**Seed Science Betty Darleen Horton**

2nd grade – 4th **dhortonky@gmail.com**

NGSS: Structure, Function, and Information Processing

NGSS: Inheritance and Variation of Traits: Life Cycles and Traits

Disciplinary Core Idea: Plants have internal and external structures that serve various functions in growth, survival, behavior, and reproduction. 4-LS1-1

Background: Students will access prior knowledge regarding seeds and how they are utilized as a food source both for humans and for animals. A student may ask, “Where do seeds come from?” Seeds come from flowers that are pollinated, fertilized and reach maturity. Many students will know for example that kernels of corn or beans are actually seeds. Some students may have planted seeds in school or at home and have some basic understanding.

Pre assessment: What are seeds? How are seeds used by people and animals? What causes seeds to grow into plants?

Materials: pre- soaked pinto or lima beans (one bean per student for dissection), dry beans, beans (any variety) growing in the garden, magnifiers

* Begin the activity by having students sit in a circle in the garden area.
* Ask students if they know what part of a plant seeds are. (Answers will vary but should ultimately be that seeds are the part of a plant that can grow into a new plant).
* Give each student a dry bean – ask them what it is. (bean or seed is fine – these came from a bean plant). Tell students that we will open the beans to see what is inside and will discover how the seed begins to grow into a plant. Caution students not to put the beans in their mouths or to use teeth to open. Give them a minute to try – they will not be able to open the beans with their fingernails as the seeds are waiting for the right conditions to “wake up” and begin to grow.
* Next, tell students they will dissect (open up) a bean that has been soaked in warm water – imitating the warmth and water necessary to begin growth - to explore and discover how the seed grows.
* Ask students to compare the dry beans to the soaked beans. Then invite students to carefully open these seeds and observe what is inside using their magnifying glasses. Most will see a new plant growing. If they do not find one, give the student another bean.
* Have students to tell about the parts of the seed they took apart. Compare the outer covering (seed coat) to an actual coat they wear in the winter. Why do we wear coats? (protection from the weather – the seed coat protects the food and embryo (baby plant) inside the seed). When conditions are right for growth (warmth and water), the seed begins to grow.
* The tiny plant growing out of the seed is the embryo – baby plant. What does the new plant use for food while waiting for its roots to grow? (The stored food inside the seed). Suggest that teachers do an extension listed at the end of this activity as a follow up lesson in the classroom.
* When students have completed this activity – 10 minutes or less, collect the seed parts for the compost bin.
* Next, ask students what kind of garden seeds are their favorite to eat. In addition to growing new plants, seeds are a food source. Ask students to give examples.
* Divide the class into two groups – each group should have an adult leader – and go on a seed hunt in the gardens. If possible, let students pick a bean or pea and open it to find the seeds. If corn ears are mature enough to see the kernels, pull back a portion of the shucks on an ear so students can observe the seeds growing. (A fun fact to share: every ear of corn will have 16 rows of kernels. Do the math: count the number of kernels in one row then multiply that number by 16. That is the approximate number of kernels on one ear of corn (it can vary between around 500 to 750) To find the approximate seed yield of the corn crop in the garden, count the number of ears and do the math. The number will be surprising!)
* As a culminating assessment, ask students to share what they know about seeds. How are seeds formed? What do seeds need to grow into plants? How are seeds used by people and animals? What do you think a farmer needs to do when harvesting a crop to be able to plant again next year? How do you think pioneers were able to plant crops when they arrived in their new homes?

Easy seed lesson extension for the classroom. Give students a clear container. Place a strip of black construction paper around the inside of the container and fill the container with water. Place seeds (beans work great) between the paper and the container and place in a warm place with light (such as near a window). Watch the seeds sprout and begin to grow. When the stems and roots have started to grow, students can transplant the new plants into a garden or a growing pot.

Science, Math, Practical Living, Social Studies