SNWA Goal 1 Objective 1.1
Goal 3 Objectives 3.1, 3.2
CCSD Curriculum Essentials Framework

Science

It is expected that students will:

(5)2.6 investigate and describe how some environmental conditions are more favorable than others to living things [NS 7.5.3]

(5)2.12 investigate and describe how environmental changes allow some plants and animals to survive and reproduce, but others may die [NS 9.5.2]

(5)4.2 investigate and describe how, for any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all [NS 15.5.2]

(5)4.11 explain that changes in environments can be natural events or influenced by human activities, including technology [NS 17.5.3]

(5)6.3 keep records of investigations and observations in a science notebook/journal, without changing those records later [NS 21.5.1]

(5)6.21 manipulate objects and observe events in an experiment [NS 24.5.6]

English Language Arts

It is expected that students will:

(5)11.1 formulate research questions and establish a focus and purpose for inquiry [NS 11.5.1]

Purpose: This is an investigation into how water quality may affect plant growth.

Time: three or four 45-50 minute sessions

You will need:

- 3 bedding plants (small flower or vegetable plants) per group
- soap solution of 1 tsp liquid detergent per quart of water
- salt solution of 1 tsp salt per quart of water
- tap water
- labels

Introduction

1. All living things need water. But water often has materials that have been dissolved in it and may be harmful to plants and animals (pollution). Salt is a natural mineral found in the ground and is easily dissolved in water. Detergents are often washed into the water system. Can you think of any other things that might pollute our water supply? Let's focus on

two possible pollutants, salt and soap. We may not want to drink salty or soapy water, but can such water have other uses?

Making Discoveries

2. Show students the bedding plants and ask, "What do plants need in order to survive? What do you think will happen if they are watered with salty water, soapy water or plain water?" Allow time for discussion, and ask students to record their predictions or hypotheses in their notebooks.

3. Let students watch as you mix 1 gallon tap water with 4 teaspoons salt and in a different container 1 gallon tap water with 4 teaspoons liquid detergent. (Wash the measuring spoon carefully after filling with salt or detergent so as not to contaminate the second mixture.) Stir the detergent solution gently to keep the bubbles at a minimum. Explain that this water will be available for them to use to water their plants.

4. Give each group 3 bedding plants, and discuss the need for controlling all variables except for the kind of water it gets. (Variables to control are the amount of light and water received, type of plant, type of dirt.) Allow time for students to talk to a partner about what they will be doing and what they hope to learn. Discuss in small groups, then with the whole group, and list which properties of the plants they will be observing and comparing for signs of change. Post this list.

5. Label each of the 3 bedding plants salty, soapy and plain. Water for the first time today and set aside. When students are ready, have them write a description of the procedure and what they hope to learn in their notebooks. Continue watering the plants with the same kind of solution over time, about once every other day for 3 weeks or more. Observe the plants and record results in notebooks every week.

Closing

Conduct a whole group discussion every week to determine what is being learned about the effects of salt, soap and plain water on the growth of plants. Students should revisit and adjust their predictions as needed. What do the results of this investigation mean to us?

Assessment Opportunity

After 3 weeks, have students write a response to this question: "What did you notice about the three different plants? How do salty water, soapy water and plain water affect plant growth? (What were the results?) What does this mean?"

Teacher Note:

Placing a clear plastic cup or saucer under the containers holding the bedding plants allows students to observe water runoff.

Extension

It is likely that the plants being watered with soapy water will thrive! Let students conjecture as to why this might happen. Brainstorm a list of questions which lend themselves to investigation with the class.

> Is soapy water beneficial to plants in the long run?
> Does the amount of soap in the water make a difference?
> Do some plants thrive on soapy water and some not?

Ask students to work with their group to design an investigation into the effect of soapy water on plants. Give time for students to pursue their investigation, keeping careful records in order to communicate the results of their investigation to the rest of the class.

Teacher Note:

Because adding soap to water decreases its surface tension, the water may be more readily absorbed into the soil, thus encouraging plant growth. Eventually, however, the soap will clog the plant pores and prevent growth.

The teacher should introduce or review the following vocabulary with the students within the context of this lesson.

controlled variable: a variable that will stay the same during an investigation

procedure: a description of exactly what was done during an investigation

property: an observable characteristic

results: a record of what happened during an investigation

surface tension: a property of liquids in which the exposed surface tends to contract to the smallest possible area. It is caused by unequal molecular cohesive forces near the surface.

variable: something that may cause the results of an investigation to change