

Sustainability Teachers' Academy Lesson Plan

Life Cycle Analysis: Tap Water vs. Bottled Water

Topics Covered

Product Life Cycles
Natural Resources
Waste

Grades

6-8

Duration

60 min

Sustainability

Competencies

Systems Thinking
Collaborative Thinking

Online Resources

["In Praise of Tap Water".
New York Times](#)

["Bottled Water Debate
Splashes Congress".
CBS News](#)

[Bottled Risk](#)

[Life Cycle of a Plastic
Water Bottle](#)

[What Really Happens
to the Plastic You Throw
Away?](#)

Key Questions

How are products evaluated for their impact on the environment?
What processes are involved in the production, use, and disposal of tap and bottled water?

Overview

This activity is an introduction to product life cycle assessment and the cradle to grave ethic. Students will create their own circular diagrams of the life cycle of bottled water and tap water.

Objectives

Students will be able to:

- Illustrate their knowledge of the life cycle of bottled and tap water through a visual and verbal representation
- Compare and contrast some costs and benefits associated with bottled and tap water
- Translate what they have learned about life cycles into their lives and decisions
- Evaluate the environmental benefits of a "cradle to grave" analysis

Materials

Per working group

- Large sheet of poster paper
- Tape or glue
- Markers
- Whiteboard, markers, eraser

Teacher Preparation

- Print and cut out pictures to correspond with the life cycle of bottled water and tap water; each group should have one set of pictures which include both life cycles
- Print one hand-out of tap vs. bottled facts for each group of students.
- Print one worksheet for each student
- On one large sheet of paper, draw in the steps of the life cycle; post this example in the front of the room for all the students to see

Background Information

A product's life cycle begins with its raw materials and then moves on to its production, manufacture, distribution, use and finally its disposal. A life cycle analysis evaluates the environmental impacts of a product through its entire life cycle, from cradle to grave. Many companies are incorporating these types of assessments to optimize the environmental performance of their products.

Recommended Procedures

1. Engagement: This activity will focus students on the topic

We need to drink water every day. How do students get their drinking water? List on the board possible ways to get drinking water. Two of the options will be from the tap and from bottled water. Explain that the water that we get from the tap or from bottles is a product that requires several steps to get from its source to us. Explain that every product has a life cycle- the steps it takes to get to you and where it goes when you are done with it.

2. Exploration: A student-led activity with guidance

Break the students into groups. Have each group put their desks together so they have a large working space. Hand out 2 large sheets of paper to each group. Hand out the pictures, descriptions, and tape or glue. Tell the students that the pictures and text they were handed describe the life cycle of bottled water and tap water. It is their job to figure out which images/text goes with which product (bottled or tap) and for which step of the life cycle.

The students can tape or glue the images and text to the corresponding part of the life cycle diagram.

3. Explanation: Students discuss their understanding of the concept

Distribute the facts about tap & bottled water to each group and a student worksheet to each student. Allow the students to answer the questions based on their life cycle diagrams and the handout.

4. Elaboration: Students apply the idea in a new context

Facilitate a discussion with the students based on the handout, worksheet, and life cycle diagrams. You may wish to create a costs and benefits table for both bottled water and tap water. Allow the students to share their thoughts on the trade-offs of each product.

5. Evaluation: Students assess their knowledge, skills, abilities

Each group should have completed presentable diagrams.

Each student should be evaluated based on their participation in creating the diagrams, completing the handout, and providing input for the costs and benefits discussion.

Extensions

Ask students to create a diagram of the life cycle of another everyday product that they use or eat. Suggestions: a hamburger, cell phone, soccer ball.

Vocabulary

Cradle to Grave: the life cycle analysis of a product from its origin (cradle) to its final resting place (grave)

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Next Generation Science Standards

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Asking questions (for science) and defining problems (for engineering)	ESS3.A Natural resources	Cause and effect: Mechanism and explanation
Developing and using models	ESS3.C Human impacts on Earth systems	Systems and system models
Obtaining, evaluating, and communicating information		

Common Core English Language Arts

Reading: Informational Text	Writing	Speaking & Listening	Language
N/A	N/A	SL.6.1, SL.6.4, SL.7.1, SL.7.4, SL.8.1, SL.8.4	N/A

Common Core Mathematics

6 through 8	9 and 10
N/A	N/A

Other Common Core

Science	History/Social Studies
N/A	N/A