

Science in the Classroom and at Home

Seed Investigations

The life of a flowering plant begins as a seed. You will need seeds (lima bean or radish seeds work great) to explore seed germination in the K-2 classroom and at home.

Investigation #1 – What's in a seed?

Engage

Take your students on a walk through the school yard or bring in plants with seeds or pictures of plants and their seeds.

Ask your students and children the following questions.

How do seeds become plants? What do they need to grow?

Explore

Have your students conduct the following procedures to observe the growth of a seed. Student Procedure:

- 1. Soak two to three lima bean seeds in water overnight.
- 2. Fold a paper towel so it fits across the bottom and upper two-thirds of a plastic sandwich bag.
- 3. Insert the paper towel into the sandwich bag.
- 4. Add water to moisten the paper towel.
- Add several lima bean seeds to the moist paper towel. It is best to place them about an inch apart. Teacher Note: rinsing the lima bean seeds for several minutes in a solution of one part bleach to ten parts water before germinating them will help prevent bacteria and mold.
- 6. Seal the baggie to prevent the paper towel from drying out. (Open baggie every day to add water if needed and to make observations.)
- 7. Record observations daily.

Teacher Note: Instruct students to make a drawing of what they see and to measure any growth that has occurred.

8. After a couple of days, open one of the seeds and draw what is inside.

Teacher Note: When the seeds have started to germinate, about day 2 or 3, instruct your students to open up one of the seeds and observe what is inside. They should see the seed embryo and the stored food. This stored food, the endosperm, is what enables the seed to start to grow before leaves are developed.

Explain

Have your students discuss what seeds need in order to grow. During this conversation, it would be a good time to discuss the function of the stored food (endosperm), roots, stems and leaves. As you are discussing the plant parts, they may label their drawings with the following terms and come up with their own definition of germination.

Stored food, seed coat, root and leaves

Teacher Note: A labeled picture of the germination of a bean seed from Britannica kids has been included for your reference only. The students at this level only need to know the following structures: Seed coat, root, stored food (endosperm), first leaves

Elaborate

Have students design their own experiment to test one of the questions below or one of their own questions with more seeds.

- What would happen if you tried to germinate the lima bean seeds in the dark?
- What would happen if you tried to germinate the lima bean seeds at a different temperature?
- What would happen if you germinated the seeds upside down?

Using the radish seeds,

- How does the germination of radish seeds compare to lima bean seeds?
- Did the biggest seed grow faster than the smaller seed?
- How do the parts of a lima bean seedling compare to the parts of the radish seedling?

Evaluate

Have your students draw a picture of their seed experiment and write a few explanatory sentences on what plants need in order to grow and what parts help the plants obtain their nutrients.



Britannica Online for Kids. Web. 9 June 2014. http://kids.britannica.com/eb/art-53362

Other resources to support the learning objectives

- Read-aloud book
 Seeds Go, Seeds Grow <u>http://www.myon.com/</u>
 Log in information School Name: Read on Arizona, Digital Library Username: read Password: read
- Ask-a-Biologist Resource
 Pocket Seed Experiment
 http://askabiologist.asu.edu/sites/default/files/resources/activities/pocketseed_experiment/seed_packet_08.pdf
- Plants for Kids http://herbarium.desu.edu/pfk/page1/page2/page2.html

K-2 Learning Progressions aligned with these investigations

Scientific and Engineering Practices

Asking questions and defining problems

K-2 Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested.

- Ask questions based on observations to find more information about the natural and/or designed world(s).
- Ask and/or identify questions that can be answered by an investigation.

Planning and Carrying Out Investigations

K-2 Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- With guidance, plan and conduct an investigation in collaboration with peers (for K).
- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.
- Evaluate different ways of observing and/or measuring a phenomenon to determine which way can answer a question.
- Make observations (firsthand or from media) and/or measurements to collect data that can be used to make comparisons.
- Make observations (firsthand or from media) and/or measurements of a proposed object or tool or solution to determine if it solves a problem or meets a goal.
- Make predictions based on prior experiences.

Analyzing and Interpreting Data

K-2 Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Record information (observations, thoughts, and ideas).
- Use and share pictures, drawings, and/or writings of observations.
- Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems.
- Compare predictions (based on prior experiences) to what occurred (observable events).
- Analyze data from tests of an object or tool to determine if it works as intended.

Disciplinary Core (Content) From Molecules to Organisms: Structures and

Processes

Concept 1: Characteristics of Organisms

 All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive, grow, and produce more plants.

Concept 2: Life Cycles

 Plants and animals have predictable characteristics at different stages of development. Plants and animals grow and change. Adult plants and animals can have young.

Concept 3: Organisms and Environments

• All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.

Ecosystems: Interactions, Energy, and

Dynamics

Concept 3: Organisms and Environments

Concept 4: Diversity, Adaptation and Behavior

- Animals depend on their surroundings to get what they need, including food, water, shelter, and a favorable temperature. Animals depend on plants or other animals for food. They use their senses to find food and water, and they use their body parts to gather, catch, eat, and chew the food. Plants depend on air, water, minerals (in the soil), and light to grow. Animals can move around, but plants cannot, and they often depend on animals for pollination or to move their seeds around. Different plants survive better in different settings because they have varied needs for water, minerals, and sunlight.
- Organisms obtain the materials they need to grow and survive from the environment. Many of these materials come from organisms and are used again by other organisms.
- The places where plants and animals live often change, sometimes slowly and sometimes rapidly. When animals and plants get too hot or too cold, they may die. If they cannot find enough food, water, or air, they may die.

Crosscutting Concepts

<u>Patterns</u>

K-2 Students recognize that patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.

Cause and effect

K-2 Students learn that events have causes that generate observable patterns. They design simple tests to gather evidence to support or refute their own ideas about causes.

Scale, Proportion and Quantity

K-2 Students use relative scales (e.g., bigger and smaller; hotter and colder; faster and slower) to describe objects. They use standard units to measure length.

Systems and System Models

K-2 Students understand objects and organisms can be described in terms of their parts; and systems in the natural and designed world have parts that work together.

Energy and Matter

K-2 Students observe objects may break into smaller pieces, be put together into larger pieces, or change shapes.

Structure and Function

K-2 Students observe the shape and stability of structures of natural and designed objects are related to their function(s).

Stability and Change

K-2 Students observe some things stay the same while other things change, and things may change slowly or rapidly.

Using Mathematics and Computational Thinking	Heredity: Inheritance and Variation of Traits	
 K-2 Mathematical and computational thinking in K-2 builds on prior experience and progresses to recognizing that mathematics can be used to describe the natural and designed world(s). Decide when to use qualitative vs. quantitative data. Use counting and numbers to identify and describe patterns in the natural and designed world(s). Describe, measure, and/or compare quantitative attributes of different objects and display the data using simple graphs. Use quantitative data to compare two alternative solutions to a problem. Constructing Explanations and Designing Solutions K-2 Constructing explanations and designing solutions in K-2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.	 Concept 2: Life Cycles Organisms have characteristics that can be similar or different. Young animals are very much, but not exactly, like their parents and also resemble other animals of the same kind. Plants also are very much, but not exactly, like their parents and resemble other plants of the same kind. Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. 	
Obtaining, Evaluating, and Communicating		
<u>Information</u>		
K-2 Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information		
 Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s). 		
 Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question and/or supporting a scientific claim. Communicate information or design ideas and/or solutions with others in oral and/or unritten forms using models, drawings, writing, communicate that 		
provide detail about scientific ideas, practices, and/or design ideas.		