

NWO Hands On STEM Activity – it is Spring! Time to take your students outdoors to learn about their environment. This lesson is from: www.discoveryeducation.com



Discovering Dirt

Grade Level: K-5

Lesson Overview:

In this lesson students will identify the needs of plants and examine the qualities and ingredients of soil. They will identify which types of garden plants are typically grown in their area and why. They will investigate the effects of growing plants in different types of soil.

Learning Objectives:

Students will be able to:

- Identify the different types of soil

- Identify the ingredients that make up a good soil for growing plants
- Explain what is helpful and harmful for plants growing in each soil type

Time Frame:

- 45-minute session for Engage and begin Explore
- 30-minute session to finish Explore and Explain
- 45-minute session for Engage and Elaborate (plus time each day to record results as seedlings grow)
- 45-minute session for Explain, Elaborate, and Evaluate

Materials for the teacher:

- chart paper and markers
- samples of sand, potting soil, and clay (hard soil)

Materials for students:

- a small bottle or jar with a lid
- plastic spoon
- magnifying glass
- ruler
- thermometer
- a packet of seeds for each student pair or group (choose something that germinates quickly - grass and beans are often good choices)
- three paper cups for planting
- sand
- potting soil
- clay (or hard soil)
- droppers for watering seeds (medicine droppers used for young children work well and can be purchased inexpensively from most pharmacies)

Classroom Activities:

Session 1

Engage

- Ask students what they know about dirt. Do they know any other names for dirt? What is dirt made of? Where does dirt come from?
- Divide students into pairs or small groups. Give each group a small jar or wide-

mouth bottle and a spoon. Tell them that they will be collecting a sample of local dirt in order to learn more about the dirt and what it is made of.

- Take students on a short tour of the schoolyard to collect a sample of dirt to explore. Instruct students to collect their dirt sample from only one location and to fill their jar or bottle about 1/2 full.

Explore

- Once students have returned to the classroom, give each group a sheet of white paper and a magnifying glass. Have students scoop one spoonful of dirt out onto the paper and examine it closely. Encourage them to use the magnifying glass to more closely examine their sample.
- Direct students to use a pencil to sort their sample into groups of similar ingredients in their soil. (For examples, bits of leaves, bits of twigs, bits of sand, bits of rock...) If students find any insects or other living creatures, make sure they record this as well. As they work, students should sketch their ingredients into their science journals and write down what they think they know about the ingredients of their soil.

Explain

- Have students share out loud what ingredients they have discovered in their soil. On chart paper or sentences strips, collect students' suggestions of what they discovered in their soil samples.
- Tell students that most of the ingredients they have discovered can be placed into one of three categories: Plants, Animals, or Minerals.
- Help students to organize their ingredients into one of these three categories. Note: while live animals are not an ingredient of soil, it will be important to note any insects discovered. Dead or decaying animal matter will be pointed out as a soil ingredient in the next session.

Session 2

Explore (Part 1)

- Tell students that you have another way for them to search for ingredients in their soil. Each group should still have about 1/3 of their jar or bottle filled with soil. (If there is much more than this, have them remove some of the soil).
- Add water to fill each jar or bottle. Instruct students to tightly replace the lid or cap. They should then set the jar or bottle on the table in front of them to see what they observe. Have them record their observations in their science journals. Ask them if they have noticed anything else that was in their soil. (They should notice air bubbles rising from their soil. Add air to the chart).
- Next have students shake their soil samples in water. Instruct them to set the jar or bottle in front of them and allow the ingredients to settle. (This may take up to an hour or two. You may want to break here and continue the

exploration on a second day).

Explore (Part 2)

- When the samples have settled, have students observe carefully and sketch the results in their science journals. Ask if they have any additions to make to the soil ingredients chart.

Explain

- Tell students that soil is made up of sand or rocks, silt, and clay. Sand is the biggest and heaviest ingredient in soil and will be at the bottom. Any rock material will also go to the bottom. Point out that this rock material was broken down from larger rocks over a very long period of time by wind, water, heat, and cold.
- Silt is smaller than sand and forms the second layer in their jar.
- Some samples may contain clay particles. Clay is the smallest ingredient and settles at the top.
- Next is the water. The water is likely grey or brown in color. This is caused by rotted plant and animal ingredients.
- Finally, there may be some material floating at the top of the water. This is plant and animal material that has not yet rotted.
- Have students share which ingredients are most common in their soil samples and which are least common. Explain that different soils will have different amounts of each of these ingredients.
- Assist students in labeling each "ingredient" in the sketch they made in their science journals.

Session 3

Engage

- Direct students to review the sketches they made from session 2. Review the ingredients of soil. Ask students which ingredients of soil they think will be most beneficial for growing their seeds. Which ingredients do they think would be less beneficial for growing seeds?
- Divide students into pairs or small groups. Give each group a packet of vegetable flower seeds. Ask students to discuss what type of seed their packet contains and what they already know about that plant and the vegetable or flower it produces.
- Next instruct students to turn over the packet and examine the map on the back of their packet. Have them locate their state on the hardiness zones map on the back of the package. Point out the key for each color and ask students to discuss why this information is important to include on the seed packets. Ask them if the seeds they have are a good choice to plant in their area of the

country. In what areas of the country should they not plant their seeds?

- Ask students, what else, in addition to temperature, is important for seeds to grow? Guide students to identify water and soil as other important needs for seeds. If students say sun, explain that while the sunlight is important for plants that have already sprouted, the seed itself needs only the warmth (temperature) the sun provides.

Elaborate

1. Tell students that they will be planting their seeds into three different types of soil: sandy soil, potting soil, or hard (clay-like) soil. Provide students with three small cups.
2. Set up a station with containers of each soil type: sand, potting soil, and clay (hard soil). Instruct students to fill each cup with a different type of soil and plant a few of their seeds into each cup following the directions on the package.
3. Have students label their seed cups and place in a sunny spot. Instruct students to check their cups each day to see if water is needed. Providing droppers will help students control the amount of water given to their seeds without overwatering. Each day they should record the daily temperature of their seed's environment, the amount of water given to the seed (this will be easy to measure if students are using medicine droppers), and any changes they observe in their seed's growth. You may also choose to have them measure and record their plant's height. They may record their results using words, pictures, or both. Records can be kept in students' science journals. You may wish to have them use a separate page for each day. They should continue these observations for one week.

Session 4

Explain

1. Ask students to share which of their soil types produced the best seed growth and why they think it was best for their seed.
2. Guide students to consider how well each sample held water for the plant, provided support for the roots and stem, and allowed for root and stem growth.
3. Explain that soils that are too sandy or too hard may prove more difficult for growing plants. Sandy soils do not provide good support for growing plants and do not retain water well, although they do allow for air to reach the roots. Clay like soil may hold too much water or seem as hard as rock when it is dried out. Roots often can't push through it and air cannot reach the roots. Clay often contains important minerals for growing. Soils that contain a balance of sand, silt, and a little clay are called loam. Explain that the potting soil contains a good balance of the ingredients of soil needed for growing plants. It has more humus (plant and animal matter) than the other soil

types. Humus provides many of the nutrients that plants need to grow.

4. The site

http://school.discoveryeducation.com/schooladventures/soil/name_soil.html has some good information to support teacher understanding and explanation. The illustration of particle sizes may be useful to support students understanding as well.

5. Have students record their conclusions about soil and planting using words or pictures in their science journals.

Elaborate

1. Visit http://www.ehow.com/info_8103960_soil-information-types-kids.html to help students further understand the different types of soils and their uses.

2. The soil triangle at

<http://www.historyforkids.org/learn/environment/soiltypes.htm> also provides a useful visual representation of soil types and uses.

Evaluate

1. Take the soil quiz at

<http://www.softschools.com/quizzes/science/soil/quiz361.html> together as a class.

2. Pretend you have invented your own brand of soil for gardeners. Make an advertisement for your soil. Tell what is included in your soil and why gardeners should use it.