

## Early Childhood and Lower Elementary:

### Living Necklace

Connections to Standards:

**Science** K-LS1-1; 2-LS2-1

### **Lesson:**

This lesson by the Oregon Agriculture in the Classroom Foundation allows students to see how seeds begin to grow up close and personal! Each student will create a living necklace, but to make it a success, students need to understand that seeds are living things and need air, water and a good growing environment to germinate and grow strong. By creating a favorable environment for a bean seed, students will soon see their bean sprouting reinforcing the idea that seeds are indeed alive and that if we take care of them, they can grow!

### **Resources:**

Living Necklace Lesson by Oregon Agriculture in the Classroom Foundation

<http://aitc.oregonstate.edu/teachers/pdf/hands-on/living.pdf>

## Upper Elementary: Bean Maze!

Connections to Standards:

**Science** 5-PS3-1; 5-LS1-1

### **Lesson:**

This lesson is adapted from the PRISM program at the University of Hawaii at Hilo and highlights the importance of light for plant growth. Divide a large shoebox into 9-12 cubicles, using extra pieces of cardboard. Poke a hole through two sides of each "cubicle" to make a maze. Fill one corner cubicle with moist soil, and plant a bean seed. Seal the box with duct tape, leaving just one quarter sized hole for light at the end of the maze. The bean will travel through the box, following the light. If the dividers in the box are not fairly flush, the bean may find a way to "cheat" its way through! Check on the bean after a week, or whenever it emerges. How did it know which way to go? (Plants are able to sense and respond to light. It's one way we know they are alive.) Where did it get the energy for the journey? (Energy from the sun, packaged in the endosperm and cotyledons of the seed.)

### **Resources:**

PRISM Bean Maze

<http://hilo.hawaii.edu/affiliates/prism/documents/lesson4wevebeangrowing.pdf>



## Middle School: The Biggest Bean

Connections to Standards:

**Science** MS-ETS1-1, 2, 3

### **Lesson:**

The steps of the scientific method are important for students to understand the basic set-up of science experiments. Rather than being told the about the importance of independent, dependent and controlled variables, this experiment allows students a free-form opportunity to plant and observe three bean seeds and change whichever variables they choose with the goal of growing the biggest bean plant.

To begin, let students know they will be in charge of three bean seeds and all will receive the same type of seed, soil and pot size. Brainstorm with students different variables that could be changed to affect the bean's growth (light exposure, amount of water, type of soil, etc). Depending on teacher preference, students can then take their beans home to plant and observe or leave in the classroom to observe. Ensure they collect data including size measurements, coloration, germination date, date of waterings, date of any changes to care protocol, etc. Usually 2 - 3 weeks should be sufficient to notice differences among the plants. Have students bring plants back to classroom and determine the "best" plant from each student and compare that data and care record with the records of others. Students will begin to see how different factors may influence plant growth, but since each student was allowed independence in their experimental set-up, it will be difficult to make any conclusions. This then can lead to a discussion about the importance of controlling variables within a scientific experiment.

### **Materials:**

Planting soil  
Small pots  
Bean seeds  
Paper or journal for recording observations

### **Resources:**

Short narrative about a teacher's experience with a similar procedure  
<http://www.kidsgardening.org/classroomstory/magic-bean-challenge>

## High School: Bean Growing Magic and Methods

Connections to Standards:

**Science** HS-LS1-3

**Lesson:** This activity will use a similar experimental set-up as "The Biggest Bean" activity on this page, but will instead focus on creating an experimental procedure that acknowledges the importance of limiting variables and investigates a plant's ability to maintain homeostasis. To begin, go over the definitions of independent, dependent and controlled variables and the scientific method as well as the term "homeostasis". Then brainstorm with students different variables that may affect plant growth. Students will then work in groups to write their own experiments to determine how certain variables may influence plant growth and homeostasis. Once an adequate experimental procedure is created by each group, planting can commence with plant care, observation and data collection occurring through the following weeks. At the end of the experimental period, discussion about the influence of different variables on plant growth and homeostasis can be reported.

### **Resources:**

What is Homeostasis?

<http://www.kscience.co.uk/resources/ks4/21c-science/b4/specification.pdf>

