



Master Teacher: Tamar Burris

Lesson Title: Seedy Business

Grade Level: 3

Time Allotment: 2 class periods (One 20 minute period and one 45 minute period)

Overview: In this lesson students will watch a video segment and use an interactive Web site to explore how a seed becomes a plant and learn about the process of germination. They will then investigate the parts of a lima bean to reinforce their knowledge of seed parts.

Subject Matter: Science

Learning Objectives:

Students will be able to:

- Identify the characteristics all seeds have in common;
- Identify the parts of a plant found in a seed embryo;
- Identify the seed coat, cotyledons, and embryo of a lima bean;
- Describe the functions of the seed coat, cotyledons, and embryo of a lima bean; and
- Identify what a seed needs to germinate

Standards:

The following standards were taken from the State of Montana Office of Public Instruction Web site at <http://www.opi.state.mt.us/>

State of Montana Science Content Standard 1: Students design, conduct, evaluate, and communicate scientific investigations

Benchmark – Represent, communicate, and provide supporting evidence of scientific investigations

Science Content Standard 3: Students demonstrate knowledge of characteristics, structures, and function of living things, the process and diversity of life, and how living things interact with one another and their environment.

Benchmark – Identify that plants and animals have structures and systems, which serve different functions.

Media Components:

Video

Assignment Discovery, Episode 54: Biomes: Seeds and Trees

Web Site

The Great Plant Escape, Case Three

<http://www.urbanext.uiuc.edu/gpe/case3/index.html>

This Web site, designed and hosted by the University of Illinois extension, offers several interactive "cases" in which students can help solve plant mysteries. Each case has information on different aspects of plant life and facts about plants and seeds. The Web site also offers plant related activities that teachers can use in the classroom. For this

lesson students will be solving Case Three, helping Detective Le Plant discover how a seed grows into a plant.

Materials:

- A mature, flowering plant
- Video tape and VCR
- Lima beans, one per student
- Plastic baggies, one per student
- Wet paper towels, one per baggie
- Permanent markers, several per class
- Pencils
- White paper or science journal
- Magnifying glasses, 1 per student

Prep for Teachers:

- Prior to teaching, bookmark the Great Plant Escape Web site, <http://www.urbanext.uiuc.edu/gpe/case3/index.html> . Load and cue the videotape to when the screen displays the title "Seed Starters" along with an image of a young seedling growing and a man's voice saying "Seeds may not look like much from the...".
- Prep the baggies by wetting one paper towel per student and sealing a towel in each baggie.

Introductory Activity:

1. With students sitting at their desks, show them the mature, flowering plant. Ask them if they know what kind of plant it is. Talk about the different parts of the plant in front of them, pointing out the flowers, the leaves, the stem, and directing their attention to where the roots are hidden by the pot.
2. Ask students if they know where the plant came from. (*A seed*) What does a seed need to grow into a plant? (*Possible answers include: water, nutrient-rich soil, a suitable temperature, air, room to grow, sometimes sunlight, and time*).
3. Tell students they are going to be watching part of a video about plants and seeds. Provide your students with a Focus for Media Interaction: After watching this video segment I want you to tell me three characteristics that all seeds have in common. (All seeds have an embryo, stored food, and a protective seed coat). Tell them to also listen for the three plant parts found inside a seed embryo. (root structure, stem, and leaves).
4. PLAY the tape from when the screen displays the title "Seed Starters" along with an image of a young seedling growing and a man's voice saying "Seeds may not look like much from the...". STOP the tape when the screen shows an illustration of a red seed beneath the dirt and a man says "...period when the embryo begins to grow."

5. Check for comprehension by asking students for the answers to the questions you posed before they watched the video. What do all seeds have in common? What plant parts are found in a seed embryo? (*Answers in step 3*)

Learning Activities:

1. Tell students that they will be examining seeds to identify the seed parts they learned about in the video. Give each student a lima bean. Give them a few minutes to observe their beans, asking questions such as "Are all the beans the same size?" (*Answers will vary*) "Are all beans also seeds?" (*Yes*) "What kinds of plants do you think will grow from these beans/seeds?" (*Lima bean plants*).

2. Pass the baggies out to the students. Model wrapping a bean in a wet paper towel and putting it in the baggie. Have students wrap their beans and place them in the baggies. Pass out permanent markers and have students write their names on the baggies after they have wrapped their beans and sealed them inside the baggies.

3. Tell students that they will be leaving their baggies out overnight to see what happens to the wet seeds. Place the baggies in a safe spot and make sure the paper towels stay damp.

4. Ask students to hypothesize about what they think might happen to the beans when they are wet. Have them record their answers on a piece of paper or in science journals if they keep them. Ask students to also record what they think they would find inside their bean if they were to open it up. Ask for volunteers to tell you what they think might happen to the wet beans and what they think is inside the beans.

5. Once students have completed their hypotheses, divide them into groups of three and have each group use one computer, or rotate the groups through your computer station if you do not have enough computers for the whole class (if this is the case you may want to rotate groups at the computer station while the other students are working on their hypotheses). Because the Web site being used has a lot of reading involved with it, be sure to pair students who are better readers with students who may have reading or language difficulties so that all students get a chance to participate in this activity.

6. Have students log on to <http://www.urbanext.uiuc.edu/gpe/case3/index.html> or click on the Great Plant Escape bookmark if you have created one. Tell students that they will be working together to help Detective Le Plant solve this plant mystery. Provide a Focus for Media Interaction: After going through Case Three you will need to tell me what germination means. (*Germination is the process by which a seed comes to life and starts turning into a plant.*) I want you to tell me what things a seed needs to germinate. (*Water, oxygen, and proper temperature. Some seeds also need the proper degree of light; some need more darkness while others need full sun to germinate.*) I also want you to tell me what things might cause poor germination. (*Overwatering can cause a seed to not get enough oxygen for proper germination. If you plant a seed too deep in the ground it might use up all its stored food before breaking through the topsoil and will not have*

enough energy to properly germinate. Also, if there is not enough moisture the seed won't be able to start the germination process and keep it going.)

7. Allow students time to solve Case Three. If there is enough time, allow them to explore the other cases on the Web site as well. Once all student groups have finished have them answer your focus questions. What is germination? What do seeds need to germinate? What causes poor germination? (*Answers in step 2*).

END OF CLASS ONE

8. WAIT 24 HOURS

Culminating Activity:

1. After 24 hours, pass baggies out to the correct students, making sure they understand not to open them until you say so. Once all students have received their baggies, ask them to open the bags and carefully unwrap their wet beans.

2. Give students magnifying glasses and tell them that you want them to carefully observe their beans. Ask them what they see. Are the beans the same as they were the day before? Do they feel different? Look different? What does the wet bean look like? Encourage students to talk with one another if they want to share what they have discovered. Give students a few minutes to talk about their observations.

3. Ask students to carefully pull apart the wet bean. Ask students if they know what the hard, outside casing that falls off easily is called. (*It is the seed coat or testa*). Ask students what they think the testa's job is. (*The seed coat protects the embryo*). Explain that the testa, or seed coat, protects the embryo much like a raincoat would protect you from the rain, or a windbreaker protects a person from getting chilled by winds.

4. Ask students to raise their hands if their bean fell apart in two halves. Explain that these halves are called the cotyledons. The cotyledons are leaves that store all the food the plant embryo needs to begin its growth. Ask students why a seed embryo might need its own food. (*A seed is self-contained, it has no roots or leaves from which to draw its food and so it needs stored food so that it can germinate and grow*). Ask students if they think their wet bean has an embryo. Have students point to the embryo and check to make sure they are correct. Have students look for the small folded leaf and roots that are encased in the embryo. Talk about how these parts will look after a few weeks, or even a month, if the seed were to germinate and grow.

5. Have students draw their beans on the same piece of paper they used to write their hypothesis, or on the same page they used the day before in their science journals. Ask students to write the different names of the parts that they found in their bean. Write cotyledon on the board so that students know the proper spelling of this word and allow

them to ask their neighbors, an assistant, or yourself if they need help with any other word.

6. When students have finished recording their observations, have them share whether they were right with their initial hypotheses about the wet bean. Ask them to compare what they thought would happen and what they thought they would see with what actually did happen and what they did see. Have students record the comparison in their science journal or on the same paper they have been working on.

7. As a class, decide what should be done with the used beans. Should we throw them out? Should we scatter them outside for the birds and animals? Why can't we plant them? (*They can't be planted because they have been pulled apart and they will not be able to grow.*) Once the class has reached a consensus, dispose of the beans. Finally, collect the papers or science journals for assessment.

END OF CLASS TWO

Cross-Curricular Extensions:

Art

Have students create mosaics out of different types of seeds.

Math/Science

Have students plant seeds and chart the time it takes the seeds to become seedlings. Have students measure the plants as they grow and conduct experiments with light, soil, and moisture.

Science

Have students study the life cycle of plants and the different ways seeds are dispersed.

Social Studies/Science

Have students write research reports on the indigenous plants in your area. What conditions have helped these plants thrive over the years? What are some things that threaten or impede their growth in modern times? What are the uses of these plants? How do they spread their seeds?

Community Connections:

- Arrange for a visit to a local garden or garden center to learn about some of the plants that thrive in your area.
- Have a botanist or gardener visit your classroom and talk about different plants and what they need to grow.
- Plant a classroom or school garden and share the food and flowers produced in the garden with the rest of the school or your community.