Sprouting Scientists!

Summary

This lesson provides students with the opportunity to observe and describe plants as they grow from seeds.

Materials

For each student:

- Pre-soaked lima bean
- Paper towel/plate
- Toothpick
- Hand lens
- Journals
- Sprout and Grow Window
- Journals
- Journaling paper
- Nonstandard measures (e.g., plastic worms)
- Drawing paper
- Camera (optional)

Additional Resources

Books

- *Sunflower*, by David M. Schwartz; ISBN 1-57471-581-X
- *Maple Tree*, by David M. Schwartz; ISBN 1-57471-556-9
- *Plant Leaves*, by David M. Schwartz; ISBN 1-57471-328-0
- *Plant Blossoms*, by David M. Schwartz; ISBN 1-57471-329-9
- *Plant Stems & Roots*, by David M. Schwartz; ISBN 1-57471-327-2
- *From Seed to Plant*, by Gail Gibbons; ISBN 0-590-63892-0
- *A Tree is a Plant*, by Clyde Robert Bulla; ISBN 0-439-45614-2
- *Ten Seeds*, by Ruth Brown; ISBN 0-375-80697
- *How a Seed Grows*, by Helene J. Jordan; ISBN 0-06-020185-1

Additional Media

- *Sprout and Grow Window*, available from www.enasco.com; Item# SB36694J.

Background for Teachers

This activity is designed to provide students with the opportunity to observe and describe plants as they grow from seeds. It is recommended that you teach All Sorts of Seeds! prior to this activity so that students have had the opportunity to manipulate seeds. Students will also have the chance to

use many process skills throughout this unit. You may teach the process skills in isolation, earlier in the school year, or concurrent with this activity (i.e. symbolization, observation, description, prediction, data collection, investigation, classification, segmentation and blending, problem solving, forming conclusions).
For this activity, group students in two different ways. They should be grouped into teams of four to five students. Give each team a name (e.g., “Team 1” or “Blue Team”). Alternately employ the jigsaw grouping strategy as well. This requires you to assign each member of each team a letter. Subsequently, in “Team 1,” you will have Student A, Student B, Student C, and Student D. To form the jigsaw groups, instead of the teams, ask students to group by their assigned letter, instead of team name. So, all “A’s” would become a group, and so on.

Team 1	Team 2	Team 3	Team 4	Team 5
Student A	Student A	Student A	Student A	Student A
Student B	Student B	Student B	Student B	Student B
Student C	Student C	Student C	Student C	Student C
Student D	Student D	Student D	Student D	Student D

Intended Learning Outcomes

5. Understand and use basic concepts and skills.
6. Communicate clearly in oral, artistic, written, and nonverbal form.

Instructional Procedures

Invitation to Learn

Pass out a lima bean (pre-soaked), toothpick, paper-towel/plate and hand lens to each student. Instruct them to investigate the lima bean seed. Students may use the toothpick to pry open the cotyledons and reveal the embryonic plant (root and leaf are visible).
Ask questions to guide student discussion about their investigation. For example: "What do you notice about this lima bean? How does it feel on the outside? What does it look like on the inside? What do you see? Do you know what it is? Do you know what it is called? Why do you think it is part of the bean/seed?"
Supply scientific vocabulary as is relevant to the discussion (e.g., seed coat, cotyledons [seed food], embryonic root, embryonic seed, etc.). Students sketch and write about their seed "dissection" in their journals.

Instructional Procedures

"What will happen if I take one of these seeds and plant it in some soil?" Use the K-W-L chart to record claims of knowledge and questions about what will happen. Be sure to use follow-up questions in response to student statements in order to better understand what they know and have already experienced. Urge students to think of questions they might have about how seeds grow into plants, specifically the lima bean seeds (e.g., How long will it take to sprout? How tall will it grow to be? How many leaves will it have?, etc.). It is critical for students to establish that they would like to plant the seeds and "see what happens" in order to validate their predictions and answer their questions.

Plant seeds in the Sprout and Grow Window.

Explain to the students that you would like to support them in their predictions of what will happen to the seeds. You are also eager to help them answer the questions they posed about the future of the seeds. Talk about how scientists often have questions about nature and what happens with living things in our world. Tell them that one strategy scientists use to help them

test their predictions and answer their questions is the strategy of collecting data/information.
Pose the question: "As we start to watch these little seeds, what are some ways we could record what we are seeing and experiencing?" Students may mention sketches, journaling, pictures, etc.
Facilitate the collection of data by assigning students to teams. Group students in cooperative teams (e.g., tables) and prepare them for jigsaw groups by assigning team names and jigsaw group letters. Explain that every student will have the same job of observing the plants and recording data. Team members take turns gathering data daily. For example, Member "A" from each team will collaboratively gather data on Monday. Each Member "B" gathers data on Tuesday, and so forth. Assign each team a folder for data collection.
Student jigsaw groups collect data and share their findings with their teams each day. Students may use cameras, drawing/journal paper, hand lenses, nonstandard manipulatives, etc. to record their data.
As the teacher, you decide how long this procedure continues. You may choose to have the students collect data for up to two weeks.
Throughout the duration of the investigation, you may want to teach some mini-lessons. Base your choice of supplemental activities on the questions and comments your students come up with as they gather data and observe the growth of the plants (K-W-L chart).
At the conclusion of the investigation, invite student teams to review their data and present it in some fashion (e.g., a book that shows the progressive growth of the plants, a graph that depicts the number of leaves/height of plants, or the number of days it took the seeds to sprout, etc.).
Revisit the K-W-L chart and discuss newfound knowledge and validated concepts.

Extensions

Teach the Seed House activity as found in the 2003 First Grade CORE Academy Handbook.
Expose students to nonfiction books on plants and the growth cycle. Books like *Maple Tree* and *Sunflower* are especially nice because they have vivid photography that is both stimulating and informative to young scientists/data recorders.
Share *How a Seed Grows* with your class. As an additional study of how plants grow, complete the activity described in the book.
Share books that talk about plant parts, although it is not a formal part of the first grade core to teach plant parts and functions. Since students will be observing plants so closely, sharing books like *Plant Leaves, Plant Stems and Roots*, and *A Tree is a Plant* will provide them with a richer schema for thinking about what they see.
Provide living plants in the classroom for students to observe. Encourage them to compare and contrast different plants. Having other plants in the classroom provides a springboard for additional discussions about plant attributes and graphing.
Integrate this unit with subtraction practice. Read *Ten Seeds*. Challenge students to write subtraction stories to match what is happening in the story, in word and/or number sentences. Using *Ten Seeds* as a reference, invite students to write their own stories (both addition and subtraction) using nature as the setting. Provide them with manipulatives like plastic worms or foam flowers to help spark their imaginations.
Have the students complete daily graphs by answering questions/collecting data on the topic of seeds and plant growth.
As jigsaw groups meet to collect data, interview individual students to assess gaps in understanding or misconceptions. These interviews also provide an opportunity to encourage deeper ideas and expanded knowledge of your advanced learners.
This lesson has built-in adaptations. It provides students the opportunity to work collaboratively and express their thoughts orally, as well as through pictures and writing.

Provide scaffolding for emergent writers by posting the Seed/Plant Word Wall that you created in the All Sorts of Seeds! activity. Accommodate for ESL learners by providing pictures/illustrations next to the words.

Give students (especially ESL) their own individual “plant dictionaries.” Provide them with vocabulary and pictures to paste into their dictionaries as the unit progresses.

Family Connections

Students identify a plant around or near their home. Challenge them to record as much data as they can about the plant (e.g., length, number of leaves, color, texture, fruit, seeds, bugs in residence, etc.).

Send home (on loan) the data collection books compiled/written by student teams so that students may share their learning with family members.

Have students write a letter to a family member telling about the growth of the seeds/plants.

Assessment Plan

Use student drawings/writing about the plant growth cycle to assess the level of their observational skills.

Individual/small group interviews are a good way to assess what students are observing about plants and their environment.

Assess students by having them sketch a plant with all the parts they observed during the investigation.

Students write about/summarize the growth process from seed to plant.

Bibliography

Research Basis

Shepardson, D. P. (1999). Learning Science in a First Grade Science Activity: A Vygotskian Perspective. *Science Education, 83*(5), 621-637.

Classroom vignettes and child interviews illustrate that teachers can mediate students’ learning by enacting these roles within the context of an activity: facilitator, guide and supporter, active participant and evaluator. As the teacher mediates, children construct their own knowledge.

Laplante, B. (1997). Teachers’ Beliefs and Instructional Strategies in Science: Pushing Analysis Further. *Science Education, 81*(3), 227-293.

“School science,” a version of science taught by many teachers, is remarkably different from science “as it is actually done.” This study of teaching strategies used by teachers illustrates the profound impact that a teacher’s own perception of science learning can have on student learning. Two vignettes punctuate the crucial necessity for inquiry as a process of leading students to the construction of science-related knowledge.

Authors

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