

The Reduce, Reuse, Recycle hierarchy's been turned on its head

Recycling receives overwhelming attention; reuse and reduce take a back seat.

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- **Grade level:**
High School
- **Subject areas:**
Science, Social Studies, Language Arts
- **Estimated duration:**
Preparation time: 20 minutes
Part one: 5 minutes to introduce assignment, 25-30 minutes for groups to read through and plan their presentations
Part two: 5-15 minutes/group to present (estimate 50 minutes total)
- **Setting:**
Classroom
- **Skills:**
Inferring, interpreting data, recording, presenting data and interpretations to a larger group

Summary

By exploring and learning about topics in small groups and then preparing a presentation, students will understand the difference between recycling, reuse and waste reduction. They will also learn about waste generated and discarded in the U.S., and will discover that Iowa's legislators identified waste reduction as the preferred waste management strategy.

Objectives

Students will:

- Develop an understanding of the waste hierarchy and various waste management strategies
- Creatively present their information to classmates, building on the knowledge learned from prior group presentations.

Materials

- Any materials needed to help students depict the concepts shared with the larger group, such as pop can, newspaper, coffee can, hand-me-down t-shirt, etc. Other helpful materials may include markers, the blackboard, and the Internet.
- *Consumption and Waste*, published in 2004 by Perfection Learning Corporation, Logan, Iowa (Group 3)
- *Stuff: The Secret Lives of Everyday Things*, by John C. Ryan and Alan Thein Durning (Group 4)

Background

Waste reduction has been largely overlooked as a waste management strategy, yet Iowa's legislators have identified it as the most preferred method of waste management. This lesson helps students understand this management strategy. It serves as an introduction to a unit on waste reduction.

Procedure: *The Activity*

Part One: Briefly introduce the lesson, and break students into 5 groups. Provide supplemental materials as needed to various groups. Allow each group 25-30 minutes to prepare their presentation.

Part Two: Have student groups present in sequential order, encouraging each group to build on the information presented by the prior group. Conclude by reviewing the main points of the lesson, including the definitions of recycling, reuse and reduction: Recycling: To use again after re-processing; Reuse: To use again in original condition; Reduction: To prevent the generation of waste.

Then, review why waste reduction is the most preferred method for managing waste.

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Group 1: 230 Million Tons of Trash

Your task is to help your peers understand:

- 1) **The difference between waste generated and waste discarded** (see * and ** under the waste statistics listed below)
- 2) **Trends in waste generated and waste discarded (both per capita and nationally) in the past four decades**

Be creative! Use lecture as a last resort.

The U.S. is creating more waste, but—fortunately—we are also recycling more. However, recycling alone is not keeping up with increased consumption and waste. In 2000, 100% more waste was sent to landfills and/or incinerators than in 1960. (The population increased by 57% during that time.)

Here are waste statistics:

Pounds of waste generated* and discarded per person per day**

Generated—1960: 2.7 1980: 3.7 2000: 4.5

Discarded—1960: 2.5 1980: 3.3 2000: 3.2

**before recycling and composting*

***after recycling and composting*

Total waste generation*

1960: 88.1 million tons/year 1980: 151.6 million tons/year 2000: 232 million tons/year

**accounts for increase in waste generation and increase in population*

Total discards*

1960: 82.46 million tons/year 1980: 137 million tons/year 2000: 164.3 million tons/year

**after recycling and composting*

Retrieved from *Municipal Solid Waste in the US:1999 Facts and Figures* at www.epa.gov/garbage/mswfinal.pdf, p. 2-3. Also retrieved from [www.epa.gov/epaoswer/non-hw/muncpl/pubs/msw2001.pdf], p. 2, 4. Some figures derived from tables "Total recovery" and "Total waste generation."

This lesson plan, titled *The Reduce, Reuse, Recycle Hierarchy's Been Turned On Its Head*, may be found at www.uni.edu/ceee/wastereduction/lesson_plan_summaries.htm.

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Group 2: Reasons for increased waste

Your task is to:

- 1) **Pick up where Group #1 left off. Among other things, they will discuss trends in waste generated and waste discarded (both per capita and nationally) in the past four decades.** For example, in 1960, 82.46 million tons/year were discarded, and by the year 2000, 164.3 million tons/year were discarded in the U.S. That's a 100% increase in disposal rates. During that time, the population in the U.S. increased 57%.*
- 2) **Help your peers understand reasons for the increase in waste generated and waste discarded. Brainstorm, expand on the information below, explore the ideas!**
Be creative. Use lecture as a last resort.

Tip: Several reasons for the increase in waste generated and waste discarded may include:

- 1) Economic boom in the 1990s, leading to more spending and increased consumption per person
- 2) Busier lives, more convenience foods, therefore more over-packaged products. Could this also lead to more cars/household? Are there other waste consequences as a result of busier lives?
- 3) More people living alone
- 4) More technologies available (how many TVs, computers, phones, etc. are in the average household compared to 40 years ago?)
- 5) Bigger homes (Average square foot of new construction, residential housing was 1,500 in 1970 and 2,225 square foot in 1999)**
- 6) Advertising expenditures continue upward (\$12 Billion in 1960; \$129 Billion in 1990; retrieved from *The Concise Encyclopedia of Economics*, <http://www.econlib.org/library/Enc/Advertising.html>) Note: This increase has remained at about 2% of GNP during this timespan.

What other factors might be involved?

*Retrieved from *Municipal Solid Waste in the US: 1999 Facts and Figures* at www.epa.gov/garbage/mswfinal.pdf, p. 2-3. Also retrieved from [www.epa.gov/epaoswer/non-hw/muncpl/pubs/msw2001.pdf], p. 2, 4. Some figures derived from tables "Total recovery" and "Total waste generation."

**Retrieved October 31, 2005 from *Statistical Abstract of the United States*, "#1197, Characteristics of New Privately Owned One Family Houses Completed 1970-1999," page 714, at <http://www.census.gov/prod/2001pubs/statab/sec25.pdf>.

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Group 3: What is recycling? What is reuse?

Your task is to:

- 1) **Pick up where Group #2 left off.** They will talk about reasons for increased waste generation.
- 2) **Help your peers understand AND remember the difference between recycling and reuse.**
Tip: The working definitions are the easiest to comprehend and remember, though the other definitions may give you ideas and more depth.
- 3) **Help your peers understand trends in recovery rates over the last four decades.**

Be creative! Use lecture as a last resort.

Recycling

Working definition: To use again after re-processing

Formal definition: The process of collecting, sorting, cleansing, treating and reconstituting materials that would otherwise become solid waste, and returning them into the economic mainstream in the form of raw material for new, reused, or reconstituted products which meet the quality standards necessary to be in the marketplace. Retrieved 6/3/03 at

<http://eetd.LBL.gov/EA/Buildings/BNordman/C/consmain.html>, p. 11.

Examples: Newspapers and plastic milk jugs are examples of materials that are readily recyclable.

Note: For more information about recycling, refer to pages 16-19 in *Consumption and Waste*, published in 2004 by Perfection Learning Corporation, Logan, Iowa.

Reuse

Working definition: To use again in original condition

Formal definition: A form of disposal that uses a discard item again as itself. Reuse generally thrives in decentralized locations that serve local markets. Nearly everything reusable can be scrapped, but once it is scrapped, it can no longer be reused. Retrieved 6/3/03 at

<http://eetd.LBL.gov/EA/Buildings/BNordman/C/consmain.html>, p. 14.

Examples: Hand-me-down clothes and coffee cans used to store nails are examples of reuse.

Total recovery (includes recycling and composting)

1960: 6.4%

1980: 9.6%

2000: 29.2%

Retrieved from *Municipal Solid Waste in the US: 1999 Facts and Figures* at www.epa.gov/garbage/mswfinal.pdf, p. 2-3. Also retrieved from [www.epa.gov/epaoswer/non-hw/muncpl/pubs/msw2001.pdf], p. 2, 4. Some figures derived from tables "Total recovery" and "Total waste generation."

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Group 4: What is waste reduction?

Your task is to:

- 1) **Pick up where Group #3 left off.** They will help peers understand the difference between recycling and reuse.
- 2) **Help your peers understand the meaning of waste reduction, and how it differs from recycling and reuse. You may need to review the definitions discussed by Group #3** (recycling: to use again after re-processing; reuse: to use again in original condition).

Be creative! Use lecture as a last resort.

Waste Reduction

What does it mean to "reduce waste?" Simply, it's *preventing* the generation of waste. Just as maintaining good health (or *preventing* illness) reduces the need for treatment of disease, waste prevention reduces the need for handling and processing of garbage. Here are a few examples:

- Soft drink can manufacturers have reduced aluminum waste by redesigning cans to use less aluminum. (See *Stuff: The Secret Lives of Everyday Things*, by John C. Ryan and Alan Thein Durning, page 64)
- When we use canvas bags at the grocery store, we are reducing paper or plastic waste by voluntarily changing our behavior.
- When we use non-toxic cleaning supplies, we are reducing the need, and therefore the production, of toxic constituents.
- Most bottles, cans and jars are produced with fewer materials today than 30 years ago. For example, one 2-liter bottle is 51 grams today, but was 68 in 1977. This change alone has kept 250M pounds of plastic out of the waste stream (*Consumption and Waste*, © Perfection Learning Corporation, Logan, Iowa, page 15).

What is the best way to address the waste problem? Stop waste before it starts.

Working definition: Prevent generation of waste

Formal definition: Any action that avoids the creation of waste by reducing waste at the source, including redesigning of products or packaging so that less material is used; making voluntary or imposed behavior changes in the use of materials; or increasing durability or reusability of materials. Also includes reduction of the use of toxic constituents. This action is intended to conserve resources, promote efficiency, and reduce pollution. Retrieved 6/3/03 at

<http://eetd.LBL.gov/EA/Buildings/BNordman/C/consmain.html>, p. 11-13.

Other terms: Source reduction, waste reduction, volume reduction at the source

Examples: Lightweighting of plastic bags and aluminum cans, not buying a t-shirt or TV based on identified needs, rationing of coffee, buying products with less packaging (such as cereal in a 15-oz. bag instead of cereal in individual serving sizes), and using baking soda or vinegar to clean instead of bleach are examples of waste reduction.

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Group 5: What is the waste hierarchy?

Your task is to:

- 1) **Pick up where the other groups left off. They will talk about waste and the difference between recycling, reuse and reduction.**
- 2) **Help your peers understand AND remember the waste management hierarchy, as set by Iowa's state legislators.**
- 3) **Using information learned from the other groups, identify why it is important to know and practice the hierarchy.**

Be creative! Use lecture as a last resort.

Code of Iowa: 455B.301A Declaration of policy.

1. The protection of the health, safety, and welfare of Iowans and the protection of the environment require the safe and sanitary disposal of solid wastes. An effective and efficient solid waste disposal program protects the environment and the public, and provides the most practical and beneficial use of the material and energy values of solid waste. While recognizing the continuing necessity for the existence of landfills, alternative methods of managing solid waste and a reduction in the reliance upon land disposal of solid waste are encouraged. In the promotion of these goals, the following waste management hierarchy in descending order of preference, is established as the solid waste management policy of the state:

- a. Volume reduction at the source. (Author's note: Volume reduction is the same as waste reduction.)
- b. Recycling and reuse.
- c. Other approved techniques of solid waste management including, but not limited to, combustion with energy recovery, combustion for waste disposal, and disposal in sanitary landfills.

2. In the implementation of the solid waste management policy, the state shall:

- a. Establish and maintain a cooperative state and local program of project planning, and technical and financial assistance to encourage comprehensive solid waste management.
- b. Utilize the capabilities of private enterprise as well as the services of public agencies to accomplish the desired objectives of an effective solid waste management program.

87 Acts, ch 225, §405; 94 Acts, ch 1177, §1

(Retrieved 10/31/2005 from

<http://nxtsearch.legis.state.ia.us/NXT/gateway.dll/moved%20code/2005%20Iowa%20Code/1?f=templates&fn=default.htm>)

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