



Blue Swallow Farm Foundation

LESSON PLAN

Title: Composting in a Bottle

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Grade: 4

Subject: Environmental Science

Time: 50 min.

Background Information and Student's Prior Knowledge

This lesson has been created to supplement student learning regarding environmental biology, sustainability, or waste-management practices. This lesson can be adapted to meet the needs of many learners but has originally been designed for a fourth grade class. The standards chosen are in accordance with Next Generation Science Standards.

In order to fully engage with this content, students should be familiar with sequencing, the scientific method, and entry-level data collection. Students should also have exposure to the plant life cycle before this lesson is introduced.

Standards

Next Generation Science Standards (NGSS)

3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

4-PS3-4. Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

Essential Questions

What can humans learn from natural systems?

How do Earth systems work together to manage waste?





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Learning Objectives

- Students will sequence the plant decomposition process.
- Students will observe the composting process.
- Students will identify important components of the composting process.
- Students will conduct an investigation about the necessary components of composting.
- Students will analyze data and draw conclusions in accordance with the collected data.

Supporting Materials and Resources

- Lesson Slides: [Independent Study: Composting Lesson Plans](#)
- Composting Sequencing Cards (one pre-cut set for each student)
- Guided Notes Activity (one for each student)
- Data Collection Worksheet (one for each student)
- Experiment Materials: [Independent Study: Investigating Composting: Lesson Materials](#)

Group 1 (Control):

- Clear plastic container with removable lid (2L bottle)
- 1 cup green waste (fruit and vegetable scraps only)
- 1 cup brown waste (dead grass, leaves, or small twigs)
- 1 cup shredded paper
- 5 cups potting soil
- 1-2 cups water
- Permanent marker
- Control Group Instructions

Group 2 (No Green Waste):

- Clear plastic container with removable lid (2L bottle)
- 1 cup brown waste (dead grass, leaves, or small twigs)
- 1 cup shredded paper
- 5 cups potting soil
- 1-2 cups water
- Permanent marker
- No Green Waste Instructions

Group 3 (No Brown Waste):

- Clear plastic container with removable lid (2L bottle)
- 1 cup green waste (fruit and vegetable scraps only)
- 5 cups potting soil
- 1-2 cups water
- Permanent marker
- No Brown Waste Instructions





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Group 4 (No water):

Clear plastic container with removable lid (2L bottle)
1 cup green waste (fruit and vegetable scraps only)
1 cup brown waste (dead grass, leaves, or small twigs)
1 cup shredded paper
5 cups potting soil
Permanent marker
No Water Instructions

Group 5 (No sun):

Clear plastic container with removable lid (2L bottle)
1 cup green waste (fruit and vegetable scraps only)
1 cup brown waste (dead grass, leaves, or small twigs)
1 cup shredded paper
5 cups potting soil
Permanent marker
No Sun Instructions

Vocabulary

Compost
Decomposers
Brown Waste
Green Waste
Nutrients

Safety Considerations

To aid in student safety, the teacher should first check with administration to secure permission to complete this lesson. Next, the teacher should ensure that no students have any allergies or asthma that could interfere with the activity. The teacher should instruct the students to wear goggles and masks while creating their compost bottles. As the students observe the bottles over the next few weeks, the teacher should consistently check the bottles as well and discard any bottles that mold. The teacher should ensure that the students do not open the bottles.





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THE TEACHER WILL . . .

THE STUDENTS WILL . . .

Lesson Delivery (5E's Model)

- ENGAGEMENT
- EXPLORATION
- EXPLANATION
- ELABORATION
- EVALUATION

Engage (7 min.): During the Engage portion of the lesson, the teacher will give each student a set of **composting sequencing cards**. The teacher will set a timer and instruct the students to put the cards in the order they belong. If needed, the teacher can instruct the students to start sequencing from the fruit card. The teacher should then instruct the students to turn and talk with their table mate or write about why they put the cards in the order they did. The teacher should display slide 5 during this process. After the students have discussed with their table mates, the teacher should ask the students to make predictions about what they believe the topic of the lesson will be. The answers to the sequencing activity are hidden on slide 6.

Explore (8 min.): During the explore portion of the lesson, the teacher should introduce the **sci sho kids video** on slide 7. This video is a description of the composting process. It will review the steps of composting. The teacher should encourage students to look, listen, and learn during the video.

Explain (10 min.): The teacher will provide the students with guided notes that can be completed alongside the video. The teacher should instruct students to add this activity to their interactive notebook once it is complete. The teacher should review the answer key with students on slide 9 after conducting an informal assessment to ensure that students are connecting with the content.

Engage (7 min.): During the Engage portion of the lesson, students will sequence the steps of plant decomposition. Given an individual set of six cards with various images, students will put the cards in order. After they have sequenced the cards, when instructed, students should write or turn and talk about why they chose the order they did. Following, students should make predictions about the topic of today's science lesson.

Explore (8 min.): During the explore portion of the lesson, the students will observe a video of the composting process. Students will actively listen during the video.

Explain (10 min.): During the explain portion of the lesson, students will be given the opportunity to complete the guided note companion activity alongside the video. If students have an interactive notebook, they may add this activity to the notebook. This activity will serve as an informal assessment.





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Elaborate (25 min.): While the students are watching the video, the teacher will distribute the experiment materials to each of the five table groups. During the explain portion of the lesson, the teacher will facilitate the creation of a classroom compost experiment. To do so, students should be divided into five groups as evenly as possible. The teacher should pre-determine groups to best suit the learner's needs. These groups can be displayed on slide 11 to assist in classroom management and student independence. Once the students have joined the correct table groups, the teacher should review the instructions for the experiment found on slide 12. Following the whole class review, the teacher should instruct students to begin conducting their experiment according to the directions. The teacher should assist students as needed with this task. After students have completed the creation of their bottles, the teacher should instruct the students to complete as much of the data collection worksheet as possible. When students have completed this, the teacher should collect this worksheet for safe keeping.

Elaborate (25 min.): During the elaborate section of the lesson, students will follow the directions for their group to build a composting bottle. Each group of students will be responsible for creating one composting bottle that represents one dependent variable change. Students will fill the bottle with layers of soil and waste in accordance with the instructions. Following the completion of the bottle, students should complete as much of the data collection worksheet as possible. Students should then turn this worksheet in to the educator in charge.





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Evaluate (10 min./day, 20 min.): The evaluate session of the lesson will be conducted over the next few weeks. Students will need to collect data and record this data to evaluate the experiment results. Once per week, instruct the students to label the level of each layer on the bottles. Teachers should instruct students to use their worksheets to record this information. Once 6 weeks have passed, the teacher should review the findings with the class. The teacher should lead an active discussion with the class about what their findings mean, and how these findings can inform the students' understanding of Earth's natural decomposition systems.

Evaluate (10 min./day, 20 min.): During the evaluate session that will be conducted over the next few weeks, students will collect data and make observations about their compost bottles. This information will be recorded in the data sheet.

At the end of the 6 week phase, one student from each group will share the results with the class as a whole. The class will discuss their findings and record their conclusions.

References

Clearway Community Solar (2022). Experiment with composting and learn about food waste.

<https://www.clearwaycommunitysolar.com/blog/science-center-home-experiments-for-kids/composting-and-food-waste-experiment/#:~:text=Experiment%20Materials%3A&text=1%20cup%20of%20fruit%2C%20vegetables,5%20cups%20of%20potting%20soil>

