Investigation Two – Greenhouses

Standard II Students will understand that organisms depend on living and non-living things within their environment.
Objective 1 Describe the interactions between living and non-living things in a small environment.
Intended Learning Outcomes 1. Use science process and thinking skills 3. Understand science concepts and principles 4. Communicate effectively using science language and reasoning

Standard II

Objective 1

Background Information

The non-living parts of an environment interact with the living parts. The main non-living parts of an environment include sunlight, soil (or other stabilizers to hold the roots), air, water, and temperature. The non-living things also interact with each other. For example, soil can be moved from place to place by air and water. We can observe non-living parts interacting with the living parts of an environment. By changing the amount of light, temperature, or water, students will be able to discover the effects that non-living elements have on the growth of a seed.

When planning this activity, you will need to decide what kind of seeds to plant and where to display the finished greenhouses. Any type of seed will work but larger seeds such as corn, beans, or peas are easier for students to handle and observe plant growth. If larger seeds are used, have the students plant 5 seeds. If smaller seeds are used, they could plant 10 seeds. Students will then be able to use a fraction to record how many of their total seeds grew. Greenhouses can be displayed in several different ways. Using strings and paper clips for hooks, they can be hung from the ceiling above the student's desk, tacked to a bulletin board, or taped to a wall, cupboard doors or windows.

Materials

- Wide variety of flower and vegetable seeds in zip-lock bags for each team.
- One coconut (to show the class the world's largest seed)
- Rulers

Pre-Assessment/Invitation to Learn

1. Provide each team of 3-5 students with a variety of seeds in a zip-lock bag. Students should use a hand lens and make notes and drawings of the seeds. Have students write what they think each seed is. For each type of seed, have students estimate how many seeds they think it would take, lined end-to-end, to make a centimeter and an inch. Team members should share their observations with their teams. Allow team to share with the class.

2. Have students discuss the question, "Are seeds living or non-living?" Point out that seeds have the potential for life but to grow they need to have the
right things provided by their environment. Have students suggest what non-living things they think a seed needs before it will start to grow. List their responses on the board. They should include water, light, warm temperature, soil, and minerals. Explain that different types of plants need different amounts of these non-living things. What kinds of plants need lots of water? What kinds need very little water? Do some plants grow better where it is very hot? Do some plants do better in colder places? Do all plants need the same amount of light?

Instructional Procedure

Materials
Per student plus 2 extra for each team.
- Sheet of dark construction paper (9" x 12")
- Pint sized zip-lock bag (1)
- Cotton balls
- Seeds
- Scissors

Per team of 3-5 students
- Spray bottle of water
- Stapler

Tell the class that today they are going to set up a miniature greenhouse for some seeds. The greenhouses will provide all the things that seeds need to grow. Ask students to share what they know about greenhouses. Emphasize that greenhouses are specially controlled environments to help plants grow. In a greenhouse, all of the non-living elements are provided and controlled so that the plants will grow very well.

1. Lay out the materials for the greenhouses and provide students with a Greenhouse Instruction Sheet. Tell them to carefully follow the directions on the sheet.
2. After students have completed their greenhouse, have each team work together and make one or two extra greenhouses. These extra greenhouses will be used to test what effect changing the non-living elements will have on the seed's growth. Teams should discuss what they want to do differently with their extra greenhouses, such as not adding as much water, adding a lot more water, putting the greenhouse in a cold place (outside) or a hot place (over the heater), etc. Students should also write down what they think will happen because of the changes they made to their extra greenhouses.
3. Each team should carefully label their extra greenhouses and set them up. Students should also label and display their personal greenhouses.
4. Bring the class back together and have each team tell what they did with their extra greenhouse and how they think the changes will affect the seed's growth.
5. Tell the class that they will observe their personal and team greenhouses three times a week to make measurements and record growth and changes in plants. Show the class the Greenhouse Observation Sheet and explain that they will use this sheet to carefully record their observations.
6. Allow students time during the week to make and record observations. Have students share their observations with their teams and the whole class. What differences do they notice between their personal plants and the team plants?
7. Discuss with the class the interactions they see between the living and non-living things in their greenhouse environments. Have them look for these interactions in the environments around them.

Curriculum Extensions

Math –

- Students will record the number of seeds that sprouted by making a fraction. For example, if 5 seeds are placed in the greenhouse and 3 started to grow the student would record 3/5 of the seeds sprouted. (*Standard I, Objective 4*)
- Students will use measurement to record the growth of their seedlings over time. (*Standard IV, Objective 2*)

Science –

- Have students transplant a few of their seedlings from their greenhouses into containers of potting soil and continue to make observations. (*ILO 1*)

Assessment Suggestions

- Check the observation notes periodically to see that students are making correct observations. They may need help in their descriptions of what they observe.
- As the students share their observations make sure their information is accurate and complete.
- Have the children assess what living and non-living things are in their terrariums.
- Have the students write how the living and non-living interact with each other in their terrariums.

Resources

Books:

- *Magic School Bus: Inside the Human Body* by Joanna Cole

Web sites:

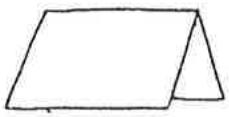
- www.harcourtschool.com
- www.si.edu/harcourt/science (Smithsonian web site)

Homework & Family Connections

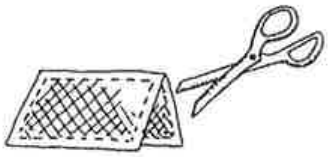
Send seeds or seedlings home with students and have them plant them in a garden, flowerbed, or a pot. Discuss with the students what they will need to do to help the plant grow and stay healthy. Have students report to their teams and the class how their plants are doing. If some of the student's plants die, ask students to try to explain what might have caused the plants to die.

Greenhouse Instruction Sheet

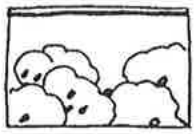
1. Fold paper in half, the short way.



2. Poke the scissors through both layers of the construction paper and cut out the middle section, leaving a 1" border. Write your name and team name on the border.



3. Fill the bottom part of the zip-lock bag with cotton balls and place the seeds between the cotton balls and the bag so they can be easily seen. Your teacher will tell you how many seeds to the plant.



4. Spray about 10 squirts of water into the bag. Seal the bag.

5. Staple the bag into the frame. Your greenhouse is ready to be hung up. (Your teacher will tell you how to do this.)

Greenhouse Observation Sheet

Name _____ Team _____

Type of seeds planted _____ Number of seeds planted _____

Personal Greenhouse			Choose one plant in the greenhouse to observe. Be sure to use the same plant every time you make an observation.			
Date	**Seeds Growing**		**Length of stem measured from the seed**	**Length of root measured from the seed**	**Number of leaves**	**Drawing of plant**
	Number	**Fraction**				

Greenhouse Observation Sheet

Name _____ Team _____

Type of seeds planted _____ Number of seeds planted _____

Team Greenhouse			Choose one plant in the greenhouse to observe. Be sure to use the same plant every time you make an observation.			
Date	**Seeds Growing**		**Length of stem measured from the seed**	**Length of root measured from the seed**	**Number of leaves**	**Drawing of plant**
	Number	**Fraction**				