Third Grade: Food Waste and Vermiculture

Standard

3L-2 Obtain, evaluate, and communicate information about the effects of pollution (air, land, and water) and humans on the environment. (GSE S3L2)

2a. ask questions to collect information on the different types of pollution (i.e., air, land, and water) and create records of sources and effects of pollution on the plants and animals of Georgia (GSE S3L2a)

2b. construct an explanation to describe the relationship between the types of pollution and the impact of humans on the environment

2c. investigate and communicate solutions, such as conservation of resources and recycling materials, to protect plants and animals of Georgia (GSE S3L2b)

Background

Ideally, students will have conducted a cafeteria "waste audit" before doing this lesson, which can be used as baseline information on the volume of trash going from the school to the landfill. Repeating the audit after the vermiculture project is in place can provide an estimate of the volume of trash diverted from the landfill. For tips on conducting a food waste audit, check out the Cafeteria Culture web site: http://www.cafeteriaculture.org/ School cafeteria trash typically includes uneaten food and a lot of packaging – all of which goes to the landfill. Meanwhile, people are going hungry from lack of food. And the amount of garbage we make is requiring more and larger landfills. Organic (once-alive) waste in a landfill can take years to break down, producing methane gas and leachates when it does. Methane is a powerful greenhouse gas that warms the earth. Leachates leak into the ground can contaminate water.

Teaching Tips

Preparation Obtain red wriggler worms (not night crawlers) from a bait shop, sporting goods or fishing store and refrigerate until needed, making sure holes for air are not blocked. Collect other supplies on the Materials list.

Directions for this lesson and design challenge (on next page) are written for teachers. Provide students with the Eco-Engineering Challenge Lab Report Form from the appendix. Break students into groups of 3-4 for the Challenge.

Phenomenon: Present phenomenon in lesson without explanation before or after students view it.

What Do you Notice? Engage students in writing a tentative explanation (or making a labeled drawing) that tells what they observed.

What Do you Wonder? Engage students in asking their own questions, which will form the basis for their research.

Student Research After each student writes a question, consider placing each question on a sticky note, grouping them in categories, and allowing students to learn more in small groups according to their interests (worms and food waste). A curated collection of articles is provided for use in small groups, using the Jigsaw protocol. https://www.jigsaw.org/

Teacher-Directed Activity Show one or more explainer videos to students. Encourage the class to contribute to collectively make a rubric for design that incorporates research on worm needs and cafeteria waste.

Zero Heroes Lesson Activity This lesson is an Eco-Engineering Challenge to make worm bins that reduce food waste.

Revised Explanation Allow students to return to and revise their initial explanations of the phenomenon. Clear up any misconceptions about worms, vermicompost, landfills, and the differences between vermicompost and compost: https://byjus.com/biology/difference-between-compost-and-vermicompost/

3rd Grade Eco-Engineering Challenge: Solving Food Waste with Vermiculture

The Phenomenon

https://youtu.be/Mxp1nnrUG0Q

What do you notice? (tentative explanation)

Engage students in writing about what they noticed while observing the phenomenon. This will serve as their tentative explanation. At the end of the lesson, allow students to revise and refine their explanations to reflect new information and to tie their understanding to the Eco-Engineering Challenge. Explanations may take the form of labeled drawings.

What do you wonder? (student questions)

Engage students in asking their own questions about the unexplained phenomenon. These questions will form the basis for student-directed research in small groups with shared interests.

Eco-Engineering Challenge

Assign this challenge: Design a worm bin that will meet two goals: 1) providing a suitable, healthy habitat for worms based on their needs, and 2) reducing the volume of food waste by converting it to vermicompost.

Constraints

Time: 1 class period for research, design and building; 1 class period for testing and refining prototype and sharing
Specifications: Design must include a suitable habitat for worms and reduce food waste volume
Design must be completed and explained before building starts. Clean Up: work stations

Materials

- red wriggler worms
- shallow waterproof container with lid (such as durable plastic shoebox)
- variety of open-weave materials of different gauges (screen, mesh, netting, filter paper, burlap)
- variety of fasteners (glue, duct tape, binder clips)
- variety of colors of construction paper
- variety of types of cardboard pieces (paperboard, corrugated, etc.), newsprint (uncoated)
- safety glasses, drill
- mister bottles / source of water
- variety of food scraps

Curated Articles for Research Jigsaw (jigsaw.org)

The Habitat of Red Worms (Sciencing.com)
- https://sciencing.com/the-habitat-of-red-worms-13406911.html

Differences between Earth Worms and Compost Worms (Sciencing.com)
- https://sciencing.com/differences-between-earth-worms-and-compost-worms-12498654.html

How to Identify Red Wrigglers at All Stages (ThrivingYard.com)
- https://thrivingyard.com/identifying-red-wiggler-worms/

Vermicomposting 101 (Foodprint.org)
- https://tinyurl.com/ejx9car5

Revised Explanation

Allow students to return to their original explanation and revise it to show what they have learned.