

Little Lima's Likely Story

Standard IV

Students will gain an understanding of Life Science through the study of changes in organisms over time and the nature of living things.

Objective 2

Living things change and depend upon their environment to satisfy their basic needs.

Intended Learning Outcomes

Generating Evidence: Using the processes of scientific investigations (i.e. framing questions, designing investigations, conducting investigations, collecting data, drawing conclusions).

Communicating Science: Communicating effectively using science language and reasoning.

Knowing in Science: Understanding the nature of science.

Content Connections: Language Arts; Math

Background Information

This activity provides students the opportunity to work cooperatively in monitoring an experiment that helps establish some basis for discussion of probability with plant growth, as well as the factors that contribute to plant growth. Teamwork practice in the Sprouting Scientists! activity prepares students to be successful with the jobs they will do as part of this activity.

Research Basis

Smith, D.C., & Neals, D.C. (1989). The construction of Subject Matter Knowledge in Primary Science Teaching. *Teaching and Teacher Education*, 5(1), 1-20.

Teachers are responsible for facilitating students' conceptual change in science. Suggested strategies for teachers to use include finding out students' prior knowledge and predictions, asking for clarification and explanation, providing discrepant events, encouraging discussion about data, and clearly presenting alternative scientific explanations.

Roth, W. M., McGinn, M.K (1997). Graphing: Cognitive Ability on Practice? *Science Education*, 81 (1), 91-105.

Graphing is a social practice that involves action and reflection, leading to understanding that is relational. Students should construct graphs from real-life situations.

Assessment Suggestion

Use student journal entries to assess their construction of knowledge about plant growth.

Videotape students during their team observations/discussions to assess student use of process skills to investigate (consult your administrator for questions about FERPA).

- Interview students to assess their understanding of conditions that affect plant growth.

Invitation to Learn

Show baby pictures of some/all students in the class. Let students try to guess which picture belongs to whom. Ask students to discuss what caused the growth from baby to first grader. “Are there specific things that a baby needs in order to grow into a first grader?”

Instructional Procedures

1. Show a lima bean seed and a grown plant (e.g., from the Sprout and Grow Window investigation).
2. Ask the students, “Can you prove that plants need specific conditions to grow?” (e.g., light, water, soil, etc.).
3. Scaffold for student discussion by asking questions like, “How can you show that plants need water to grow?”
4. Ultimately, students may decide on an experiment to show that there are conditions that affect plant growth.
5. Place students into teams of four or five. Explain that all students will help gather data for this experiment.
6. Decide which factors to test in the experiment. You may choose to have the following four test groups for each team of students:
 - control group (seed with water, soil and sunlight).
 - seed with water and sun, no soil.
 - seed with water and soil, no light.
 - seed with soil and sun, no water.
7. Have students graph their predictions for the success of each experimental group and the importance of each condition. Provide the opportunity for them to journal about the graphs. You may choose to keep an interactive class journal.
8. Provide students with hand lenses, measuring tools, paper, etc. for gathering data over a two-week period.
9. As a discrepant event, introduce the idea of growing a seed on a sponge. As a class, observe results. Do the results change or strengthen the concept that plants must have soil to grow?

Materials

- Lima beans
- Soil
- Plastic cups
- Graph icons
- Little Lima's Chance* worksheet
- Colored (painted) lima beans—approximately 60 yellow, 15 brown, 15 blue, 15 white
- Brown paper lunch sacks—enough for each pair of students to have one
- Hand lenses
- Nonstandard measurement manipulatives
- Student journals

10. Read books about plants to the class and provide selections for student independent reading. Include books that talk about plant growth and uses of plants (see resources for suggested titles).
11. Play *Little Lima's Chance*. Discuss the probability of growth each experimental group has given the results of the game.
12. Compare results of *Little Lima's Chance* with the initial predictive graphs. Compare the results with the actual observations and data being collected on the experimental groups.
13. During the two-week period, interview/discuss with each team about the data they are collecting. Ask them to draw conclusions and make further predictions.
14. Create a class report/book to analyze and display the data and draw conclusions.
 - As a class, compare and contrast the data collected. Decide on norms that were observed by every team.
 - Elicit facts discovered through shared and independent reading.
 - Discuss the order in which the facts/norms should be presented.
 - Have cooperative groups work on writing each fact on a page of the class report/book.
 - Students may add illustrations or selected pieces of data.
 - Publish the book.

Curriculum Extensions/Adaptations/Integration

- Read *Plantzilla* to your class. Discuss why they think the story is reality or fantasy. Students write letters to a scientist telling about their experiences with plants during class.
- Read *Weslandia*. Discuss the ways the main character uses plants (e.g., food, clothing, etc.). Students write lists of all the ways they use plants.
- Provide more activities with probability (see 2004 CORE Academy Handbook).
- Students further investigate how conditions affect plant growth by experimenting with temperature (growing plants in heat and cold).
- Advanced learners reflect on how the conditions required for plant growth affect the lives of farmers. Have them predict the results of a drought or flood on crop production.

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- Encourage ESL students to continue to add to their plant dictionaries and use them as resources for reading and writing throughout the activity.

Resources

Books

From Shoot to Apple, by Stacy Taus-Bolstad; ISBN 0-8225-0670-X

From Tree to Paper, by Pam Marshall; ISBN 0-8225-0672-6

From Wheat to Bread, by Stacy Taus-Bolstad; ISBN 0-8225-0673-4

From Flower to Honey, by Robin Nelson; ISBN 0-8225-0667-X

From Cotton to T-Shirt, by Robin Nelson; ISBN 0-8225-4732-5

From Grass to Milk, by Stacy Taus-Bolstad; ISBN 0-8225-4734-1

Plantzilla, by Jerdine Nolen; ISBN 0-439-67953-2

Weslandia, by Paul Fleischman; ISBN 0-7636-1052-6

The Gardener, by Sarah Stewart; ISBN 0-374-42518-3










Family Connections

- Invite parents to a celebration where students present their report.
Invite parents to play *Little Lima's Chance* with the students.

Little Lima's Chance






What are Lima Bean's chances of growing? Can Lima grow with only light and soil? Play this game of chance to make some predictions about how conditions affect plant growth.

Predict: Circle the set of conditions that are most likely to help Little Lima Bean grow into a healthy plant.






1. light  water  and soil 
2. light  and soil 
3. soil  and water 
4. water  and light 

Trial A: Put 3 yellow lima beans and 2 brown lima beans in a paper bag.






Are the chances for a seed that gets light, soil and water (yellow) better than the chances for a seed that only gets light and soil, but no water (brown)? Draw one seed from the bag and record the result with a tally mark. Return the seed to the bag and repeat 25 times. Write the totals. Circle the color drawn most.

Conditions	Color of Seed	Number of Times Seed is Drawn	Total
Light  soil  and water 	Yellow		
Light  and soil 	Brown		

Trial B: Put 3 Yellow lima beans and 2 blue lima beans in a paper bag. Are the chances for a seed that gets light, soil and water (yellow) better than the chances for a seed that gets only soil and water, but no light (blue)? Draw one seed from the bag and record the result with a tally mark. Return the seed to the bag and repeat 25 times. Write the totals. Circle the color drawn most.

Conditions	Color of Seed	Number of Times Seed is Drawn	Total
Light  soil  and water 	Yellow		
Soil  and water 	Blue		

Trial C: Put 3 Yellow lima beans and 2 white lima beans in a paper bag. Are the chances for a seed that gets light, soil and water (yellow) better than the chances for a seed that gets only water and light, but no soil (white)? Draw one seed from the bag and record the result with a tally mark. Return the seed to the bag and repeat 25 times. Write the totals. Circle the color drawn most.

Conditions	Color of Seed	Number of Times Seed is Drawn	Total
Light  soil  and water 	Yellow		
Water  and light 	White		

Write about what you noticed: