?
    - What are two materials that were used to make ceramics?
    - Why did the Hohokam mix clay and ground up stone?
    - How did the invention of ceramics contribute to the community?

Evaluate:

24. As a class, have students complete the final column of the KWL chart, "What did we learn about soil?"
25. Using the KWL chart, have students complete the Soil Assessment. **(Assessment: Individual, Written)**

Assessment

Geography and Science
Soil Observation Sheet 1 can be graded for accuracy and completeness. Mastery will be considered 80% or higher.

Soil Observation Sheet 2 can be graded for accuracy and completeness. Mastery will be considered 80% or higher.

Soil Assessment can be graded for accuracy. Mastery will be considered being able to state 2 of the 3 kinds of soil (clay, sand, silt), giving 3 ways that humans use soil (farming, making bricks, ceramics, playgrounds, etc.), and writing 2 interesting facts about soil.

Vocabulary Test can be given. Mastery will be considered 80% or higher.

Extensions

Not all soils are alike so have students look at various Arizona soils. Students could then compare other types of soil (from other places) either from samples brought to class or through photos.

Connect to literature by reading these books:
- *When Clay Sings* by Byrd Baylor
- *Dirt The Scoop on Soil* by Natalie M. Rosinsky

Sources

Native American Primary Source Photos
https://www.loc.gov/item/2016802720/

Arizona Museum of Natural History
https://arizonamuseumofnaturalhistory.org/plan-a-visit/mesa-grande/the-hohokam

Science Learning Hub: Soil Properties
https://www.sciencelearn.org.nz/resources/957-soil-properties