Compost, Recycling, and Trash

Overview:
Students will learn how to make compost and how it benefits a garden. Students will also learn the importance of recycling and the environmental dangers of landfills.

Objectives:
At the end of the lesson, students will be able to:

- **Describe** how compost is made of organic matter that helps plants grow.
- **List** what items should go into a compost pile and in what proportions.
- **Sort** items into appropriate containers for compost, recycling, and landfill.
- **Explain** why minimizing trash that goes into a landfill is important.

Preparation:
- Label three containers with: compost, recycling, and trash/landfill. Include images with examples of what goes inside.
- Dig a small hole in the ground, lined with plastic bags that will simulate a landfill.

Vocabulary:
- compost
- decompose
- carbon
- nitrogen
- methane
- microbes
- recycle
- invertebrates

Learning Activities:
1. Presentation (20 min.)
   A. Ask students if anyone knows what compost is and if anyone knows how to make compost?

Materials:
- Visual Aid: "Compost Cake"
- Handout 1: "The Good Microbes"
- Three containers for sorting items into compost, recycling and trash piles
- Items to sort into the three containers
- A simulation of a landfill
- Photos of landfills

On the board:
- Vocabulary
- Student Reflection Questions

Suggested Snack:
- Pickled vegetables: http://www.feastingathome.com/quick-pickled-vegetables/
- Pesto: http://www.foodnetwork.com/recipes/food-network-kitchens/basil-pesto-recipe2.html

Other Resources:
- Building a compost pile: https://www.planetnatural.com/composting-101/making/compost-pile/

B. Define key terms for the students:
   - *compost*: decomposed organic matter added to soil to make it rich with nutrients
   - *organic matter*: decayed matter derived from previously living organisms (plants and animals)
   - *decompose*: to be broken down into component parts by bacteria, fungi, or invertebrates
   - Tell students that only things that were once living can decompose.

C. Guide students through the "compost cake" poster from the bottom to top.
   - Discuss the ideal carbon (C) to nitrogen (N) ratio: 30:1. Explain that this is achieved when you add four parts brown plant material with 1 part green plant material.

D. Show students the garden composter and talk about why it is important to follow the guidelines on how to make compost (add water, turn it once a week). This allows all of the material to get into the center of the pile where the microbes are, breaking down the soil and making it rich with nutrients.
   - Tell students that in order for organic matter to decompose, you need decomposers.
   - These are *microbes*: microscopic organisms, including bacterium, fungi and invertebrates.
   - Explain that these organisms need food, warmth, and moisture to grow and reproduce. Some microbes feed on things that were once living, such as fallen leaves and dead animals, causing them to breakdown or decay. The decayed materials mix with soil, providing essential nutrients for plants to use. Without this process, the nutrients in the soil would not be there.
   - Tell students that most leftover food can go into the compost bin. However, meat, fish, oils and diary products cannot be composted as they will attract predators, like rodents.

E. Review items that can and cannot be composted using the Handout "The Good Microbes."

F. Discuss what can be done with items that cannot be composted.
   - Define Recycling: Converting waste into reusable material
   - Define Trash/Landfill: Discarded matter that cannot be composted or recycled. In the U.S., this waste is usually disposed of in landfills.
   - Have students sort piles of waste into the three bins: compost, recycling, and landfill.
   - Have students put each pile into the appropriate bin.

2. Landfill demonstration (20 min.)

A. Ask students if they know what happens to the trash in trash cans when it gets picked up by a garbage truck.
B. Bring students to the pre-dug hole that will simulate a landfill.
C. Show students pictures of large landfills in the US.
D. Have students put all items from the landfill bin into the hole.
   - Explain why this is not a good place to dispose of trash as it: 1) contaminates the soil and ground water and 2) produces methane gas which contributes to global warming.
E. Ask students what they think is the best way to minimize what gets put into landfills? Tell them minimizing their own waste is the best way!

3. Snack (5 min.)
   A. Bring students inside and serve a snack that teaches a strategy for minimizing food waste. For example, food that was preserved using canning or pickling (good strategies for handling an abundance of a particular crop).
   B. Have the students taste the snack first, then explain how it can help minimize waste.

4. Have students answer the reflection questions in their journals. (5 min.)

**Note: If there are enough teachers, turn Activities 2-4 in stations, and rotate small groups of students through each to keep them active and engaged.

Student Reflection Questions:

1. Were you surprised by how waste can turn into soil? Does the process seem difficult? Gross? Fun?
2. What is one strategy you can share with your family to help minimize what goes into your trash/landfill container at home?

Assessment Questions:

1. When talking about compost, what does FBI stand for?
   A. Fungi, Bacteria, Insects
   B. Food waste, Bins, Insects
   C. Fungi, Bacteria, Invertebrates

2. What items can be composted?
   A. Anything that you don't want anymore.
   B. Items that were once living.
   C. All plastic items that you don't want to reuse.

3. Explain why it is a bad idea to put waste into landfills.
   - **Landfills release methane gas which contribute to global warming.**

Standards:

ESS3.C: Human Impacts on Earth Systems
Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. (MS-ESS3-3)
MS-ESS3-3.
Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.*
CCSS.ELA-LITERACY.SL.8.1
Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6-8 topics, texts, and issues, building on others' ideas and expressing their own clearly.

Acknowledgements:

This lesson was adapted from:

Compost Cake. Lower Columbia School Gardens, The Edible Schoolyard.
https://edibleschoolyard.org/sites/default/files/Compost%20Cake%20-%20Graphic.pdf

Sustainable Agriculture Activity Guides. UC Davis.
http://asi.ucdavis.edu/programs/sf/publications/sustainable-ag-activities-guide-compost.pdf

Science Worksheets. GreatKids.
http://www.gscdn.org/library/cms/91/25791.pdf?_ga=1.244464134.287594415.1469466688