

4-6 MODULE

Unit 2: Reducing, Reusing, and Recycling *Overview*

UNIT 2'S CONCEPTS

- Reducing the amount of materials we buy and reusing and recycling the materials we have helps conserve natural resources. People need to exercise judgment, care, and planning in their use of natural resources. (*Science Framework*, p. 125)
- Responsible individuals analyze the long-term effects, costs, benefits, and trade-offs of their lifestyle choices. They take responsible action by practicing waste reduction and waste management strategies in their communities, schools, and homes. (“Conceptual Matrix for Integrated Waste Management Education”)

The 12 lessons in this unit are described in the outline that follows.

LESSON 1: SOURCES OF ENERGY

Lesson's concepts:

- Energy is the ability or capacity for doing work by a body or system, and energy is required for any change to take place. The word *energy* can also describe resources used for producing power; e.g., solar energy, fossil fuel energy.
- Various sources of energy are used to make a variety of objects and to provide power to operate certain objects.

In Lesson 1 students will:

- Define the word *energy*.
- Identify the sources of energy people use to make and operate various objects and determine which of these are considered renewable or nonrenewable.
- Determine what things they enjoy doing that requires using objects and identify the energy sources and other natural resources used to make or to use these objects.
- Develop a game to teach others about energy sources and other natural resources and the importance of conserving them.

LESSON 2: PERFORMING A CLASS AUDIT OF WASTE

Lesson's concept:

Analyzing the source and content of a waste

stream is the first step in learning how to reduce, reuse, and recycle.

In Lesson 2 students will:

- Observe the amount of waste generated by the class.
- Categorize the waste from their classroom by type of material from which products were made, and analyze each category by weight, volume, and number of items.
- Calculate the percent of waste by type of material and determine how much waste is generated by the class in one day, one month, and one year.
- Attempt to reduce the amount of waste they dispose of in the class's garbage can over a one-week period and complete charts to show their progress.
- Design a plan to reduce in the classroom the amount of waste that would have been placed in a landfill.

LESSON 3: MODEL COMMUNITY RELAY

Lesson's concepts:

- People can reduce their solid waste by learning the ways that waste can be sorted, according to the materials which can be reused and recycled.
- Through the process of reusing and recycling, people can save the energy and natural resources it takes to acquire and manufacture items from raw materials.

In Lesson 3 students will:

- Listen to and/or read parts of *Recycle!* by Gail Gibbons to identify the difference between reusing and recycling.
- Use clay to mold a new item and/or make recycled paper in order to understand the process of recycling.
- Compare reusing to recycling.
- Work in teams and participate in a relay race to show how waste can be diverted from a landfill through reusing and recycling practices.

LESSON 4: PACKAGING: WHAT A WASTE!

Lesson's concepts:

- Packaging is useful and necessary for many reasons.
- Packaging is a major component of the waste stream. People can reduce the amount of garbage they generate by making thoughtful and informed choices when they buy packaged products.
- Excessive packaging and processing can waste natural resources and increase the amount of solid waste requiring disposal.

In Lesson 4 students will:

- Determine the purposes of a variety of packaging.
- Identify the materials used in packaging.
- Compare the amount of packaging and costs of the same product when placed in a large package as compared to being packaged in individual containers.
- Work in groups to compare the costs of various potato products that are processed and packaged differently.
- Classify packaging according to categories, based on the purpose or function of the packaging.
- Evaluate wasteful packaging.
- Recognize packaging made from recycled materials.

LESSON 5: WHY DO I BUY IT?

Lesson's concepts:

- Practicing waste prevention is an effective way to cut down on solid waste.
- An individual's informed and careful buying decisions, which include considering waste disposal and recycling, can significantly

reduce the volume of household waste.

- Solid waste contains increasingly more disposable (one-time use) objects and synthetic materials.
- If people reduce the number and types of goods they purchase, fewer goods will need to be manufactured and fewer natural resources will be used.

In Lesson 5 students will:

- Listen to or read *The Lorax*, by Dr. Seuss.
- Develop advertisements for products that are not really needed and for products that have many uses.
- Identify some of these products as they pertain to their lives.
- Complete a questionnaire on why they and their classmates buy things.
- Work in groups to analyze disposable and durable items.
- Develop a criteria for selecting and purchasing products which use less energy and fewer resources.
- Keep a log of what they buy and analyze their purchases.

LESSON 6: REUSING TRASH

Lesson's concept:

Reusing products helps reduce waste and conserve natural resources and landfill space.

In Lesson 6 students will:

- Participate in guided imagery to focus on how an item can be reused.
- Brainstorm ways a milk carton can be reused and then work in groups to design new uses for two milk cartons.
- Listen to or read *Galimoto* by Karen Lynn Williams and describe the efforts of the boy in the story to reuse wire to make a toy.
- Provide examples of items they can gather to make a new item.
- Participate in two skits about reusing materials and write additional parts to the skits.
- Select an item at home that would have been thrown away, reuse it in a creative way, and bring the item to class or write a description of how the item was reused to share with class members.

LESSON 7: PLASTIC POLYMERS

Lesson's concepts:

- Properties of different plastics can be identified.
- Some plastics can be reused or recycled.

In Lesson 7 students will:

- Conduct a series of tests to determine the properties of different types of plastics.
- Test plastics for decomposition by burying them for several weeks.
- Develop a rubric for assessing the value of their invention of new uses for a plastic item.
- Invent new uses for a plastic item.
- Audit the plastic waste generated in their homes.
- Identify new practices which would generate less plastic waste.

LESSON 8: SEPARATION MANIA

Lesson’s concept:

Waste can be sorted by physical properties, and some waste materials can be recycled.

In Lesson 8 younger students will:

- Identify specific properties of recyclable items by determining which items sink or float, are magnetic, can be moved by wind, or can be easily cut or shredded.
- Compare different characteristics of recyclable materials.
- Determine ways to sort recyclable materials.

In Lesson 8 older students will:

- Use several mechanisms to separate ten different recyclable waste items and record the results on a data sheet.
- Identify specific properties of recyclable items by determining which items sink or float, are magnetic, can be moved by wind, or can be easily cut or shredded.
- Recognize that the techniques they used to separate certain recyclable items are similar to the ways used to separate recyclables at a materials recovery facility.
- Work in groups to develop an efficient design for the separation process, based on the data they have gathered on their data sheets.

All students participate in manually separating recyclables on a simulated conveyor belt to show how a materials recovery facility works.

LESSON 9: BUYING RECYCLED PRODUCTS

Lesson’s concept:

Purchasing and using materials made from recycled products instead of nonrecycled products conserves natural resources.

In Lesson 9 students will:

- Discuss what types of materials can be made from recycled products.
- Compare the properties of paper towels made from recycled fibers to those made from nonrecycled fibers and design a chart to summarize their findings.
- Identify five items in their homes that are made from recycled materials.
- Conduct an informal survey to find out why people do not buy more products made from recycled materials.
- Work in groups to investigate the differences between white paper made from recycled and nonrecycled fibers and the differences between plastics made from recycled materials and nonrecycled materials.
- Design or invent an item that can be made from recycled materials.
- Present arguments about why recycled paper and other products made from recycled materials should be bought and used.
- Describe how to “close the loop” in the use of paper.
- Design an advertisement for a product made from recycled materials.

LESSON 10: WHAT ARE WE REUSING AND RECYCLING AT SCHOOL?

Lesson’s concept:

Some school waste can be reused or recycled.

In Lesson 10 students will:

- Conduct an audit by using a questionnaire and other methods of gathering data to determine what waste is being generated, what is being thrown away, what currently is being reused or recycled, and what could be reused or recycled at their school.
- Identify ways to make the existing reusing and recycling program more effective at school, or design a plan to start reusing or recycling at least one type of material if there is no reusing or recycling program at their school.

- Analyze the way their trash is handled at home, apply some of the waste minimization concepts and strategies learned at school in the home, and share what they learned with the class.

LESSON 11: A CLASS OR SCHOOL GAME AND REUSE DAY

Lesson's concept:

Reusing materials helps to conserve natural resources and landfill space.

In Lesson 11 students will:

- Name organizations and events that facilitate the reuse of old items.
- Work in groups to develop a game out of discarded materials.
- Participate in an auction in which items brought to class by students are auctioned off.
- Organize a class or school "Game and Reuse Day" when games made out of discarded materials will be played and reusable books and toys brought by students will be won, bartered, sold, or exchanged.

LESSON 12: SHARING WHAT WE KNOW ABOUT REDUCING, REUSING, AND RECYCLING

Lesson's concept:

Showing and teaching others about reducing, reusing, recycling, and buying products made from recycled materials reinforce what students have learned and encourage others to participate in waste management.

In Lesson 12 students will:

- Work in groups to plan and complete a project, such as a display, newsletter, slogan, skit, or story, that will teach others about reducing, reusing, and recycling materials or that will encourage people to buy products made from recycled materials.
- Design a rubric to evaluate their projects.
- Present their projects to the class and decide which projects should be shared with the entire school.

Required Books to Implement Unit 2

- **For Lesson 3**

Gibbons, Gail. *Recycle! A Handbook for Kids*. New York: Little, Brown and Company, 1992.

- **For Lesson 5**

Seuss, Dr. *The Lorax*. New York: Random House, Inc., 1971.

- **For Lesson 6**

Williams, Karen Lynn. Illustrated by Catherine Stock. *Galimoto*. New York: William Morrow & Company, Inc., 1990.

PROJECTS

Projects provide experiences in service learning and project-based learning to students and allow them to apply what they have learned in the classroom. Some lessons in this unit (e.g., lessons 2, 11, and 12) are project-based, and others include parts that are project-based (e.g., lessons 6, 7, and 10).

The following describe projects that students can do in a small group or as a class. Students are encouraged to select one of these projects, or they can develop one of their own. Examples are provided of schools that have conducted projects that address this unit on reducing, reusing, and recycling. If your students implement an applicable project, please send a description of the project to the California Integrated Waste Management Board, Office of Integrated Education, MS-14A, P.O. Box 4025, Sacramento, CA 95812-4025.

- **Project 1:** Students develop a classroom reducing, reusing, and recycling program. (Lesson 2)

*Bullis-Purissima Elementary School, Los Altos Elementary School District*¹

Students from Bullis-Purissima Elementary School created a questionnaire based on recycling. The focus of the questionnaire was to learn how often (always, sometimes, or never) families recycle at home. The survey was then sent home with each student. The information collected was then compiled into a database

¹"Jiminy Cricket's Environmental Heroes 1994-97." Burbank, Calif.: The Walt Disney Company, Inc., and the State of California's Environmental Education Interagency Network, 1999, p. 40.

and recorded on graphs. A graph was given to each classroom to demonstrate exactly where that specific class could improve on recycling efforts. Posters were hung in front of the school to remind students and passersby to respect the Earth by recycling.

- **Project 2:** Students set up recycling bins in areas that do not have one; this could be at school or in a nearby park. (Lesson 3)

Redway Elementary School, Southern Humboldt Joint Unified School District²

Jane Rowland, a Redway Elementary School fifth-grade teacher, and her class went on a camping trip and noticed that there were no recycling bins in their local state park. They decided to conduct a fund-raising project to purchase recycling bins for the park. One of the things that the students decided to do was to organize a coloring contest. The winning drawings were compiled in the “Redway School—Help the Earth Blossom” coloring book. They acquired donations for the printing of the coloring book and for posters to advertise the sale of the books. The books were sold by students and by local shops, businesses, and organizations. The class goal was to raise \$200, but they were able to raise over \$400 and purchased the recycling bins for their local state park.

- **Project 3:** Students make toys out of reused materials to give to younger students. (Lesson 6)
- **Project 4:** Students encourage school officials to buy recycled products for the school. (Lesson 9)

The Palo Alto Unified School District³

The Palo Alto Unified School District (PAUSD), with assistance from the City of Palo Alto, launched a new and expanded district-wide recycling program for elementary schools during April’s Earth Day Week. Although some schools have been recycling some materials for many years, this new program provides the district with the opportunity to recycle additional materials, reduce garbage costs, and model waste reduction behaviors to PAUSD students. The recycling team consisted of parents, volunteering as recycling coordinators; students, acting as “Recycling Leaders”; the PAUSD Business office; and the City of Palo Alto Recycling Program staff. Parent volunteers donated their time to organize the logistics of their school’s program, kickoff events, and a stu-

²“Jiminy Cricket’s Environmentality Heroes 1994–97.” Burbank, Calif.: The Walt Disney Company, Inc., and the State of California’s Environmental Education Interagency Network, 1999, pp. 34–35.

³“For Palo Alto, Recycling Is Elementary!” *Reusable News*. Sacramento: Integrated Waste Management Board (fall, 1995).

dent “Recycling Team,” which helps monitor lunch area recycling. PAUSD Business Office staff wrote a revised school recycling policy requiring each school to recycle aluminum cans, glass, white paper, and colored paper, and to increase the purchase of school supplies made with postconsumer content. This policy was then approved by the school board.

- **Project 5:** Students select one item on the list of what students could do to reduce waste at school and develop a plan on how to implement it. (Lesson 10)
- **Project 6:** Students find out what the school is recycling and determine what else can be recycled or how the materials now being recycled could be recycled more efficiently. (Lesson 10)

McKinley Elementary School, Stockton Unified School District⁴

Ms. Rivera’s fifth-grade class took control of the existing school recycling program and brainstormed ways to improve it. They determined that recycle bin visibility and program knowledge needed to be increased. The class developed new signs for the recycle bins and promoted awareness of the recycling program through a letter-writing campaign and by writing articles for the school paper.

John Tyler Elementary School, Stockton Unified School District⁵

Students at the John Tyler Elementary School practice throughout their lives to reduce, reuse, and recycle, whether they are at school, home, or even on a field trip. Students participate in the C.L.E.A.N. squad, which is an acronym for Children Learning Environmental Awareness Naturally. The C.L.E.A.N. squad collects anything that can be recycled. They have rolling trash cans to collect recyclables throughout the school and have made use of an empty classroom as their recycling center where everything is sorted, weighed, recorded, and broken down.

- **Project 7:** If there is no recycling program at school, students organize a recycling program, emphasizing collection and recycling of aluminum and paper. (Lesson 10)

⁴“Jiminy Cricket’s 1997–98 Environmentality Winners.” E-mail from Deidra Bennett, Senior Environmental Programs Representative, Environmental Policy, The Walt Disney Company, Inc., October 15, 1998.

⁵“Jiminy Cricket’s Environmentality Heroes 1994–97.” Burbank, Calif.: The Walt Disney Company, Inc., and the State of California’s Environmental Education Interagency Network, 1999, p. 39.

Gold Trail Union Elementary School District, El Dorado County⁶

Gold Trail Union Elementary School District in El Dorado County has been “doing the right thing” for a very long time. Beginning in 1985, paper has been collected for recycling from the two schools in the district. More Paper Recycling, a nonprofit organization dedicated to providing jobs and training to developmentally disabled adults and children, picks up mixed and white paper for recycling. The students maintain the recycling bins and do the sorting. In 1992 the district expanded its recycling program by working out an agreement with the vendor to recycle cardboard. The schools in the district also have a composting program. (Composting is a type of recycling; see Unit 3.)

Wilson Elementary School, Dinuba Elementary School District⁷

The entire school population works at recycling soda cans for “Reading Is Fundamental.” The money is used to buy books for students. As a result, each student at Wilson Elementary School receives three “free” books a year.

- **Project 8:** Students organize a conservation and recycling fair to provide information on recycling and entertainment for the community. (Lesson 11)

John Malcolm Elementary School, Capistrano Unified School District⁸

The “Barney Bunch,” a group of students from John Malcolm Elementary School, formed a partnership with a local disposal company to begin an extensive recycling program at school. They culminated their efforts with Earth Summit II, a Conservation and Recycling Fair featuring over 22 booths, exhibits, and displays, as well as characters such as Mother Earth, Ricky the Raindrop, Recycle Rex, and Mr. Pollution. Over 2,000 heard their message!

Isador Cohen Elementary School, Sacramento City Unified School District, in Partnership with the California Integrated Waste Management Board

The California Integrated Waste Management Board (CIWMB) sponsored the Second Chance Week dur-

ing the period of October 18–26, 1997. The activities the staff from CIWMB organized in partnership with staff and students at its adopted school, Isador Cohen Elementary School, included a school-wide book exchange, book repair clinic, and art from a scrap workshop. Students also presented the results of the event and samples of their artwork at a public meeting of the CIWMB.

The Second Chance Week is designed to promote the concepts of reuse, repair, and resale. For more information see the following website: <http://www.secondhand.com>.

- **Project 9:** Students develop a holiday display (Thanksgiving, New Year’s Day, Valentine’s Day, Fourth of July) to raise awareness about waste during the holidays and how to reduce it. (Lesson 12)
- **Project 10:** Students develop and implement ways to educate others about the benefits of recycling through slogans and logos, posters, displays, radio announcements, newsletters, poems or songs, skit or plays, stories, and bulletin boards. (Entire Lesson 12)

McKinley Elementary School, Stockton Unified School District⁹

Ms. Rivera’s class focused on developing and promoting environmental awareness at the McKinley Elementary School. They participated in an educational program sponsored by their local waste disposal company. The club, Yakkety Yak! Recycle That! encourages students to take a leadership role in their school’s recycling program. The goal of the club is to educate others about the benefits of recycling through skits, plays, art projects, essays, presentations, and fairs. Ms. Rivera’s class educated their fellow students through a school-wide essay and poster contest based on the theme of cutting down on trash. The class with the highest number of entries was treated to an ice cream party.

Note: To acquire a copy of “Jiminy Cricket’s Environmentality Heroes 1994–97,” contact the California Integrated Waste Management Board’s Office of Integrated Education at (916) 341-6769.

For ideas for awards and projects, see “Appendix F–I, Awards and Activities websites.”

⁶“Gold Trail Union Elementary Does It Right!,” *Reusable News*. Sacramento: California Integrated Waste Management Board (spring, 1995).

⁷Submitted by Janell Olson, fourth-grade teacher and field tester for *Closing the Loop*, Wilson Elementary School, Dinuba Elementary School District.

⁸“Jiminy Cricket’s Environmentality Heroes 1994–97.” Burbank, Calif.: The Walt Disney Company, Inc., and the State of California’s Environmental Education Interagency Network, 1999, p. 31.

⁹“Jiminy Cricket’s 1997–98 Environmentality Winners.” E-mail from Deidra Bennett, Senior Environmental Programs Representative, Environmental Policy, The Walt Disney Company, Inc., October 15, 1998.