Rachel Nabors
Practicum – Sustainability Office
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Lesson Plan: What is Composting?

Goals and Outcomes: At the end of this lesson, students will be able to:

- Define compost
- Explain the process of making compost, particularly with an industrial composter like the one at GC
- Describe the effects of diverting food waste for compost

Participant Prerequisites: There are no prerequisites for this lesson. No prior knowledge is required for students to reach the goals.

Resources: Below are the resources required to prepare and execute this lesson plan.
Time: Preparation: 30 min; Execution: 30 min
Site: This lesson plan was developed to be used at the compost site. It is imperative that the site is prepped and ready for the tour, see the "Management and Safety" section for more details.
Equipment: Compost examples, food waste examples, carbon examples, 3 folding tables, 9 containers for samples, labels, compost poster, road sign

Management and Safety:

1. Compost Site:
    a. Organization:
        i. Compost Materials: Tools, compost, food and carbon examples should all be put away or on display before the event.
    b. Parking:
        i. Parking will need to coordinated with facilities. They use the site regularly, so it is important that there are minimal cars at the site and they are parked out of the way. It may also be useful to schedule the site visit at a time where facility trucks won't be coming through, to minimize distractions.
    c. Safety:
        i. Mixer: Be sure to remind students that the mixer is not safe to put your hands in or near.
        ii. Compost drum: The compost drum should not be touched or handled, and students should not be using any of the equipment.
        iii. Tools: Tools should be put away, unless they are out for educational purposes.

Background Content: This will provide you with the information you need to teach.

Compost is decaying organic matter that can be used as plant fertilizer. This fertilizer has an abundance of nutrients that plants need to grow. Often, commercial

compost will have an NPK (Nitrogen, Phosphorus, Potassium) rating, and these are the three main fertilizer ingredients; however, healthy compost will have a variety of trace minerals. The wider the variety of brown (carbon-rich) and green (nitrogen-rich) materials going into the compost, the more nutritious the product!

At Georgia College's compost site the main brown used is sawdust, but older compost piles have been used as well as shredded paper from main campus. The greens come from The MAX, and vary depending on the time of collection. There have been bins filled with mostly bread, some with a large ratio of sweets, and some with a good mix of vegetables and meat. Meat can only be composted in conditions where the compost is held at a high temperature (140-160 degrees) for at least seven days to kill off harmful bacteria. Once everything is collected and mixed, it enter the compost drum where it will mature. The drum helps keep it hot and aerates the compost so that the environment stays aerobic. After the compost matures (usually after 7-10 days), it is emptied and left to cure, which is the final decomposition/maturing stage.

In regards to the environment for the compost, it is important to address the difference between composting and throwing food away. When people throw food away in the trash (usually a plastic bag) this food is entering an anaerobic environment where it will decay and create methane gas, contributing to Greenhouse gases. Taking food and combining it with carbon in a aerobic environment. creates a system of organic matter all working together. Composting makes use of waste, diverting it from a landfill where it would otherwise be of no practical use.

- Describe the effects of diverting food waste for compost

<u>Teaching Methods</u> (HOW)

1. Preparation:
    a. Communication: The class or group that is visiting will need to know what to expect when they come out to the site. Whether you are emailing or speaking in person, mention the following:
        i. There is no bathroom.
        ii. There is potable water and a trash can.
        iii. There is no address, but there will be a sign (provided and kept at site) placed by the road.
        iv. There is limited parking (no more than 10 cars) so carpooling is necessary.
    b. Site: The site needs to be clean and presentable. This means no visible trash, tools put away (unless they are being used), and educational materials set up ready to go. The road sign will need to be set up at least 30 minutes prior to the lesson start time for anyone who may arrive early.
    c. Educational Materials: **Be sure to request tables from Kristen or Lori ahead of time in order to set up.** This lesson should be hands on (experiential) where participants are engaging with the instructor. This lesson is set up so that after you introduce the site and talk about the process, students can separate into groups and walk through different stations and interact independently with the materials.It is also acceptable to guide students through each section, depending on the size of the group. Stations can include:

        i. Poster: Have a poster (provided, kept at site) to showcase the process. Students can examine the poster before moving on to the next section.
        ii. Compost samples: Have samples of compost set out on a table for students to be hands-on with if they choose. Label which sample is from which pile/semester to show a progression.
        iii. Brown & Green samples: Examples of brown and green sources might be helpful for students to visualize the mixing process, or to give them ideas of what can and cannot be composted.
        iv. Compost Trivia: have examples of things that can and cannot be composted and have students divide up the materials, ensuring they "reset" the table for the next group.
    d. Parking: Be prepared to usher people in when they arrive in their cars. It might be helpful to tell people where to park at they arrive, and to do so in a way that makes it easy for them to leave (make sure no one is blocked in).
2. Introduction: When students arrive, wait until the entire group is there to start (give 5 minutes after planned start time if there is someone knowingly running late. The introduction should go as follows:
    a. Ask the students "What is composting"
        i. Provide/add to answer.
        ii. Discuss use as fertilizer, mentioning NPK rating.
    b. NPK? Discuss importance of ratio - nutrients from variety of browns and greens.
    c. Explain GC process :
        1. Collect "greens" from The MAX
        2. Mix "greens" with "browns"
        3. Monitor temperature and capacity of drum
        4. Empty composter
        5. Turn piles
    d. Address difference of composting versus throwing food away:
        i. Anaerobic versus Aerobic environments
        ii. Aeration of drum
    e. EITHER: Separate into groups (if >10 people) and allow rotation to different stations, or guide group through each station. Stations should take between 5-8 minutes, depending on the group.
3. Poster:
    a. The poster presents the GC compost process through pictures. This allows students to visually examine how the interns operate on a daily and weekly basis.
    b. The poster should be hung or set up at eye level for student viewing.
4. Compost Samples:
    a. On a folding table, have 3 compost samples (3 containers) from different piles on display to show a progression. Have labels marking the semester and year to show this progression.
5. Browns/Greens Samples: Have a folding table with the following samples displayed:

    a. Browns samples: sawdust, paper shreds, or older compost (3 containers) is used as a carbon source, have these on display and labeled.
    b. Greens Samples: pull food from different bins to show variety in food waste (3 containers); have them labeled with meal and contents.
6. Compost Trivia:
    a. Collect different materials that can and cannot be composted, with signs on the table that say "Compost? YES" and "Compost? NO"
    b. Have another label on the table explaining the directions: "Place items in correct pile"
7. Conclusion:
    a. After each group has gone through each station, the group will gather for questions.
8. CLEAN UP:
    a. All materials will need to be cleaned and safely placed back into the shed at the site. Tables will need to be returned to the Office of Sustainability. Take the road sign, poster and containers to the shed, and the materials used can go back into the composter or their respective piles.

<u>Adaptations</u>:

1. Remediation: if the students are struggling meeting the outcomes, the instructor will go into more detail with the following:
    a. Defining compost
    b. Explaining in detail the compost process
2. Enrichment:
    a. Chemistry behind aerobic and anaerobic decomposition.

Lesson Plan Rubric (Score Combined with Event Delivery)

Item	Description
Template (3 pts.)	-Title that explains lesson plan -Easy to follow and understand -Easily replicable
Components (4 pts.)	-Appropriate for time and topic -Inclusive of knowledge and skills

Event Delivery Rubric

Skill	Excellent (6 pts.)	Good (4 pts.)	Needs Improvement (2 pts.)	Poor (0 pts.)	Score
Knowledge & Demonstration	-Content is relevant and appropriate -Knowledge is correct, and current -Well timed and organized to foster optimal	-Content somewhat relevant and appropriate -Knowledge somewhat correct and current	-Content appropriate, irrelevant, -Knowledge incorrect and not current -Timing off, unorganized	-Content inappropriate, irrelevant -Knowledge incorrect, not current -Timing off, unorganized	

	understanding of concept	-Well timed, organized but doesn't foster optimal understanding			
Teaching Methods	-Prepared, relevant information -Organized, appropriate -Easy to follow -Supports student learning -Address different learning styles	-Somewhat prepared with relevant information -Organized, inappropriate -Not easy to follow -Students struggle to learn -One or two learning styles addressed	-Unprepared, irrelevant information -Unorganized, inappropriate information -Hard to follow -Students don't comprehend topic -Only one learning style addressed	-Unprepared, irrelevant information -Unorganized, inappropriate information -Impossible to follow, very scattered -Students completely lost -Learning styles not addressed	
Risk Management	-All hazards adequately assessed, not underestimated -All site risks assessed and managed -All activity risks assessed and managed	-Not all hazards addressed, not underestimated -Not all Site risks addressed or managed -Not all activity risks addressed and managed	-Hazards addressed, underestimated -Site risks addressed, not managed -Activity risks addressed, not managed	-Hazards not addressed, underestimated -Site risks not addressed or managed -Activity risks not addressed or managed	
Total Score					/25