Food Webs Lesson 3: "The Engineer"

Student Handout

Your Challenge:

Food from your cafeteria likely goes to the landfill. There are many problems casued by landfills and today, your challenge is to engineer a way that your school can:

1. Reduce the amount of waste that goes to the landfill.
2. Recover the nutrients from food waste to make it available for a local food web.

Directions: Use the planning organizer below as you go through the design process.

1. Go outdoors to an outdoor environment to make observations. List the biotic (living) and abiotic (non-living) features of the environment along with any organisms that you observe.

2. Construct a diagram that shows how the organisms on your list interact with one another. With a star, identify the organisms in your diagram that provide energy or nutrients to the others.

3. Make a prediction about the impact of all living or once-living waste going into landfills and not being available as nutrients in the outdoor space you are observing

4. Brainstorm a list of cafeteria waste that could be useful in an outdoor space but would normally go into a landfill.

5. Brainstorm ideas about your design solution.

6. Finalize your drawing (SS) and describe how your solution or prototype works step-by-step.

7. Build your prototype according to your drawing as applicable.

8. Present your prototype.

Planning Organizer:

List the BIOTIC and ABIOTIC features of an outdoor environment:

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Construct an arrow diagram that shows how the organisms on your list interact with one another. With a star, identify the organisms in your diagram that provide energy or nutrients to the others.

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Prediction: What would happen to plants if all organic waste (food scraps, etc) ended up in landfills?

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Brainstorm some ideas for your design solution and or prototype based upon your key features or considerations to mitigate the cafeteria waste. Label the parts of any sketches you make (SS).

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Complete the final labeled drawing of your prototype (SS). List here the step-by-step explanation of how the waste is mitigated in your solution.

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Diagram your solution and build your prototype (if applicable) according to your final labeled drawing

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<u>Get ready for your presentation</u> **Conclusion: Explain the key features of your prototype and explain the benefit of your design over landfill waste disposal.**

Assessment

Your principal is very impressed by all the work you put into finding a solution for your cafeteria waste problem! Now it is time for them to select the best solution. Use the checklist and cognitive skills rubric to ensure you have addressed all aspects of the "Engineer" with quality work.

Food Webs Engineer Checklist: Content Concepts and Practices

- ❏ Accurately identifies organisms that provide energy and nutrients to an ecosystem
    - ❏ Prototype relates understanding of these organisms' role to their cafeteria waste solution
- ❏ Diagram of waste solution prototype has labeled arrows showing the function of the parts
    - ❏ Accurately explains how waste is mitigated in their prototype
- ❏ Prototype model matches the drawn diagram
- ❏ Explanation of prototype design explains its benefit over landfill
- ❏ Presentation includes explanation of key features and benefits

Cognitive Skills Assessed

	Emerging (1)	Developing (2)	Proficient (3)	Advanced (4)
Constructing Explanations or Arguments From Evidence	Constructs an explanation with no clear sources of evidence.	Uses scientific principles and/or data from at least one source to construct or evaluate an explanation, but explanation contains minor misconceptions.	Uses accurate but incomplete scientific principles and/or data from multiple sources to construct or evaluate an explanation.	Uses accurate and complete scientific principles and/or data from multiple sources to construct or evaluate an explanation.
Designing Solutions	Applies no scientific principles and/or data to design, construct, and/or test a design of an object, tool, process or system.	Applies minimal scientific principles and/or data to design, construct, and/or test a design of an object, tool, process or system.	Applies adequate scientific principles and/or data to design, construct, and/or test a design of an object, tool, process or system.	Applies complete scientific principles and/or data to design, construct, and/or test a design of an object, tool, process or system.