“Do You Want Paper or Plastic?”

AN INQUIRY-BASED ENVIRONMENTAL EDUCATION UNIT FOR GRADES 3–5

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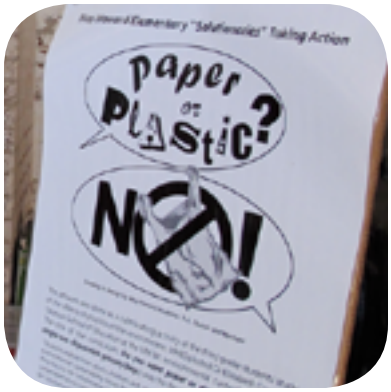
paper
or
Plastic?
NO!




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Unless stated otherwise, the source for all charts, figures, maps, and statistics used in this unit is United Nations Children's Fund (UNICEF), New York. Additional sources are noted when they are required. Website addresses (URLs) are provided throughout this unit for reference and additional research. The authors have made every effort to ensure these sites and information are up-to-date at the time of publication, but availability in the future cannot be guaranteed.

ACKNOWLEDGMENTS

This unit was largely inspired by the philosophy of humane education and, in particular, the work of the Institute for Humane Education Co-Founder and President, Zoe Weil. Using Weil's concept of solutionary education and the "Most Good" (or MOGO) principle, "Do You Want Paper or Plastic?" encourages young children to be critical thinkers and creative problem solvers for a better future. To learn more about the Institute for Humane Education, visit http://humaneeducation.org.

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UNIT OVERVIEW

Unit Overview

"Do You Want Paper or Plastic?" An Inquiry-Based Environmental Education Unit for Grades 3–5 includes six lessons with recommended extension activities. These lessons are intended to be flexible, with learning activities and resources that may be replaced with others deemed appropriate based on the interests, needs, and abilities of students. Although this unit outlines how educators may implement inquiry-based teaching and learning of the specific issue of paper and plastic grocery bags, any environmental issue can be researched and analyzed by students.

The overarching goals of the unit are to build and enhance young children's

1. Understanding of the causes and effects of contemporary environmental concerns, and how these concerns relate to human rights and responsibilities.
2. Ability to analyze local, national, and international environmental policies and practices.
3. Skills in developing perspectives, critical thinking, research, and decision-making about the global issue of single-use disposable bags through a student-led inquiry model.

Lesson Overview

Each lesson is structured around Kath Murdoch's inquiry cycle as students investigate the specific issue of the production, consumption, and disposal of paper and plastic grocery bags. The first part of each lesson is designed to build background knowledge before students conduct their investigations. Should the teacher determine students have adequate prior knowledge of the concepts addressed, he or she may elect to skip Part I and proceed to Part II.

Lesson 1: "Tuning In" to Consumption

In this lesson, students learn about the origin of everyday products in their lives, concluding that most are derived from precious, limited natural resources. Students "tune in" to the effects of consumption on the availability of resources and on the environment by exploring their prior knowledge and establishing research questions based on the choice of paper or plastic bags when shopping.

Lesson 2: "Finding Out" About Human Innovation

This lesson builds students' understanding of the production of goods with a focus on why new goods are made to replace older products or ideas. Students discover the intentional and unintentional consequences of human innovation, including the effects on our lives and on the environment. Students apply their learning to the issue of single-use, disposable grocery bags in their small research groups.

Lesson 3: "Sorting Out" Diverse Perspectives

In this lesson, students develop awareness of the diverse spectrum of human perspectives and how they influence beliefs and behaviors. Students' skills in developing perspectives are enhanced through reading and discussing a work of fiction. They analyze point of view and author's voice, making connections to the issue of single-use, disposable grocery bags. By understanding a range of perspectives, students begin to sort out their research findings and to validate sources of information.

Lesson 4: "Going Further"—Local to Global Bag Politics

In this lesson, students go further in their inquiry by exploring laws and policies related to the use of plastic bags. By learning how local, national, and international governments and groups have responded to this issue, students increase their understanding of the complexity of environmental issues and politics. Through collaborative research, students discover that policies set in place by governing bodies affect consumers' choices.

Lesson 5: "Drawing Conclusions," Making Informed Choices

In this lesson, students learn about the concept of civic responsibility as it relates to resource use and waste disposal. Drawing upon their research-based findings, reflections, and experiences, students begin to draw conclusions regarding the issue of single-use, disposable grocery bags. Students demonstrate metacognitive abilities as they reflect upon how their ideas and feelings have changed throughout the course of the investigation, ultimately deciding upon what is most essential to communicate with others. By the lesson's end, they understand that being informed is beneficial to one's personal development, and that being informed is also one's civic duty.

Lesson 6: "Taking Action"—Students as Solutionaries

In this culminating lesson, students reflect upon their learning about the specific issue of single-use, disposable grocery bags and how they can be positive change agents in their communities. Students first explore how adults, children, and organizations like UNICEF take action to promote environmental sustainability. Using these examples as inspiration, students determine how they, too, can be "solutionaries" by planning and implementing action steps that lead to a more sustainable future.

Unit Framework

"Do You Want Paper or Plastic?" An Inquiry-Based Environmental Education Unit for Grades 3–5 addresses the overarching essential questions listed below. These questions are intentionally open-ended, designed to focus on enduring understandings and to be transferable to other content. Within each of the unit's lessons, students explore topic-specific questions related to the specific issue of the production, consumption, and disposal of paper and plastic grocery bags. However, this particular global issue can be replaced with another environmental concern.

The sequence of these essential questions is intentional, and they serve as an impetus for students' investigations and decision-making. Using Kath Murdoch's (1988) inquiry model[1] as a framework, students seek answers to these questions, as well as those they generate themselves.

1 Kath Murdoch, *Classroom Connections: Strategies for Integrated Learning* (Prahran Victoria, Australia: Eleanor Curtain Publishing, 1988).

A variety of rich resources representing diverse perspectives promote the flexible thinking and deep understanding necessary to take informed action.

This unit is not designed to answer questions for students. Rather, students are encouraged to delve deeply into the issues presented, draw their own conclusions, and make decisions regarding how they may be "solutionaries" in ways that are appropriate and meaningful to them. Some of the questions raised in this unit may challenge students outside of the school setting for months and years to come; indeed the issues that most engage us are often the most difficult to solve.

Lesson	Enduring Understanding	Overarching Questions	Topical Questions
Lesson 1: "Tuning In" to Consumption	The goods we purchase are made of limited natural resources; therefore, we must make informed, thoughtful choices as consumers.	Where do the goods we purchase come from? How are goods produced and distributed?	How are paper and plastic bags produced? What raw materials are used to make them? How are bags distributed to my local grocery stores?
Lesson 2: "Finding Out" About Human Innovation	Scientific discoveries and technological innovations change the way people live and work. These changes may result in predictable or unpredictable, positive or negative effects on living things and the environment.	How do advancements in science and technology affect society?	What led to the production of paper and plastic bags? How have they evolved over time, and why? What are the perceived benefits and drawbacks of paper and plastic bags to society? For example, how are bags considered convenient? Useful?
Lesson 3: "Sorting Out" Diverse Perspectives	People have diverse perspectives that may help to explain the behaviors of individuals and groups. Sometimes these different points of view lead to conflict.	What does it mean to have a perspective or point of view? How does one's perspective affect or influence one's behaviors?	What perspectives do stakeholder groups have regarding the production, consumption, and disposal of paper and plastic bags?
Lesson 4: "Going Further"—Local to Global Bag Politics	Governing bodies affect the choices or decisions we make as consumers through the implementation of laws and policies.	What is the role of government in regulating the production, distribution, consumption, and disposal of products?	What local, national, and international laws and policies have been passed regarding paper and plastic bags?
Lesson 5: "Drawing Conclusions," Making Informed Choices	Being informed is a civic responsibility.	What are the effects of consumerism on humans, other living creatures, and the environment? What are my responsibilities as a consumer?	What happens when paper and plastic are thrown away? Where is "away"? What are the effects of disposal?
Lesson 6: "Taking Action"—Students as Solutionaries	An individual's choices and actions can have a positive impact on others and the environment. Anyone can be a solutionary!	How can individuals, groups, and nations work together to solve problems?	In what ways can I make positive choices regarding consumption to lessen my impact on the environment and living creatures? How can I reduce waste and pollution?

Background Information

Environmental Sustainability: A Key Dimension of Sustainable Development

Carbon emissions. Deforestation. Groundwater contamination. These are just some of the environmental threats that affect our atmosphere, land, water, and biodiversity. They contribute to climate change, an increase in more destructive weather events, changes to the ecosystem, and a reduction in the quality of air and water, which in turn prove detrimental to our health, society, and economy.

Of all members of society, it is the children who are most affected by environmental degradation, and thus suffer the most. They are more susceptible to maladies caused by pollutants in the air and water, for example, and their increased vulnerability to adverse social conditions is worsened by things like forced migration due to desertification. Moreover, as the inheritors of the environment we leave for them, today's children have an additional challenge: dealing with the irresponsible choices we are making today about managing our natural resources. The rate and manner in which resources are extracted from the Earth cannot be sustained if the environment is to be preserved or if future needs—our children's needs—are to be met. Their ability to thrive in the future—and provide for their children—is put in question. There couldn't be a more important reason than our children's present and future well-being to commit to fundamental changes in environmental practices.

The type of planning and resource management that offers the best hope is called sustainable development, defined by the United Nations as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.[2] It recognizes that economic development, environmental sustainability, and a third dimension—social development—are equally important concerns and must be held in equilibrium with one another. The choice to open new land for mineral extraction, thus promoting economic development, must first be analyzed for its effect on social development; for example, how will the influx of commercial interests affect local indigenous populations? And of course, what will be the environmental impact of clear-cutting forests and the production of mining waste products? If the answers do not result in total development that is worthwhile today and sustainable for the future, then different choices need to be made to achieve the desired equilibrium.

Core UN and UNICEF Documents and Policies

Convention on the Rights of the Child[3]

In November 1989, after nearly a decade of negotiations, the United Nations General Assembly unanimously adopted the Convention on the Rights of the Child—the CRC. For the first time in history, an international treaty recognized that children are not possessions, but people who have human rights. It also recognized the incredible importance of parents and families in providing the best environment for children to grow.

2 UN General Assembly, A/42/427, "World Commission on Environment and Development: Our Common Future," August 4, 1987, http://www.un-documents.net/a42-427.htm.

3 Adapted from "The Convention on the Rights of the Child," U.S. Fund for UNICEF, accessed August 12, 2013, http://www.unicefusa.org/campaigns/public-policy-advocacy/the-convention-on-the-rights.html.

The CRC is the most widely accepted human rights treaty in history. To date, 193 nations have ratified this important treaty. The only three UN member states that have not ratified the CRC are Somalia, South Sudan, and the United States.

You can find the full text of the CRC at http://www.ohchr.org/EN/ProfessionalInterest/Pages/CRC.aspx or a short version at http://teachunicef.org/sites/default/files/documents/Summary_of_the_CRC.pdf. To learn more about why the United States has not ratified the CRC and how you can become involved in the ratification movement, visit http://childrightscampaign.org.

The CRC sets out the special rights of children, including the right to live with a family that cares for them, protection against the effects of war, and the right to rest and play. It is an important instrument for sustainable development. The CRC recognizes the importance of the natural environment for the well-being of children (Preamble), while requiring State Parties to take account of the risks of environmental pollution (Article 24), to educate children to respect nature (Article 29), and to enable children to participate in decisions that affect them (Article 12). In decision-making, governments are obliged to consider the best interests of children.[4]

Millennium Development Goals

In September 2000, 189 world leaders convened for the Millennium Summit at United Nations headquarters in New York. The delegation created a blueprint for a better future: eight Millennium Development Goals (MDGs). The leaders pledged that by the year 2015 the world would achieve measurable improvements in the most critical areas of human development, from halving extreme poverty to providing universal primary education. Goal 7 is to ensure environmental sustainability, and it established the following targets:

1. Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources.
2. Reduce biodiversity loss.
3. Halve the percentage of people without sustainable access to safe drinking water and basic sanitation.
4. Achieve a significant improvement in the lives of at least 100 million slum dwellers.

Visit http://www.un.org/millenniumgoals for the UN's MDGs website. TeachUNICEF resources on the MDGs, including units, videos, and activity sheets, can be found at http://teachunicef.org/explore/topic/millennium-development-goals.

Progress globally has been made toward the achievement of the MDG 7 targets with regard to certain issues. The target of increasing the percentage of people with access to safe drinking

4 United Nations Children's Fund (UNICEF), "Sustainable Development Starts and Ends With Safe, Healthy and Well-Educated Children," May 2013, 4, accessed August 12, 2013, http://www.unicef.org/socialpolicy/files/Sustainable_Development_post_2015.pdf.

water, for example, was met ahead of schedule, in 2010.[5] However, as of that year the world was not on track to meet the MDG target for sanitation. Between 1990 and 2008, the percentage of people without improved sanitation decreased by only 7 percentage points. Other targets were met with mixed success.[6]

The MDGs are for everyone, but at their essence, they are about children. From poverty reduction to environmental sustainability, it is the children who stand to gain the most. Whether the goals are met by 2015 or not, there remains a standing commitment by the world's countries to achieve a sustainable world for children.

The Post-2015 Development Agenda

The MDGs have been a success and achieved a great deal for children and other young people. But there is an unfinished agenda in terms of goals not yet achieved, people not yet reached, and major commitments not fulfilled. Efforts will need to continue well beyond 2015 in many countries and communities.[7]

Since 2010, the United Nations has been working on a global development agenda for the post-2015 period. UNICEF has been a leading voice in its formulation, representing the interests of the children of today and the future. In April 2013, UNICEF issued the following position on sustainable development:[8]

- **Sustainable development starts and ends with safe, healthy, and well-educated children.** They are the foundations of a thriving and equitable society, sustainable growth, and proper management of natural resources.
- **Safe and sustainable societies are, in turn, essential for children.** A sustainable society is one where every child—now and in the future, from his or her earliest years—can survive and thrive. Sustainable development that considers children's needs can prevent harm, manage risks, and promote the ability of children to contribute to their societies in the future.
- **Children's voices, choices, and participation are critical for the sustainable future we want.** Children are not only the inheritors of the planet; they also actively shape it in the present. Inclusive and people-centered development means investing in the well-being and empowerment of children and young people so they can grow into responsible, capable, and skilled citizens and effective guardians of a sustainable world.

According to UNICEF, countries cannot achieve sustained growth and shared prosperity without investing effectively in their people, and above all, in their children.[9] Only with a commitment from all actors within and among societies can development after 2015 be sustainable, equitable, and successful.

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5 Inter-Agency and Expert Group on MDG Indicators, *The Millennium Development Goals Report 2012* (New York: United Nations, 2012), 52, accessed August 12, 2013, http://www.un.org/millenniumgoals/pdf/MDG%20Report%202012.pdf.

6 United Nations Development Group, *Thematic Paper on MDG 7: Environmental Sustainability* (New York: United Nations, 2010), 4-5, accessed August 12, 2013, http://www.undg.org/docs/11421/MDG7_1954-UNDG-MDG7-LR.pdf.

7 Adapted from UNICEF, "Towards a Post-2015 World Fit for Children: UNICEF's Key Messages on the Post-2015 Development Agenda," October 2012, 3, accessed August 12, 2013, http://www.unicef.org/parmo/files/Post-2015_Key_Messages_V05.pdf.

8 UNICEF, "Sustainable Development," 7.

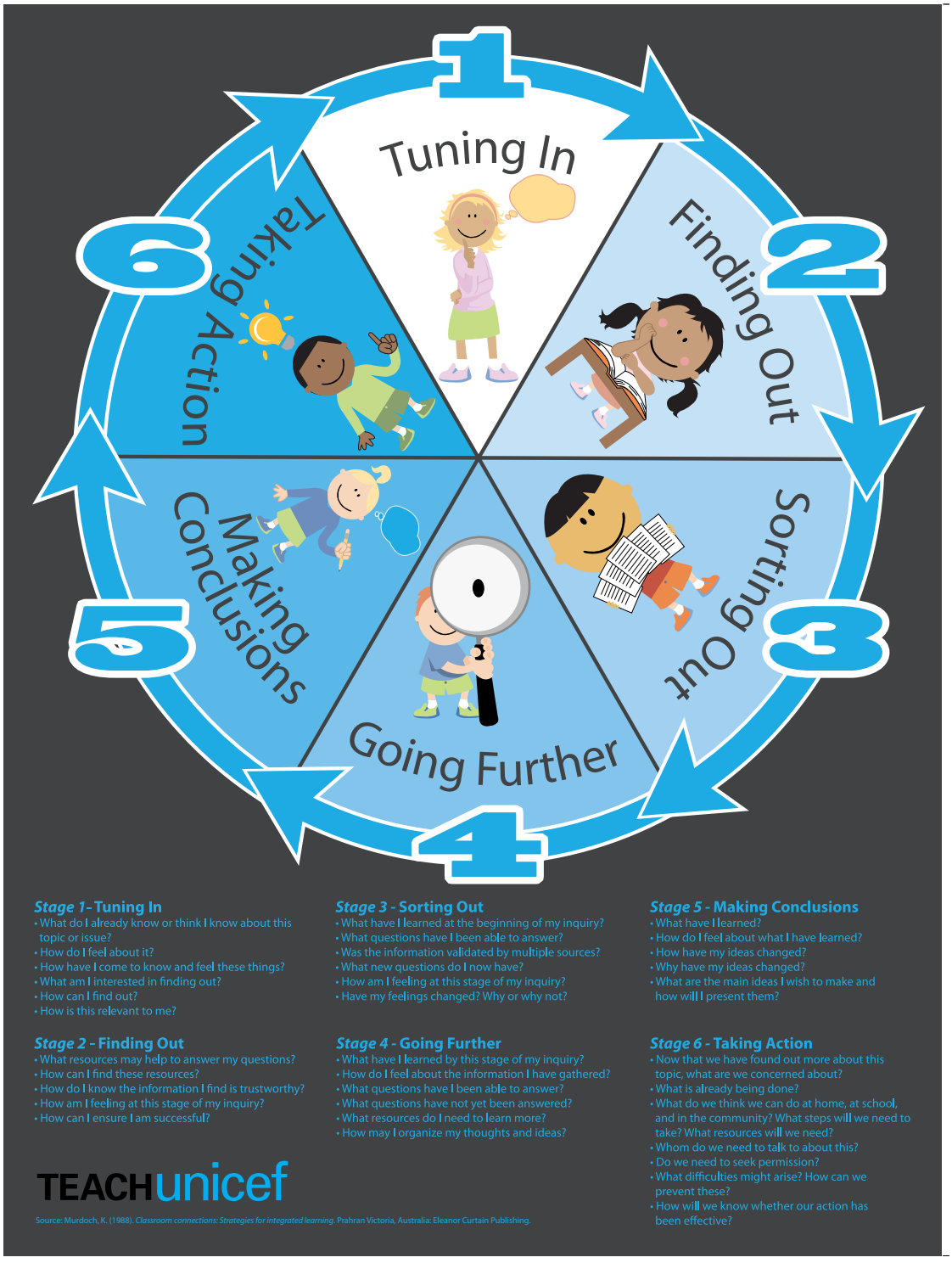
9 UNICEF, "Towards a World Fit for Children," 2.

Examples of Youth Empowerment

Around the world, youth have been taking action for environmental sustainability and achieving positive results. UNICEF supports some of these programs, honoring the right of children in Articles 12 and 13 of the CRC to be heard in decision-making that affects their lives. Other organizations play vital roles as well. For examples covering a range of activities from a variety of countries, download the UN resource titled *Youth in Action on Climate Change: Inspirations From Around the World*, at http://unfccc.int/files/cc_inet/information_pool/application/pdf/youth_pub_2013_en_m.pdf.

Kath Murdoch Inquiry Model

Kath Murdoch's (1988) inquiry model serves as a framework for students' investigations of their chosen global issue throughout this unit. Students are encouraged to delve deeply into their chosen issue, to draw their own conclusions, and to make decisions regarding how they may be "solutionaries" in ways that are appropriate and meaningful to them. Educators may elect to print the inquiry model for display in the classroom as a reference during this and other inquiry-based units of study.



Pre- and Post-Assessments

This unit includes two assessments that measure students'

(1) understanding of the causes and effects of environmental problems.

(2) ability to conduct a self-directed inquiry on the issue of single-use grocery bags.

Directions for Implementation

Assessment #1: Provide each student an electronic or hard-copy notebook (Inquiry journals) for recording notes and reflections throughout this unit. Explain that this unit includes an investigation of the causes and effects of environmental problems. Reinforce that the purposes of the pre-assessment is to inform your instruction and, at the completion of the unit, to determine what each student learned. Project a three-column table and ask students to draw it in their notebooks. Afterward, have students fill in the table using the following guidelines:

1. In the first column, record environmental problems that you know about. List as many as you can think of.
2. In the column labeled Cause(s), record what you believe caused these environmental problems.
3. In the column labeled Effect(s), record the effects of these problems on people, other living creatures, and the environment.

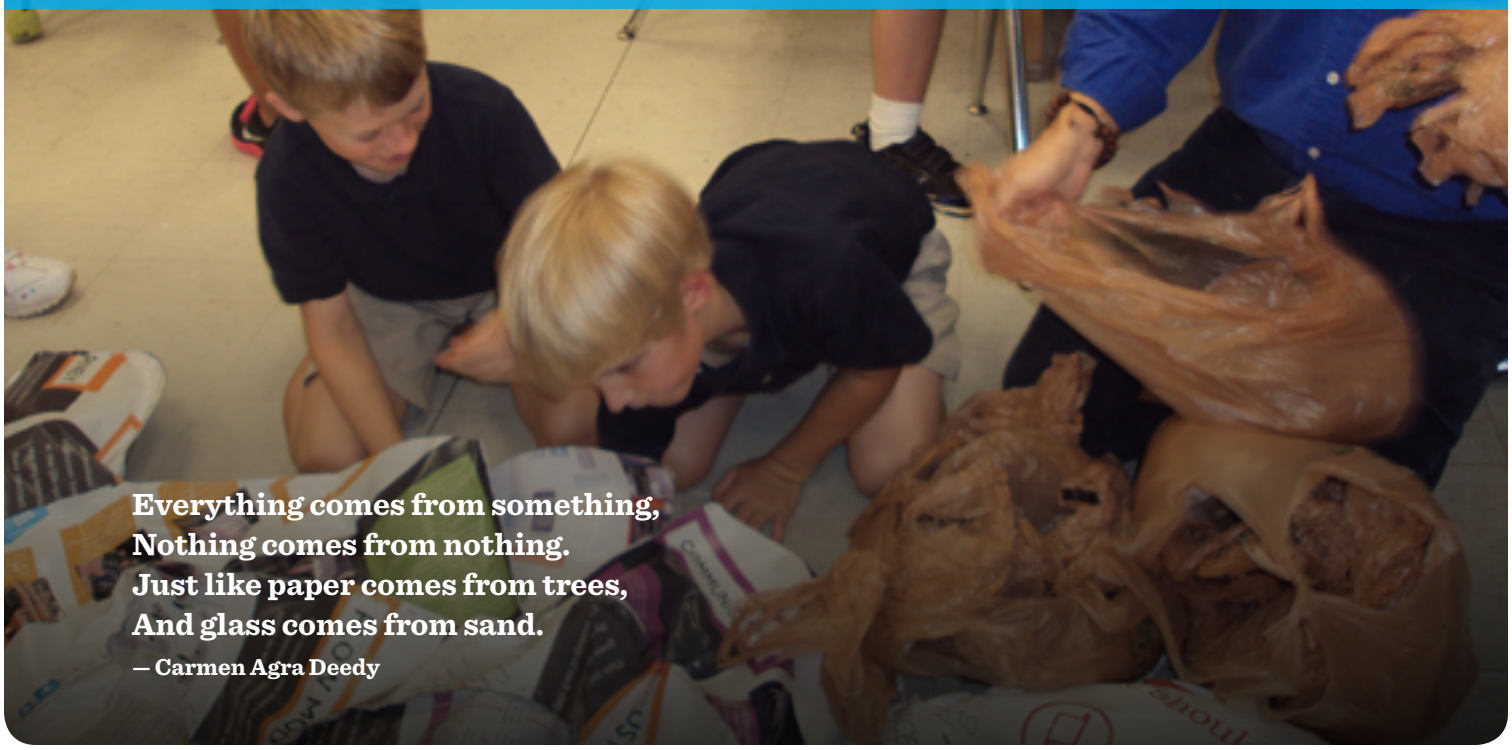
Environmental Problem	Cause(s)	Effect(s)

At the end of the unit, have students revisit their initial thoughts, correcting any misconceptions and adding additional examples of environmental problems, along with their causes and effects.

Assessment #2: Using the Kath Murdoch Inquiry Model as a guide (see page 10), students will generate questions, conduct research, weigh perspectives, and take action relative to the global issue of the production, consumption, and disposal of single-use grocery bags. Discuss the scoring rubric prior to implementing the lessons so that students understand the desired outcomes of the unit.

Lesson 1: "Tuning In" to Consumption

TOTAL TIME: TWO 45- TO 60-MINUTE PERIODS



Overview

In this lesson, students learn about the origin of everyday products in their lives, concluding that most are derived from precious, limited natural resources. Students "tune in" to the effects of consumption on the availability of resources and on the environment by exploring their prior knowledge and establishing research questions based on the choice of paper or plastic bags when shopping.

Enduring Understanding

The goods we purchase are made from limited natural resources; therefore, we must make informed, thoughtful choices as consumers.

Objectives

Students will

- Define and provide examples of natural resources (e.g., air, water, wind, plants, animals).
- Classify resources as renewable (e.g., plants, animals, solar power) or nonrenewable (e.g., fossil fuels).
- Articulate that because natural resources are limited, consumers must make wise choices about what they buy.

Vocabulary

The following words and terms may not be familiar to students. Use this list as a resource for students to expand their working vocabulary as they encounter these words and terms in the lesson.

- Global citizen
- Life cycle of a product
- Natural resource
- Renewable/nonrenewable
- Sustainable/sustainability

Materials Needed and Setup

- Common household products/containers, such as disposable grocery bags (paper and plastic), canned goods, shampoo bottles, etc.
- Children's book(s) on renewable and nonrenewable resources
- T-chart labeled *Renewable and Nonrenewable*
- Images of materials made of renewable and nonrenewable resources
- Inquiry chart labeled *I Think I Know, Confirmed*, and *Misconceptions*
- Sticky notes
- Kath Murdoch Inquiry Cycle poster (see page 10)
- Inquiry Journals, one per student
- Computers with Internet access (optional)

NOTE TO TEACHER: In preparation for this unit, please provide each of the students with an inquiry journal where they will record their questions, findings, reflections, and actions. Prior to this lesson, conduct a pre-assessment of students' knowledge and perceptions regarding the causes and effects of environmental problems (see Pre- and Post-Assessment section).

Introduction

1. Display common household products and containers, such as grocery bags, canned goods, shampoo bottles, and more. Ask students where they have seen these items, how they are used, and what they know about how they are made.
2. Explain that everything we purchase as consumers has a story or a life cycle—how it is manufactured or produced, shipped or distributed, and used and disposed of by all of us as consumers.
3. Inform students that they will learn about the origin of these and other materials during this unit of study. They will consider the impact on the environment of our choices as consumers. In doing so, students will develop as global citizens, defined by the U.S. Fund for UNICEF as "someone who understands global interdependence, respects and values diversity, has the ability to challenge injustice and inequities, and takes action in ways that are personally meaningful."

Directions

PART I: INTRODUCTION TO NATURAL RESOURCES

1. Read aloud an age-appropriate children's book highlighting the origin of materials we make or buy and consume (e.g., *The Goat in the Rug; Agatha's Feather Bed: Not Just Another Wild Goose Story; Charlie Needs a Cloak*).
2. During the reading, pause to discuss the origin of the materials included in the book. Ask how the products were made, what they are made of, and whether they are natural or human-made. Emphasize that while all products are ultimately made from natural resources, human-made products do not exist naturally (e.g., sand is a natural resource, whereas glass—made from sand—is a human-made product that does not exist on its own in nature).
3. Post a T-chart labeled *Renewable Resources* and *Nonrenewable Resources*. Ask students to define these terms. Clarify that *renewable* refers to natural resources that can grow back or be replaced (e.g., trees, wind power) while nonrenewable refers to resources that cannot be replaced or take a long time to come back (e.g., coal, oil, natural gas).
4. Place students in cooperative groups of three or four and provide each group with a set of images of renewable and nonrenewable resources (see, for example, http://www.neok12.com/pictures/Natural-Resources.htm). Instruct groups to sort the images appropriately.
5. Reconvene the class and invite volunteers to adhere each image to the appropriate column of the T-chart displayed earlier.

Ms. Deborah Phillips, 3rd grade teacher at May Howard Elementary School (Savannah, GA), leads her class in a discussion of renewable and non-renewable resources.

Renewable Resources	Nonrenewable Resources
• animals • plants* • sunlight or solar power • wind • water	• fossil fuels (e.g., coal, oil, natural gas) • plants* • rocks and minerals • metals

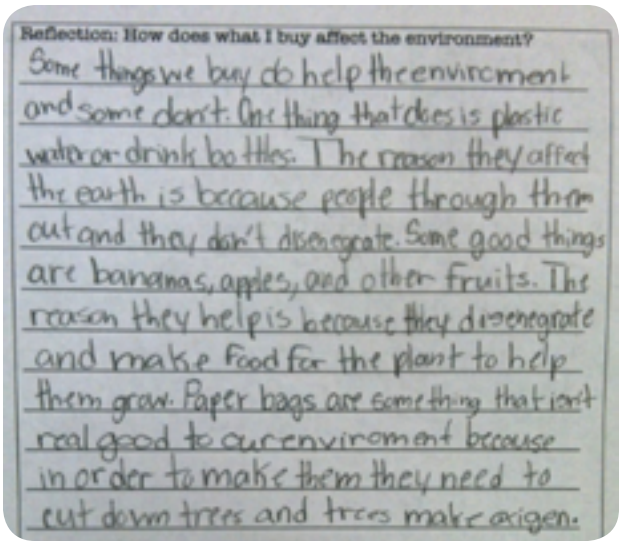
*Some resources are both renewable and nonrenewable. For example, trees are renewable because more trees can be planted. However, if an entire forest of 400-year-old trees is cleared, it would take many generations to regenerate, so old-growth trees are considered nonrenewable.

6. Ask students to draw conclusions about humans' use of renewable and nonrenewable resources. Ask if they think that renewable resources are unlimited, since they can be replaced.

7. Explain that even though some resources are renewable, it does not mean that human consumption cannot result in their overuse. We must make consumer choices that are sustainable, or that allow us to balance our wants and needs so that we do not overuse limited, precious resources.

INQUIRY JOURNAL REFLECTIONS ON NATURAL RESOURCES

- Where do the goods we purchase come from? What are some examples?
- How does what I buy affect the environment?


Reflection: How does what I buy affect the environment?
Some things we buy do help the enviroment and some don't. One thing that does is plastic water or drink bottles. The reason they affect the earth is because people through them out and they don't disenegrate. Some good things are bananas, apples, and other fruits. The reason they help is because they disenegrate and make food for the plant to help them grow. Paper bags are something that isn't real good to our enviroment because in order to make them they need to cut down trees and trees make oxigen.

A 4th grade student from Eaton Elementary School (Wilmington, NC) reflects upon how her choices as a consumer affects the environment.

PART II: STUDENT RESEARCH

INQUIRY STAGE 1: TUNING IN

This first stage in the investigation provides a foundation for students' inquiries, assessing their prior understandings, misconceptions, and experiences, determining their goals for learning, and revealing their dispositions or feelings regarding the topic or issue (Murdoch, 1988). To learn more, please refer to the Kath Murdoch Inquiry Model poster (see page 10) and visit http://kathmurdoch.com.au.

Note: Teachers are encouraged to maintain their own Inquiry Journals and to model their questions, new learnings, and ideas for taking action along with their students. Based upon scheduling and students' ages and attention spans, this section may need to be separated into two or more class sessions.

1. Display a common grocery story plastic and a grocery store paper bag.
2. Ask students if they have ever been asked by a grocery store employee, "Paper or plastic?"
3. Discuss why this is often given as a choice, and what concerns exist regarding each option. Guide students' discussions, but avoid influencing their thinking.
4. Display an Inquiry Chart, as pictured here, and refer to the criterion *Problem Identification* in the summative assessment rubric. Ask students to generate what they "think they know" about this topic. Have them record their ideas on sticky notes and post on the chart. Eliminate any duplication and share aloud. Explain that throughout this unit, students will have the opportunity to confirm what is true and to correct misconceptions with facts learned through research.

I think I know	Confirmed	Misconceptions

5. Display the Kath Murdoch Inquiry Cycle poster (see page 10). Explain that TUNING IN is the first stage of the inquiry into single-use, disposable grocery bags. It will help to prepare students for learning.
6. In small groups, have students generate "Wonderings" or questions they wish to explore. Post these and share aloud. (Note: Teachers may use a Web 2.0 technology tool—such as Padlet, padlet.com; VoiceThread, voicethread.com; or CorkboardMe, noteapp.com—to post students' questions, adding and refining to them throughout the inquiry.)
7. Compare questions, grouping common questions together. Examples include:
    - **History of Bags**: When were paper and plastic bags invented? Who invented them? Have they changed over time? How? Why?
    - **Production**: How are paper and plastic bags produced? From which resources are they made? Are all plastic bags the same? Where are they made?
    - **Distribution**: Who ships the bags to the grocery store? How are they shipped?
    - **Cost**: How much do paper and plastic bags cost the grocery store? Is one less expensive than the other?
    - **Disposal**: Are all paper and plastic bags recyclable? How are they recycled? What happens to paper and plastic in the landfill if they are not recycled? What happens if they float into the ocean?
8. Discuss as a class categories of questions for research and create research groups. Assign roles within each group, such as recorder, manager, illustrator, and summarizer. (Note: Research will begin during the FINDING OUT stage in Lesson 2.)

INQUIRY JOURNAL REFLECTIONS ON TUNING IN:

- What do I already know or think I know about this topic or issue?
- How do I feel about it?
- How have I come to know and feel these things?
- What am I interested in finding out?
- How can I find out?
- How is this relevant to me?

EXTENSION IDEAS

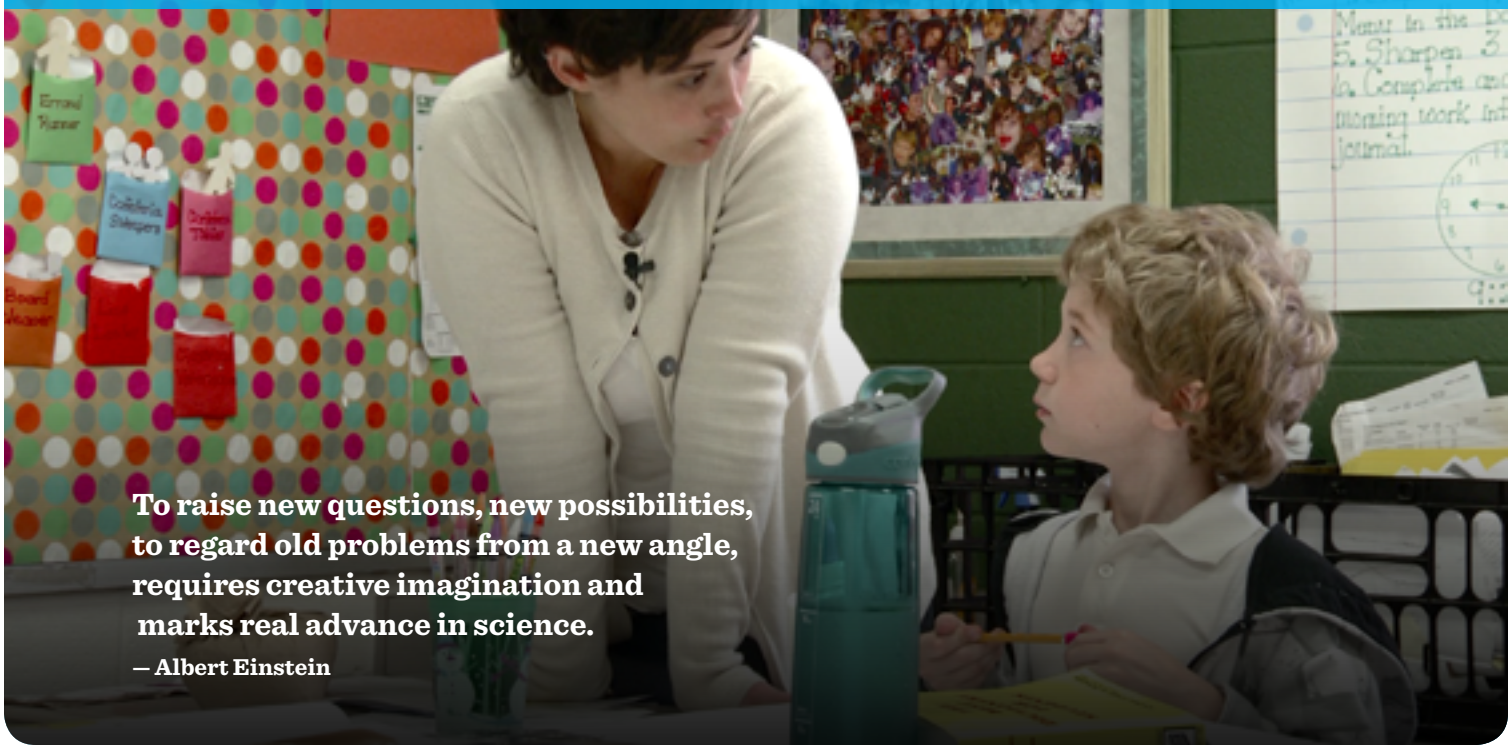
- Discuss the impact of consumption and improper waste disposal on animals and the environment by examining the large-scale photography of Chris Jordan and works by the Ocean Conservancy (see References).
- Research and Present the Life Cycle of a Product (Note: How It's Made videos are available through NeoK12 at http://www.neok12.com/Industry.htm).
    - Share an example the life cycle of a product, including obtaining raw materials, processing, distribution or transportation, consumption, and disposal.
    - Have students select and research a product, and illustrate its life cycle by hand or using technology.

  - Students may compare the length of life cycles of various products (e.g., a newspaper's cycle is relatively short, whereas a plastic milk container's is longer).

- Watch the videos and complete the related activities on natural resources at BrainPOP Jr. (www.brainpopjr.com/science/conservation/naturalresources/grownups.weml).
- Contact your state Department of Natural Resources for educational resources and learning opportunities for teaching about resources in your region.

Lesson 2: "Finding Out" About Human Innovation

TOTAL TIME: TWO 45-MINUTE PERIODS



Overview

This lesson builds students' understanding of the production of goods, with a focus on why new goods are made to replace older products or ideas. Students discover the intentional and unintentional consequences of human innovation, including the effects on our lives and on the environment. Students apply their learning to the issue of single-use, disposable grocery bags in their small research groups.

Enduring Understanding

Scientific discoveries and technological innovations change the way people live and work. These changes may have predictable or unpredictable, positive or negative effects on living things and the environment.

Objectives

Students will

- Explain why humans strive to innovate.
- Determine the impact of human innovations on society, living things, and the environment.

- Locate a variety of sources relative to a research topic.
- Gather information from sources to answer specific research questions.

Vocabulary

The following words and terms may not be familiar to students. Use this list as a resource for students to expand their working vocabulary as they encounter these words and terms in the lesson.

- Consequence
- Innovate/innovation

Materials Needed and Setup

- Children's book(s) or short video(s) on innovation/inventions
- Inquiry Chart (see Lesson 1)
- Handout 1: Planning the Investigation
- Kath Murdoch Inquiry Cycle poster (see page 10)
- Inquiry Journals, one per student (see Lesson 1)
- Computers with Internet access (optional)

NOTE TO TEACHER: In preparation for this lesson, review students' wonderings from Lesson 1. Compile sample resources to help students answer their questions (see Resources for ideas).

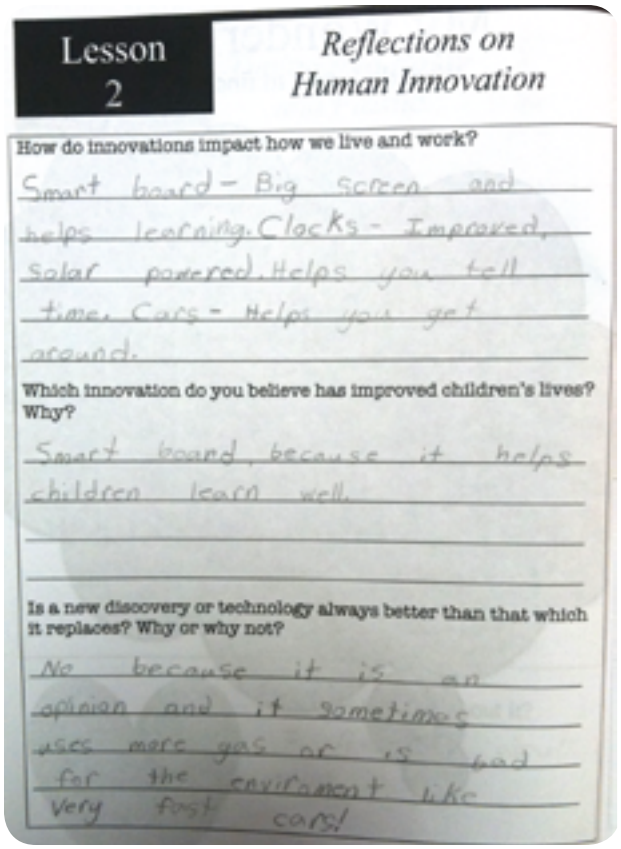
Introduction

1. Display (again) a common grocery store plastic bag and a grocery store paper bag.
2. Using the following prompts, ask students to record in their Inquiry Journals additional ideas under "I think I know...":
    - What is the function or purpose of these products? (Sample responses: to carry groceries; to collect trash for the garbage or recycling bin)
    - Why are there two types of bags available at the grocery store? (Sample responses: some people prefer paper over plastic, or vice versa; people may want to use them later for other purposes)
    - Have we always had the option of paper or plastic? (Answers will vary)
    - How long have paper and plastic bags been available for our use? (Answers will vary)
3. Have students share their responses. Record their thoughts on sticky notes and add them to the class Inquiry Chart.
4. Explain that new technologies or innovations often arise to fulfill a human want or need. Paper and plastic bags are one example of human innovation. They bring with them both benefits and problems that affect people, other living creatures, and the environment.

Directions

PART I: INNOVATIONS IN SOCIETY

1. Read aloud an age-appropriate children's book or watch a short video highlighting human inventions or technological advancements (e.g., *The Story of Inventions; Mistakes That Worked: 40 Familiar Inventions and How They Came to Be; Girls Think of Everything: Stories of Ingenious Inventions by Women; What a Great idea! Inventions That Changed the World*).
2. Discuss why we innovate and why new products are made.
3. Brainstorm with students a list of inventions or innovations that have affected their lives. As a class, group these into categories (e.g., communication technologies, transportation, medical advancements, recreation, etc.).
4. Ask how these innovations have affected our lives and the environment. Emphasize that innovations may have positive or negative effects on living things and the environment.
5. Explain that students will apply their learning about human innovation to the global issue of single-use paper and plastic grocery bags in their small research groups.


Lesson 2

Reflections on Human Innovation

How do innovations impact how we live and work?

Smart board - Big screen and helps learning. Clocks - Improved, solar powered. Helps you tell time. Cars - Helps you get around.

Which innovation do you believe has improved children's lives? Why?

Smart board, because it helps children learn well.

Is a new discovery or technology always better than that which it replaces? Why or why not?

No because it is an opinion and it sometimes uses more gas or is bad for the environment like very fast cars!

A 3rd grade student from Swain West Elementary (Bryson City, NC) records notes in her inquiry journal about how innovations affect humans' lives and the environment.

INQUIRY JOURNAL REFLECTIONS ON INNOVATION

- How do innovations affect how we live and work?
- Which innovations do you believe have improved children's lives? Why?
- Is a new discovery or technology always better than that which it replaces? Why, or why not?

PART II: STUDENT RESEARCH

INQUIRY STAGE 2: FINDING OUT

During this stage, students acquire new information from a variety of sources. Teachers may select from diverse strategies to support students' learning, including learning by doing, through

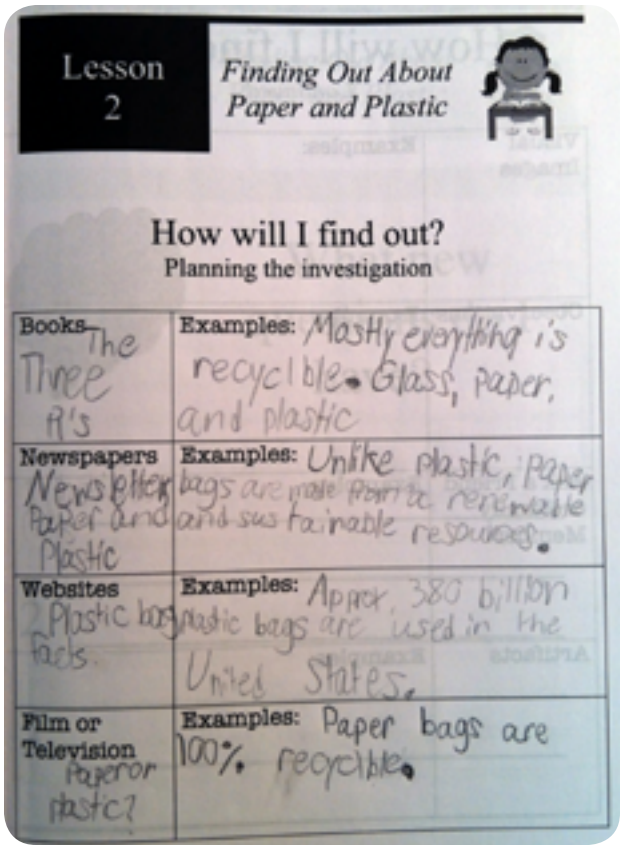
observation, and through oral and written expression (Murdoch, 1988). As students learn, they acquire skills in gathering and recording information about their topic or issue. To model finding out about the innovation of single-use, disposable grocery bags, present trustworthy information about the invention of plastic (see References), citing for example:

> *Plastic is considered one of the top 10 accidental inventions and one of the top 100 greatest inventions, by the Discovery Channel series, How Stuff Works.*

As students find out, they will answer the following questions:

- What new information was presented and confirmed that may be added to our Inquiry Chart?
- What new wonderings do we now have?

To learn more, please refer to the Kath Murdoch Inquiry Model poster (see page 10) and visit http://kathmurdoch.com.au.



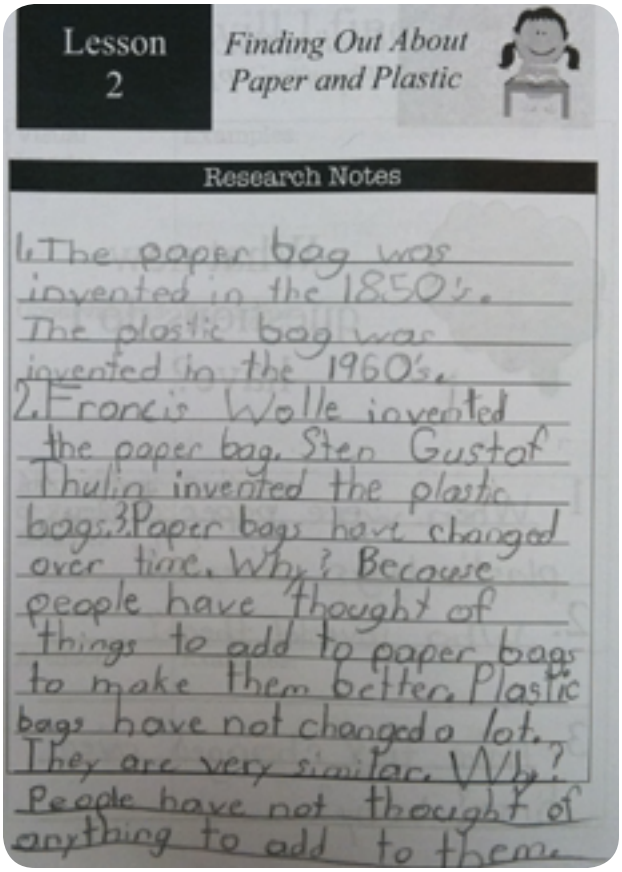
A 3rd grade student from Swain West Elementary (Bryson City, NC) plans his investigation to include a variety of reputable sources

1. Review the Inquiry Chart from Lesson 1 regarding what students "think they know" and "wonder about" paper and plastic grocery bags.
2. Ask students to sit with their research team members and to revisit their research questions from the previous lesson.
3. Refer to the Kath Murdoch Inquiry Cycle poster (see page 10), explaining that this stage in the inquiry process is called "finding out." During this stage, students will determine where and how to find information to answer their questions. (Refer students to the summative assessment rubric criterion, Information Literacy Skills).
4. Ask students the following questions:
   - What sources might you use to answer your questions about paper and plastic bag production, use, and disposal?
   - How can you find different points of view on this issue?
   - How will you know if your sources are reliable?
5. Provide resources and have students locate additional resources if possible, using Handout 1, "Planning the Investigation."

6. As students *find out*, they will record notes in their Inquiry Journals. They will also mark "confirmed" or "misconception" and note the source(s) that led them to their conclusions. [Note: Encourage students to compare the information gathered from multiple sources during the sorting out stage to validate the accuracy of information.]

INQUIRY JOURNAL REFLECTIONS ON FINDING OUT

- What resources may help to answer my questions?
- How can I find these resources?
- How do I know if the information I find is trustworthy?
- How am I feeling at this phase of my inquiry?
- How can I ensure I am successful?



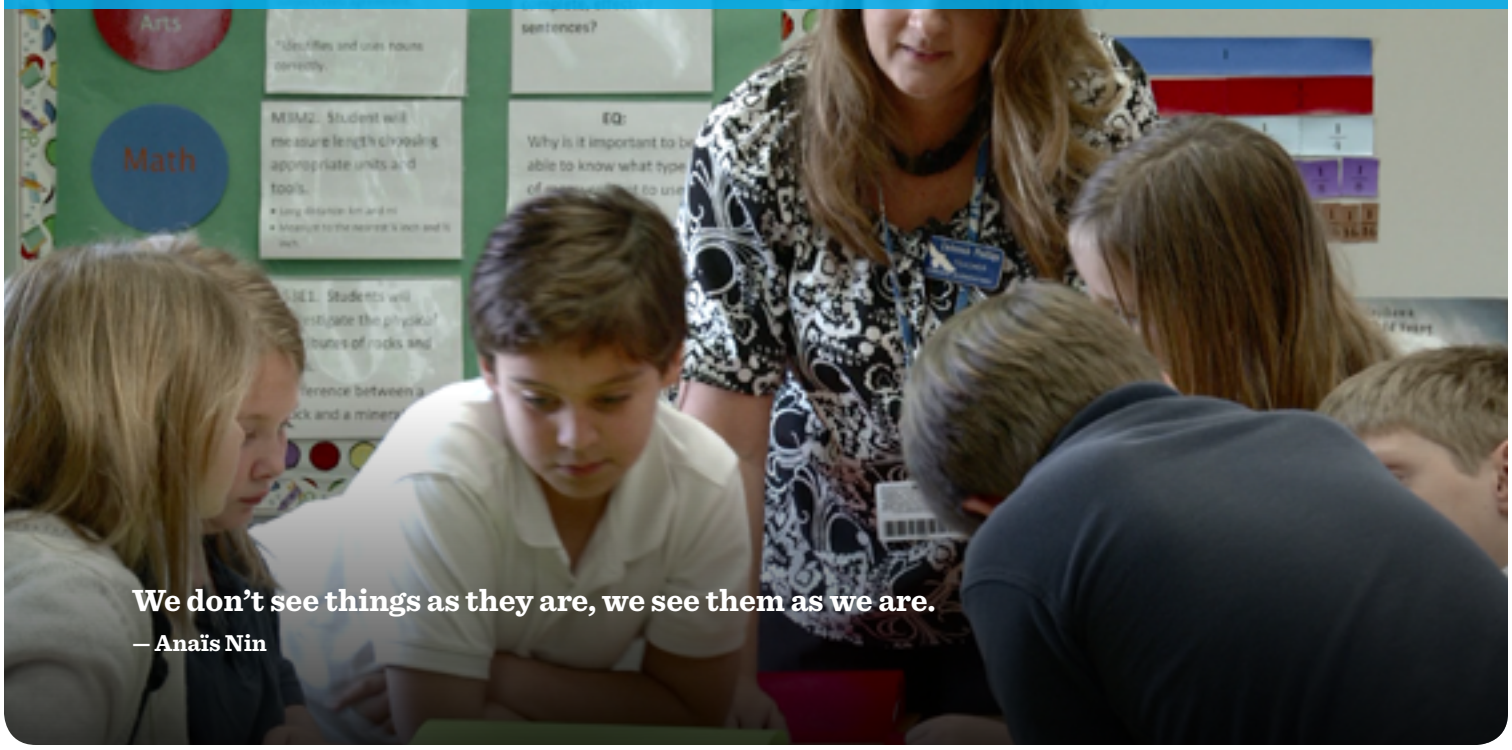
A 3rd grade student from May Howard Elementary School (Savannah, GA) takes research notes in her inquiry journal.

EXTENSION IDEAS

- Assign students to learn about youth inventors (see, for example, "Kid Inventor: The Collapsible Lacrosse Stick" at http://www.teachersdomain.org/resource/phy03.sci.engin.design.zstick). Afterward, have students free write, following the prompt: *If you could invent anything, what would it be, and why?*
- Have students research and present on an innovation that changed their lives for the better. Afterward, have them
  - Design a poster illustrating how the innovation affected their life. They may create their posters by hand or using online technology (e.g., Glogster, www.glogster.com).
  - Create a visual timeline or slide show demonstrating how the product has changed over time. They may create their timelines by hand or using online technology (e.g., Capzles, www.capzles.com; Dipity, www.dipity.com; Timerime, www.timerime.com).
- Have students make a concept map of invention types and the functions they serve. They may make their maps by hand or using online technology (e.g., Popplet, www.popplet.com; Mindomo, www.mindomo.com; MindMeister, www.mindmeister.com)
- Assign students to research examples of people reusing materials in innovative ways.
- Have students reflect upon the following question: Is there something you could reuse or repurpose in your life?

Lesson 3: "Sorting Out" Diverse Perspectives

TOTAL TIME: 90 MINUTES OR TWO CLASS PERIODS



We don't see things as they are, we see them as we are.
— Anaïs Nin

Overview

In this lesson, students develop awareness of the diverse spectrum of human perspectives and how they influence beliefs and behaviors. Students' skills in developing perspectives are enhanced through reading and discussing a work of fiction. They analyze point of view and author's voice, making connections to the issue of single-use, disposable grocery bags. By understanding a range of perspectives, students begin to sort out their research findings and to validate sources of information.

Enduring Understanding

People have diverse perspectives that may help to explain the behaviors of individuals and groups. Sometimes these different points of view lead to conflict.

Objectives

Students will

- Compare the points of view or perspectives of characters in a work of fiction.
- Articulate with evidence different stakeholder perspectives relative to the issue of single-use, disposable grocery bags, inferring their possible influence on human behaviors.

Vocabulary

The following words and terms may not be familiar to students. Use this list as a resource for students to expand their working vocabulary as they encounter these words and terms in the lesson.

- Perspective
- Point of view
- Stakeholder

Materials Needed and Setup

- Clear glass half full of water
- Children's book(s) or photograph(s) depicting diverse perspectives
- Inquiry Chart (see Lesson 1)
- Kath Murdoch Inquiry Cycle poster (see page 10)
- Inquiry Journals, one per student (see Lesson 1)
- Computers with Internet access (optional)
- Handout 1: Planning the Investigation (one per student)

Introduction

1. Present a glass half full of water and ask students to write a phrase describing what they see. If necessary, prompt students by asking if the glass is half empty or half full. Have them share their responses.
2. Explain that the "half empty, half full" metaphor illustrates the idea that we all have different perspectives. Ask students to define the word perspective (a way of looking at or thinking about something; a particular attitude or way of considering a matter).
3. Emphasize that each of us often perceives situations and interprets events in different ways, and that it is important to understand diverse perspectives and points of view.

Directions

PART I: DEVELOPING PERSPECTIVES

1. Further develop students' understandings of diverse perspectives by reading aloud an age-appropriate children's book (e.g., *Voices in the Park; Black and White; Duck! Rabbit!*) or by presenting a slideshow of photographs representing diverse vantage points.
2. Discuss the point of view of the story or photograph, using the questions below. As you discuss, reinforce how one's point of view or perspective may alter how a story is communicated and interpreted.

- Who are the characters in the story and what point of view or perspective does each reflect?
- How did you determine each character's perspective? Did you infer, or can you point to direct statements?

3. Relate the reading or slideshow to human perspectives in daily life and how point of view influences the way we perceive the world and our role in it.

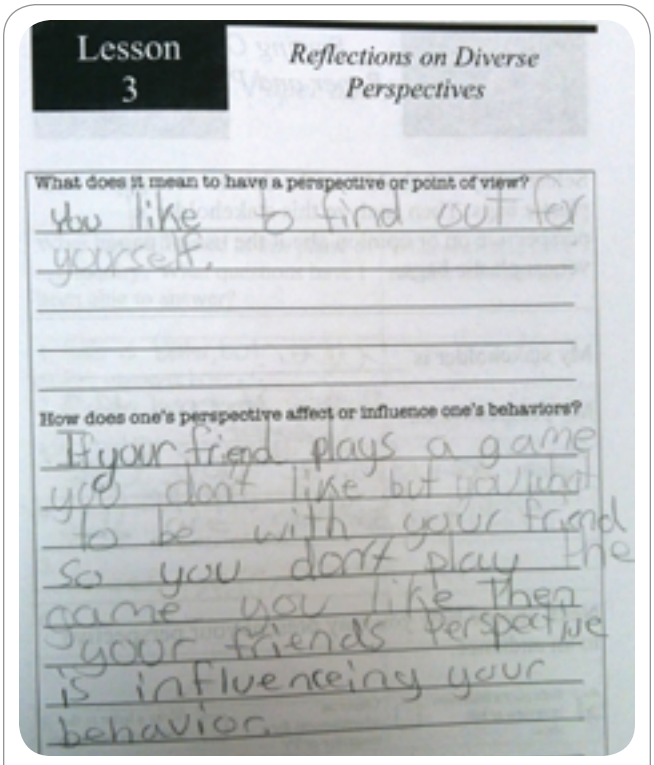
INQUIRY JOURNAL REFLECTIONS ON PERSPECTIVES

- What does it mean to have a perspective or point of view?
- How does one's perspective affect or influence one's behaviors?

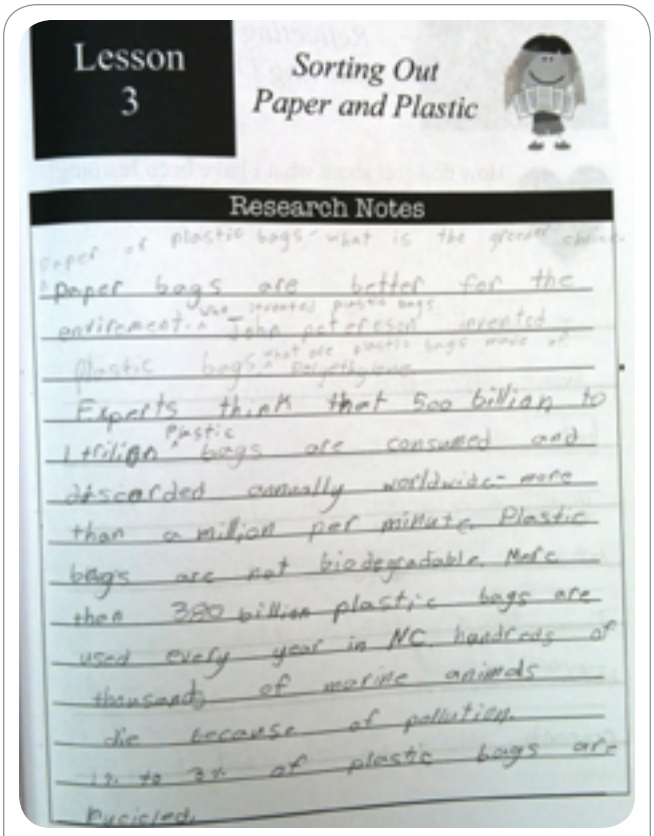
PART II: STUDENT RESEARCH

INQUIRY STAGE 3: SORTING OUT

During this stage, students make sense of their new learnings. Students review the facts they have gathered and compare information from different sources. They explore many ways to express their understandings and to share them with others using a variety of processes. As students sort out, apply, and express their learning, their understanding of content deepens and their skills are sharpened (Murdoch, 1988). Teachers should model how they sort out their own understandings of the issue of single-use, disposable grocery bags. For example, a teacher may express new learning about the evolution of single-use, disposable grocery bags by presenting a multimedia slide show, creating a timeline, or designing a piece of artwork. To learn more, please refer to the Kath Murdoch Inquiry Model poster (see page 10) and visit http://kathmurdoch.com.au.



A May Howard Elementary School third grader (Savannah, GA) reflects on what it means to have a perspective.



A 3rd grade student from Swain West Elementary (Bryson City, NC) takes research notes in her inquiry journal.

1. Ask students to review what they "think they know" and "wonder about" paper and plastic grocery bags. Following data gathering during "finding out," have students determine if any information was "confirmed" or a "misconception," and how they know.

2. Move sticky notes to the appropriate column and ask students to mark accordingly in their Inquiry Journals.

3. Refer to the Kath Murdoch Inquiry Cycle poster (see page 10), explaining this stage in the inquiry process is called "sorting out." During this stage, students will make sense of the information they have researched thus far by organizing and analyzing information representing a variety of perspectives.

4. Explain that as we conduct additional research, we may need to revisit what we think is valid or accurate information because it may originate from multiple human perspectives. Some of these points of view may be biased or misinformed. (Refer students to the summative assessment rubric criterion, Critical Thinking Skills).

5. To illustrate diverse human perspectives, present a variety of local or national newspaper articles, listen to a podcast, or watch a short video related to the controversy over paper and plastic bags in which diverse perspectives are evident (see References). Examine as a class and explore some of the following questions:

   - Who is the author or journalist who wrote the article (or organization that prepared the newscast)? Is this person or organization connected to or affiliated with the issue in any way? If so, how do you know? Is there enough information to determine the author's relationship to the issue?
   - Why was the article written (or the story aired)? What is the purpose of sharing the information or viewpoints presented? Is it to inform, entertain, or for another purpose?
   - Where was the article published (or what was the location of the story)? Is the source or location significant?
   - Were diverse viewpoints or perspectives included? If so, what are they? If not, why do you think only one viewpoint was presented?

6. Explain that there are different stakeholders for any issue—individuals or groups with an interest or concern in the issue. Ask: *Who are the stakeholders in the controversy over whether it is better to use paper or plastic grocery bags?* Confirm that they may include customers, the companies who make paper and plastic grocery bags, environmental groups, politicians, and others.

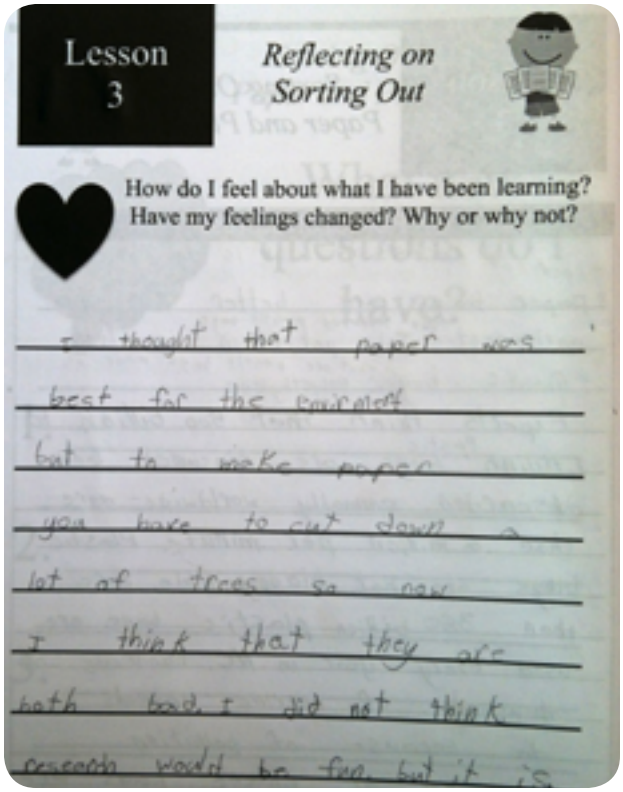
7. In their research groups, assign students to analyze the perspectives of a key stakeholder group using Handout 2, "Identifying Stakeholder Perspectives." Have students sort out their research findings and determine the best way to express their stakeholder's perspectives. Ideas include:

   - Role play a television interview or talk show.
   - Create an advertisement for a magazine or for television.
   - Write and present a petition.

8. Have each group present on their stakeholder to the class. Afterward, debrief and discuss:
   - What new perspectives did you learn?
   - Was information supported by evidence?
   - How does learning about different stakeholder perspectives inform your research?
   - How can diverse perspectives result in human conflict?

INQUIRY JOURNAL REFLECTIONS ON SORTING OUT

- What have I learned at the beginning of my inquiry?
- What questions have I been able to answer?
- Was the information validated by multiple sources?
- What new questions do I now have?
- How am I feeling at this phase of my inquiry?
- Have my feelings changed? Why, or why not?



A Swain West Elementary third grader (Bryson City, NC) reflects on her feelings following her initial research.

EXTENSION IDEAS

- Ask students to analyze the quotation, "We don't see things as they are, we see them as we are," by Anaïs Nin. Have students write or discuss what they think it means, if they agree or disagree with the quote, and why.
- Observe artwork related to the production, consumption, and disposal of goods. Determine how one may view the artwork from different perspectives.

Lesson 4: "Going Further"—Local to Global Bag Politics

TOTAL TIME: 90 MINUTES OR TWO CLASS PERIODS

Overview

In this lesson, students go further in their inquiry by exploring laws and policies related to the use of plastic bags. By learning how local, national, and international governments and groups have responded to this issue, students increase their understanding of the complexity of environmental issues and politics. Through collaborative research, students discover that policies set in place by governing bodies affect consumers' choices.

Enduring Understanding

Governing bodies affect the choices or decisions we make as consumers through the implementation of laws and policies.

Objectives

Students will

- Compare local, state, national, and international laws and policies in relation to single-use, disposable plastic bags.
- Demonstrate cooperative learning skills.

- Conduct open-ended research.
- Summarize and articulate research findings.

Vocabulary

The following words and terms may not be familiar to students. Use this list as a resource for students to expand their working vocabulary as they encounter these words and terms in the lesson.

- Ban
- Levy

Materials Needed and Setup

- News articles, websites, children's books, or short videos on contemporary, single-use, disposable plastic bag policies
- Children's books or websites on the function of government
- Inquiry Chart (see Lesson 1)
- Kath Murdoch Inquiry Cycle poster (see page 10)
- Inquiry Journals, one per student (see Lesson 1)
- Handout 3: Researching Bag Politics (one per student)
- Computers with Internet access (optional)

Introduction

1. Display news articles related to plastic bag bans or taxes. Read the titles and subheadings of the articles aloud. Include local, national, and international articles. Websites for child-friendly news articles include:
   - CBBC News http://www.bbc.co.uk/newsround/news
   - DOGOnews http://www.dogonews.com
   - HereThere Everywhere News for Kids http://htekidsnews.com
   - Indy Kids http://indykids.net/main
   - KidsPost http://www.washingtonpost.com/lifestyle/kidspost
   - National Geographic News http://news.nationalgeographic.com/news
   - Teaching Kids News http://teachingkidsnews.com
   - Time for Kids http://www.timeforkids.com
2. Ask students to describe what they think is happening in each article based on the title, subheading, picture, caption, etc.
3. Explain that bans and taxes (or levies) are being placed on single-use plastic carryout bags in many places locally, nationally, and internationally. In this lesson, students will learn why this is occurring and how it affects consumers' choices.

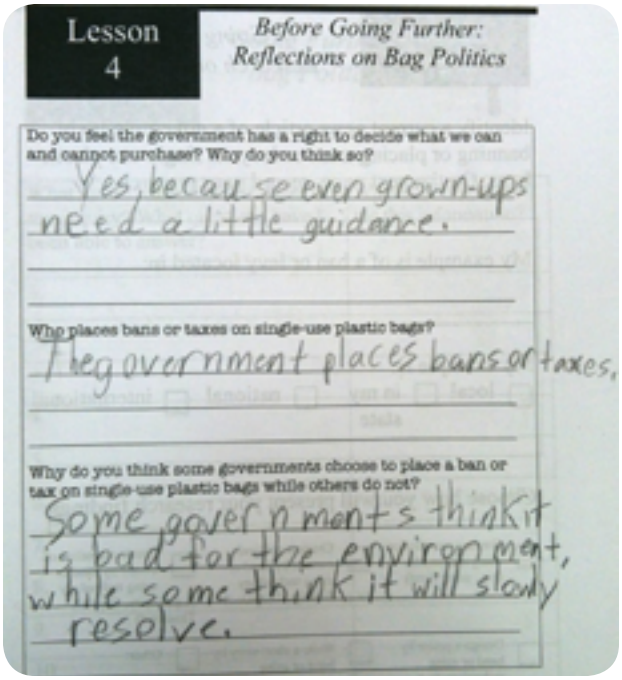
Directions

PART I: THE ROLE OF GOVERNMENT IN WHAT WE BUY

1. Read aloud an age-appropriate children's book (e.g., *Who's in Charge? How Governments Make the World Go Round*) or visit a website (e.g., http://pbskids.org/democracy/govandme) on the function of government.
2. Share the following explanation from PBS Kids: "In its simplest form, a government determines the way in which a country, state, county, township, city, or village is run. At every level, government makes laws that citizens must obey and creates policies about everything connected with the daily life of a community—whether that community is a nation, a state or the town where you live" (http://pbskids.org/democracy/classic/govandme).
3. Relate the function of government to forms of human consumption, emphasizing that the government has the ability to regulate or control products that we buy and how we use them. Ask students for examples of government regulation and if they feel the government should have the authority to impose these types of rules on society.
4. Ask students why they think some governments have placed bans or taxes on single-use plastic bags while others have not. Ask what action (if any) they think government should take on this issue in order to represent the "common good" or act in the best interests of society.

INQUIRY JOURNAL REFLECTIONS ON GOVERNMENT AND POLICIES

- How do plastic bag bans or taxes put into place by governing bodies affect me?
- Do you think plastic bag bans and taxes are good solutions? Why, or why not?
- Do you think the government should be able to decide what goods and services consumers purchase? Why, or why not?
- Why do some places have plastic bag bans or taxes while others do not?


Lesson 4

Before Going Further: Reflections on Bag Politics

Do you feel the government has a right to decide what we can and cannot purchase? Why do you think so?

Yes, because even grown-ups need a little guidance.

Who places bans or taxes on single-use plastic bags?

The government places bans or taxes.

Why do you think some governments choose to place a ban or tax on single-use plastic bags while others do not?

Some governments think it is bad for the environment, while some think it will slowly resolve.

A 3rd grade student from May Howard Elementary School (Savannah, GA) reflects upon the role of the government.

PART II: STUDENT RESEARCH

INQUIRY STAGE 4: GOING FURTHER

During the going further stage, students deepen and extend their understanding about the topic or issue at hand. Often, a contrast is presented to challenge one's conceptions, requiring that students revisit previously studied information or seek out new sources of information. As they refine and

clarify facts and ideas, students become more confident in their knowledge. To learn more, please refer to the Kath Murdoch Inquiry Model poster (see page 10) and visit http://kathmurdoch.com.au.

1. Ask students to review what they "think they know" and "wonder about" paper and plastic grocery bags. Following data gathering during "sorting out," have students determine if any information was "confirmed" or a "misconception," and how they know.
2. Move sticky notes to the appropriate column and ask students to mark accordingly in their Inquiry Journals.
3. Refer to the Kath Murdoch Inquiry Cycle poster (see page 10), explaining this stage in the inquiry process is called "going further." During this stage, students will deepen and extend their understanding about the issue of single-use, disposable grocery bags. This may entail students' revisiting previously studied information or seeking out new sources of information.
4. To facilitate this process, divide students into cooperative groups of three or four. Assign each group one of the articles previewed earlier (see step #1 in the introduction to this lesson) that discusses plastic bag policies at the local, national, and international levels. If time allows, assign students to research additional articles on the topic.
5. Each small group should work cooperatively to create a summary or overview of their article(s) using Handout 3, "Researching Bag Politics." (Refer students to the summative assessment rubric criteria *Communication Skills* and *Collaboration Skills*.)
6. Students should work with their small groups to decide on a method to present their research summaries to the class. Students may choose to use, but are not limited to, one of the following methods (see "Using 21st Century Tools to Support Environmental Education" on page 52 for URLs and additional information):
   - Prepare a presentation using multimedia (e.g., Prezi)
   - Draw a political cartoon by hand or using technology (e.g., Bitstrips, ToonDoo)
   - Design a poster by hand or using technology (e.g., Glogster)
   - Create a timeline of events by hand or using technology (e.g., Dipity, Capzles, Timetoast)
   - Write a short story by hand or using technology (e.g., Lulu, Little Bird tales)

INQUIRY JOURNAL REFLECTIONS ON GOING FURTHER

- What have I learned at this stage of my inquiry?
- How do I feel about the information I have gathered?
- What questions have I been able to answer?
- What questions have not yet been answered? What resources do I need in order to learn more?
- How should I organize my thoughts and ideas?

EXTENSION IDEAS

- After having students research local policies on single-use plastic bags in your community, have them write letters to local officials expressing their opinions and advocating for or against the existing policy (or lack thereof).
- Arrange a videoconference with another class that has studied the issue of single-use plastic bags and have students share their research findings. Discuss similarities and differences that come up and what might account for some of the differences.

Lesson 5: "Drawing Conclusions," Making Informed Choices

TOTAL TIME: 90 MINUTES OR TWO CLASS PERIODS

There is no more important task than the development of an informed, effective, and responsible citizenry.
— Center for Civic Education

Overview

In this lesson, students learn the concept of civic responsibility as it relates to resource use and waste disposal. Drawing upon their research-based findings, reflections, and experiences, students begin to draw conclusions regarding the issue of single-use, disposable grocery bags. Students demonstrate metacognitive abilities as they reflect upon how their ideas and feelings have changed throughout the course of the investigation, ultimately deciding upon what is most essential to communicate with others. By the lesson's end, they understand that being informed is beneficial to one's personal development, and that being informed is also one's civic duty.

Enduring Understanding

Being informed is a civic responsibility.

Objectives

Students will

- Identify and describe individual human rights and responsibilities.
- Relate civic responsibilities to making informed choices as a consumer and as a global citizen.

Vocabulary

The following words and terms may not be familiar to students. Use this list as a resource for students to expand their working vocabulary as they encounter these words and terms in the lesson.

- Human rights
- Responsibility

Materials Needed and Setup

- Several pieces of candy of various types and brands
- Children's books on civic responsibility
- Inquiry chart (see Lesson 1)
- Kath Murdoch Inquiry Cycle poster (see page 10)
- Inquiry Journals, one per student
- Computers with Internet access (optional)

Introduction

1. Display several pieces of candy of various types and brands.

2. Ask students which candy they would purchase if they could have only one. Ask them what factors led to their decision and how, as a consumer, they decide to purchase one product over another. Discuss common factors, such as:
   - Cost
   - Quality
   - Personal preference (taste, appearance, etc.)

3. Ask students if they would continue to buy their favorite products if they knew that the workers who produced them had been treated unfairly or that the environment had been harmed in the production process. Ask for examples of practices that hurt workers or the environment and discuss. Examples include:
   - Low pay for workers
   - Child labor
   - Unsafe working conditions
   - Harmful farming practices that hurt animals or the land
   - Pollution from factories that damages the environment

4. Emphasize that being informed about these issues and making consumer choices based on them is our responsibility as global citizens.

Directions

PART I: CIVIC RIGHTS AND RESPONSIBILITIES

1. Discuss the idea of universal human rights (e.g., the rights to be free, to express oneself, to safety, etc.). Emphasize that all humans are valuable and have rights, no matter who they are or where they live. Note: If students have not yet learned about human rights, read or watch:
   - *We Are All Born Free: The Universal Declaration of Human Rights in Pictures*, by Amnesty International
   - *For Every Child*, by Caroline Castle
   - *Every Human Has Rights: What You Need to Know About Your Human Rights*, by National Geographic
   - *I Have the Right to Be a Child*, by Alain Serres
   - *This Child, Every Child: A Book About the World's Children*, by David J. Smith and Shelagh Armstrong
   - *Cartoons for Children's Rights*, by UNICEF (http://www.unicef.org/crcartoons)
2. Ask students what responsibilities come with their human rights. Reinforce that we all have a responsibility to respect and protect the rights of others. We also have a responsibility to consider the consequences of our actions on others and the environment, and to set a good example for others.
3. Draw a T-chart labeled Rights and Responsibilities. Place students in cooperative groups of three or four and provide each with a marker and sheet of chart paper. Have groups draw their own T-charts and list what they consider to be essential human rights and the corresponding responsibilities.

Following a read-aloud of *For Every Child*, May Howard Elementary School (Savannah, GA) educator Rob Amonette leads a Socratic Dialogue on human rights and responsibilities, including our responsibilities to care for the environment.

4. Reconvene the class and have groups report to the class. Add their ideas to the class T-chart. For example:

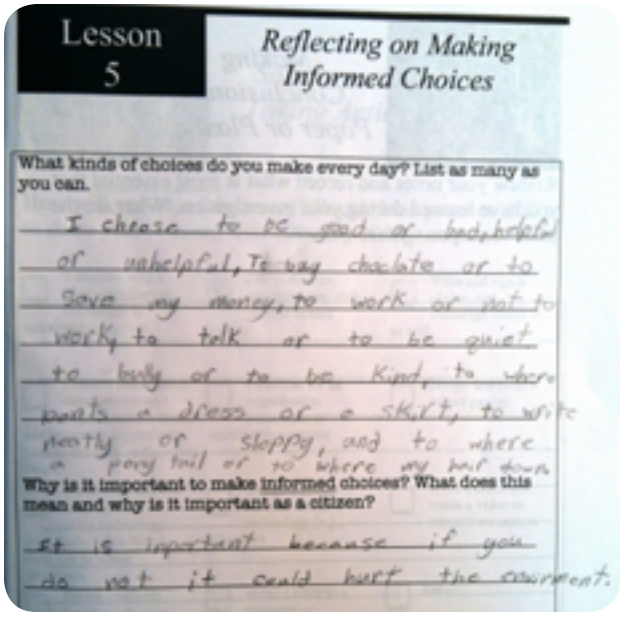
Rights	Responsibilities
to have a place to call home	• to take care of your home, including the natural environment
to safety and health care	• to be safe so as to not hurt others • to avoid violence • to limit behaviors that negatively affect the air, soil, and waterways, affecting the health of others

Rights	Responsibilities
to be loved and cared for	• to love and care for others, to be compassionate and help others in need
to express oneself	• to listen respectfully to others and to avoid saying hurtful things to another
to food and nourishment	• to not waste food • to eat healthful foods
to decide things for yourself	• to make informed choices

5. Close the discussion by emphasizing that global citizens are accountable for their words, actions, and attitudes. Each of us has a responsibility to be informed, to think before speaking and acting, and to consider the consequences of our choices on others and the environment.

INQUIRY JOURNAL REFLECTIONS ON INFORMED DECISION-MAKING

- What kinds of choices do you make every day? List as many as you can.
- Why is it important to make informed choices? What does this mean, and why is it important as a citizen?


Lesson 5

Reflecting on Making Informed Choices

What kinds of choices do you make every day? List as many as you can.

I choose to be good or bad, helpful or unhelpful, To buy chocolate or to save my money, to work or not to work, to talk or to be quiet to bully or to be kind, to wear pants a dress or a skirt, to write neatly or sloppy, and to where a pony tail or to where my hair down.

Why is it important to make informed choices? What does this mean and why is it important as a citizen?

It is important because if you do not it could hurt the environment.

A 3rd grade student from Swain West Elementary (Bryson City, NC) reflects upon the kinds of choices she makes daily, and why it is important to make informed choices.

PART II: STUDENT RESEARCH

INQUIRY STAGE 5: DRAWING CONCLUSIONS

Throughout students' investigations, they are making connections to prior knowledge, extending their understanding, and modifying any misconceptions. As they begin to *draw conclusions*, students determine what they have learned, how they feel about what they have learned, how their ideas have changed, and what to do with the new insights they have acquired (Murdoch, 1988). Teachers may select from many *Drawing Conclusions* strategies, including concept mapping; consensus building; de Bono's 6 Thinking Hats; and by making statements of generalizations. To learn more, please refer to the Kath Murdoch Inquiry Model poster (see page 10) and visit http://kathmurdoch.com.au.

1. Ask students to review what they "think they know" and "wonder about" paper and plastic grocery bags. Following data gathering during "going further," have students determine if any information was "confirmed" or a "misconception," and how they know.
2. Move sticky notes to the appropriate column and ask students to mark accordingly in their Inquiry Journals.

3. Refer to the Kath Murdoch Inquiry Cycle poster (see page 10), explaining this stage in the inquiry process is called "drawing conclusions." During this stage, students will synthesize what they have learned, making generalizations that are supported by their research findings. (Refer students to the summative assessment rubric criterion *Critical Thinking Skills*.)
4. Conduct the "4 Corners Activity." Place signs in each corner of the classroom labeled Agree, Strongly Agree, Disagree, and Strongly Disagree. Ask students to take a stance on the following statement by standing next to the appropriate sign: "Single-use, plastic grocery bags should be banned."
5. Students should discuss their position with the others standing in their corner, and choose one student to articulate the group's stance to the entire class.
6. After the discussion, invite students to change their position if they were persuaded by another group's position.
7. Debrief as a class, explaining that they will choose how to put their beliefs into action during the final stage of the inquiry.

INQUIRY JOURNAL REFLECTIONS ON DRAWING CONCLUSIONS

- What have I learned?
- How do I feel about what I have learned?
- How have my ideas changed?
- If my ideas changed, why did they?
- What are the main ideas I wish to make, and how will I present them?

Lesson 6: "Taking Action"—Students as Solutionaries

TOTAL TIME: 90 MINUTES OR TWO CLASS PERIODS + TIME FOR CIVIC ACTION PROJECTS

Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has.
— Margaret Mead

Overview

In this culminating lesson, students reflect upon their learning about the specific issue of single-use, disposable grocery bags and how they can be positive change agents in their communities. Students first explore how adults, children, and organizations such as UNICEF take action to promote environmental sustainability. Using these examples as inspiration, students determine how they, too, can be "solutionaries" by planning and implementing action steps that lead to a more sustainable future.

Enduring Understanding

An individual's choices and actions can have a positive impact on others and the environment. Anyone can be a "solutionary"!

Objectives

Students will

- Identify individuals and organizations that embody the characteristics of a "solutionary."
- Develop and implement an action project to promote environmental sustainability informed by their own research.
- Assess the impact of their civic engagement.

Vocabulary

The following words and terms may not be familiar to students. Use this list as a resource for students to expand their working vocabulary as they encounter these words and terms in the lesson.

- Change-maker
- Reflection
- "Solutionary"

Materials Needed and Setup

- One or more OneMinutesJr. video(s) about environmental sustainability
- Inquiry chart (see Lesson 1)
- Kath Murdoch Inquiry Cycle poster (see page 10)
- Inquiry Journals, one per student
- Computers with Internet access (optional)
- Materials (e.g., paper, colored pencils, etc.) and equipment necessary for "Taking Action" project
- Handout 4: Planning My Action! (one per student)

Introduction

1. Introduce the term "solutionary,"[10] pointing out its root word, solution. Explain that solutionaries use their knowledge and skills to bring about positive changes for all people, animals, and the Earth. They are change-makers for a better world.
2. Ask students to think of someone who is a solutionary. Have them record the person's name in their Inquiry Journal and answer one or more of the following questions:
   - What makes this person a solutionary?
   - What global issue or problem is the person attempting to address?
   - How do his or her solutions create a better world for all living creatures and the environment?
3. Have students share their responses with a partner.
4. Reconvene the class and discuss the traits that their solutionaries have in common and what they have learned that can help them to be active global citizens.

Directions

PART I: UNICEF TAKING ACTION

1. Select one or more of the following "OneMinutesJr" short videos for students to watch:
   - Friends of Nature: Mariam Matiashvili, 17, Georgia, 2013, http://www.youtube.com/watch?v=12EVFykoQWY&feature=share&list=PL_X6BhIYRstZ8ls7xG30__ubGX6LZRfq3

10 ©The Institute for Humane Education, 2013

- Gas: Qusyairi Zazili, 16, Malaysia, 2009, http://www.youtube.com/watch?v=cnAL-ePd-bQ
- Letter from the Future: G. Nandin and Erdene Ganbaatar, 14, Mongolia, 2009, http://www.youtube.com/watch?v=qP9WOGjBQmU
- Plastic River: Rahimov Furgatjon, Tajikistan, 2010, http://www.youtube.com/watch?v=Tk0Q4B3q3xI
- Protéger l'environement (Protect the Environment): Sterline Cherubin, 11, Haiti, 2011, http://www.youtube.com/watch?v=GCv6i61iQGs
- What Goes around Comes Around: Muhammad Jabarov and Mansur Sharipov, Tajikistan, 2010, http://theoneminutesjr.org/index.php?thissection_id=10&movie_id=201000232

2. Explain to students that the videos they are about to view were made by youths aged 12 to 20 to raise awareness about environmental sustainability. Tell students that UNICEF worked with the young people to make these videos because the organization believes that children are an important part of the movement to create a more sustainable global community.
3. Divide the class into small groups of four to six students. Have each group watch a different video and discuss the questions below. (Alternatively, show one or more videos to the whole class and discuss as a large group.)
   - What environmental problem or issue is addressed in the video?
   - What actions does the video suggest we take to help solve the problem?
   - What additional actions do you think we should all be taking to deal with this problem?
4. Debrief as a class how individuals working together can develop healthy, just, and sustainable communities.

INQUIRY JOURNAL REFLECTIONS ON BEING A SOLUTIONARY

- What do you think it means to be a "solutionary"?
- What are some ways children can have a positive impact on the world?
- How can you get involved in a cause you believe in?

PART II: STUDENT RESEARCH

INQUIRY STAGE 6: TAKING ACTION

Although the inquiry process is by nature fluid and recursive, taking action is presented as the final stage as students apply their learning in meaningful ways. Through purposeful topic or issue selection and engaging students in meaningful learning activities in which they access valid, diverse resources, students recognize the relevance of what they are investigating. They begin to formulate their own perspectives and ideas about how to bring about positive change. Students should "own" their learning and thus be responsible for deciding how they will take action. To learn more, please refer to the Kath Murdoch Inquiry Model poster (see page 10) and visit http://kathmurdoch.com.au.

Note to teacher: Prior to implementing this final inquiry stage, encourage students to revisit their pre-assessment responses regarding the causes and effects of environmental issues. Ask them to identify additional examples they learned during the course of this unit.

1. Share with students contemporary news articles that highlight ways in which children around the world are taking action to protect their environment. (See Lesson 4 for a list of websites with child-friendly news articles.)
2. Ask students what problems the children in the articles were trying to solve and how they came up with solutions. Emphasize that individuals of any age can make a positive impact on the world.
3. Ask students what concerns they now have about the environment and what actions they want to take, based on their research and investigation of single-use, disposable grocery bags.
4. Assign students to collaborative groups of three or four to brainstorm how they may take action. (Refer students to the summative assessment rubric criterion *Civic Action*.) Distribute Handout 4, "Planning My Action!" and have groups focus on one goal and how to achieve it. They should discuss action steps, resources and materials needed, and a proposed timeline.
5. Debrief each group about their ideas and ask students to record them in their Inquiry Journals.
6. As students implement their plans, have them check in periodically to report on progress. Ensure students are collecting evidence of their civic action for later evaluation.
7. At the end of the project, engage students in reflecting upon their civic action. (Refer students to the summative assessment rubric criterion *Reflection of Civic Action*.) Sample discussion or writing prompts include:
   - Did you achieve your goals? How do you know?
   - How can this project help you to decide on future action that you might take?
   - How did the action you took reflect the characteristics of a solutionary and global citizen?
8. Celebrate the students' accomplishments as solutionaries and global citizens.

Students at May Howard Elementary School (Savannah, GA) became solutionaries by designing reusable canvas bags and artwork using recycled materials, and using them to raise community awareness and funds for UNICEF's Clean and Safe Water Campaign.

INQUIRY JOURNAL REFLECTIONS ON TAKING ACTION

- Now that we have found out more about this topic, what are we concerned about?
- What is already being done?

- What do we think we can do at home, at school, and in the community? What steps will we need to take? What resources will we need?
- Whom do we need to talk to about this? Do we need to seek permission?
- What difficulties might arise? How can we avoid these?
- How will we know whether our actions have been effective?

EXTENSION IDEAS

- Have students reflect on the following Anne Frank quote: "How wonderful it is that nobody need wait a single moment before starting to improve the world." Have students discuss or write about how they can start taking action in small ways.
- Share positive actions online, such as through the 7 Billion Actions site (http://7billionactions.org), which demonstrates our shared responsibility to care for each other and our planet.
- As a school, take the Zero Footprint Challenge (see http://zerofootprintfoundation.org), aimed at cutting your school's carbon footprint and energy consumption over the course of a one-year period.

Handout 1: Planning the Investigation

Global citizens reflect upon how they will investigate the questions they have about important issues. Identify below a variety of trustworthy sources from which you may gather information. In your Inquiry Journals, you will take notes from these sources.

Books	**Examples:**
Newspapers	**Examples:**
Websites	**Examples:**
Film or Television	**Examples:**
Visual Images	**Examples:**
Observations	**Examples:**
Ask a Friend or Family Member	**Examples:**
Artifacts	**Examples:**

Handout 2: Identifying Stakeholder Perspectives

Select a key stakeholder in the debate over paper versus plastic bags. Then analyze this stakeholder's perspective on or opinion about the use of paper versus plastic bags.

My stakeholder is .....

My stakeholder's perspective is: .....

.....

.....

.....

Next, choose how you will present your perspective to an audience.

- ☐ Role play a television interview or talk show
- ☐ Create an advertisement for a magazine or TV
- ☐ Write a letter to the editor of a newspaper
- ☐ Design a piece of artwork for a museum
- ☐ Write a speech for a community meeting
- ☐ Other: .....

.....

.....

Handout 3: Researching Bag Politics

Identify a current news article about a governing body banning or placing a tax or levy on single-use plastic bags. On a separate page, record notes on the article to support your research.

My example is of a ban or levy located in: .....

My example is:

- ☐ Local
- ☐ National
- ☐ State
- ☐ International

Choose how you will present your research findings:

- ☐ Prepare a presentation using multimedia (e.g., Prezi)
- ☐ Draw a political cartoon by hand or using technology (e.g., Bitstrips, ToonDoo)
- ☐ Create a timeline of events by hand or using technology (e.g., Dipity, Capzles, Timetoast)
- ☐ Design a poster by hand or using technology (e.g., Glogster)
- ☐ Write a short story by hand or using technology (e.g., Lulu, Little Story Birds)
- ☐ Other: .....

.....

.....

Handout 4: Planning My Action

How will you be a solutionary? Decide how you would like to share your learning with others by taking action.

- [ ] Volunteer with a local organization committed to sustainable practices.
- [ ] Join or start an environmental club on your school campus.
- [ ] Write and sign a pledge, and encourage others to as well.
- [ ] Prepare a presentation using multimedia (e.g., Animoto, Prezi) and present to an audience, such as the PTA or school board.
- [ ] Fundraise for an organization committed to sustainable practices.
- [ ] Design and build a school garden.
- [ ] Write and publish a story by hand or using technology (e.g., Lulu, Little Story Birds) to promote awareness.
- [ ] Design a poster by hand or using technology (e.g., Glogster).
- [ ] Write a script and film a video to promote awareness.
- [ ] Develop a bulletin board at school to recognize children taking action.
- [ ] Write a letter to a company or governing body to promote change in practices.
- [ ] Other:

.....

.....

Glossary

All definitions from Merriam-Webster online at merriam-webster.com or Merriam-Webster's Word Central at wordcentral.com, unless otherwise noted. Used with permission. Use your professional judgment before sharing definitions with students verbatim.

Ban: To forbid, especially by law or social pressure.

Changemaker: One who shows initiative in solving problems using teamwork, leadership, and action.[11]

Consequence: Something that logically or naturally follows from an action or condition.[12]

Global citizen: Someone who understands interconnectedness, respects and values diversity, has the ability to challenge injustice, and takes action in personally meaningful ways. (© U.S. Fund for UNICEF, 2011)

Human Rights: Basic rights and freedoms that all people are entitled to regardless of nationality, sex, national or ethnic origin, race, religion, language, or other status.[13]

Innovate: To introduce something new.

Innovation: A new idea, method, or device.

Levy: The laying or collection, especially of a tax.

Life cycle of a product: All stages of a product's use, from collecting fuel for power to making, using, and throwing it away.[14]

Natural resource: Something (as a mineral, waterpower source, forest, or kind of animal) that is found in nature and is valuable to humans (as in providing a source of energy, recreation, or scenic beauty).

Perspective: Point of view.

Point of view: A way of looking at or thinking about something.

Renewable: Relating to a natural resource, such as solar energy, water, or wood, that is never used up or that can be replaced by new growth.[15]

11 FAQ," Ashoka's Youth Venture, accessed July 10, 2013, http://www.youthventure.org/faq.

12 The Free Dictionary, accessed September 18, 2013, http://www.thefreedictionary.com.

13 "Human Rights Basics," Amnesty International, accessed August 20, 2013, http://www.amnestyusa.org/research/human-rights-basics.

14 *Terms of Environment: Glossary, Abbreviations, and Acronyms (Revised December 1997)* (Washington, DC: U.S. Environmental Protection Agency, 1997), s.v. "life cycle of a product," http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=4000081B.txt (accessed August 20, 2013).

15 The Free Dictionary, accessed September 18, 2013, http://www.thefreedictionary.com.

Right: Something to which one has a just claim.

Solutionary: One who develops solutions to both large and small problems. Solutionaries use their knowledge and skills to take on challenges in order to bring about positive changes for all people, animals, and the Earth.[16]

Stakeholder: One who is involved in or affected by a course of action.

Sustainable: Of, relating to, or being a method of harvesting or using a resource so that the resource is not depleted or permanently damaged.

UNICEF (United Nations Children's Fund): Organization that works in more than 190 countries and territories to save and improve children's lives by providing health care and immunizations, clean water and sanitation, nutrition, education, emergency relief, and more.[17]

16 "What is a Solutionary?" The Institute for Humane Education, accessed July 10, 2013, http://humaneeducation.org/become-a-humane-educator/what-is-humane-education/what-is-a-solutionary.

17 "About Us," U.S. Fund for UNICEF, accessed July 10, 2013, http://www.unicefusa.org/about/.

Pre- and Post-Assessments Scoring Rubric

LEARNING OBJECTIVES

Student will:

- Identify the environmental problems associated with single-use, disposable grocery bags, building upon prior knowledge, perceptions, and feelings about the issue.
- Locate information from a variety of sources with diverse perspectives, and evaluate this information.
- Communicate ideas and emotions clearly and effectively with diverse audiences for various purposes.
- Collaborate effectively with diverse individuals in research teams.
- Plan and implement ways to take action to address the issue of single-use, disposable grocery bags.
- Reflect upon and evaluate actions taken, in order to inform future action.

Criteria	**Exemplary (3)** *Consistently demonstrates all or most of the following:*	**Satisfactory (2)** *Consistently demonstrates all or most of the following:*	**Needs Improvement (1)** *Consistently demonstrates all or most of the following:*
Problem Identification	• Selects a complex issue of both local and global significance to investigate. • Describes prior knowledge, perceptions, and feelings about the issue. • Generates meaningful, researchable questions to investigate.	• Selects an issue to investigate, but it may not be significant at both local and global levels. • Describes prior knowledge, perceptions, and/or feelings about the issue. • Generates researchable questions to investigate.	• Selects an issue to investigate chosen by peer(s) and/or the teacher without consideration of prior knowledge, perceptions, and feelings about the issue. • Generates few questions to investigate. Questions may not be meaningful or researchable.
Information Literacy Skills	• Identifies a range of relevant and reputable sources (e.g., primary and secondary sources, websites, media, interviews) for conducting research.	• Identifies and gathers information from reputable sources (e.g., primary sources, websites, media, interviews).	• Gathers information from few sources or those that lack diverse perspectives.

Criteria	**Exemplary (3)** *Consistently demonstrates all or most of the following:*	**Satisfactory (2)** *Consistently demonstrates all or most of the following:*	**Needs Improvement (1)** *Consistently demonstrates all or most of the following:*
Information Literacy Skills	• Gathers information from a variety of reputable sources reflective of diverse perspectives and personal observations. • Uses Internet search engine and electronic database search features effectively and fluently, such as by using appropriate keywords, synonyms, and other search tools. • Organizes ideas and information by taking notes, drawing diagrams, or other methods.	• Uses Internet search engine and electronic database search features for conducting research. • Attempts to organize ideas and information gathered during research.	• Is unable to use Internet search engine and electronic database search features for conducting research. • Ideas and information gathered during research are disorganized.
Critical Thinking Skills	• Distinguishes between facts, opinions, and value judgments with rationale. • Analyzes, synthesizes, and evaluates information to answer research questions. • Relates chosen issue to other global problems, demonstrating understanding of interdependence and systems thinking. • Addresses own and others' assumptions about the issue, exhibiting open-mindedness.	• Distinguishes between facts, opinions, and value judgments with or without rationale. • Analyzes information to answer research questions. • Recognizes own and others' assumptions about the issue, exhibiting open-mindedness. • Brainstorms several possible solutions to address the chosen issue. Selects one to implement.	• Often confuses facts, opinions, and value judgments. • Does not corroborate information to answer research questions. • Has difficulty considering alternative viewpoints or information that does not support own perspective. • Chooses a solution to implement without consideration of a range of possibilities relative to their benefits and drawbacks.

Criteria	Exemplary (3) *Consistently demonstrates all or most of the following:*	Satisfactory (2) *Consistently demonstrates all or most of the following:*	Needs Improvement (1) *Consistently demonstrates all or most of the following:*
Critical Thinking Skills	• Brainstorms a range of possible solutions to address the chosen issue. Analyzes each, weighing their benefits and drawbacks based on evidence or rationale, ultimately outlining a comprehensive plan of action.		
Communication Skills	• Considers others' perspectives and ideas through active listening. • Uses various forms of communication (i.e., oral, nonverbal, written, and visual) effectively to articulate information and ideas in a variety of contexts. • Demonstrates proficiency using a range of tools (e.g., presentation applications and multimedia) for a variety of communication purposes (e.g., to inform; to motivate; to persuade).	• Listens actively in an attempt to consider others' perspectives and ideas. • Uses more than one form of communication (i.e., oral, nonverbal, written, and visual) to articulate information and ideas in a variety of contexts. • Demonstrates *some* proficiency using one or more tools (e.g., presentation applications and multimedia) for a variety of communication purposes (e.g., to inform; to motivate; to persuade).	• Fails to listen actively to others or to consider their perspectives and ideas. • Relies on one form of communication without consideration of audience or context. • Demonstrates *little* or no proficiency using one or more tools (e.g., presentation applications and multimedia) for a variety of communication purposes (e.g., to inform; to motivate; to persuade).
Collaboration Skills	• Makes strong contributions as a team member by sharing ideas and leading discussions.	• Strives to contribute as a team member, sometimes sharing ideas.	• Rarely offers ideas to help the team solve problems or complete tasks. • Does not complete tasks satisfactorily and/or on time.

Criteria	Exemplary (3) *Consistently demonstrates all or most of the following:*	Satisfactory (2) *Consistently demonstrates all or most of the following:*	Needs Improvement (1) *Consistently demonstrates all or most of the following:*
Collaboration Skills	• Accepts responsibility for tasks as a team member and supports others in their efforts. • Values and respects human diversity, diverse perspectives, and individual contributions as part of a collaborative team.	• Willing to complete tasks as a team member when asked, and completes them on time to the group's satisfaction. • Is polite to team members and demonstrates respect for their perspectives and ideas.	• Does not show respect for diverse perspectives or ideas (e.g., may ignore or criticize others).
Civic Action	• Identifies goals for civic action, providing a solid rationale for each proposed solution. • Takes meaningful and appropriate action to improve conditions relative to the chosen global issue. • Accepts responsibility for actions. • Collects diverse evidence of civic action for later evaluation (such as notes, interviews, photographs).	• Identifies relevant goals for civic action. • Takes action to improve conditions relative to the chosen global issue. • Accepts responsibility for actions when asked. • Collects some evidence of civic action for later evaluation (such as notes, interviews, photographs).	• Identifies few relevant goals for civic action. • Takes action to improve conditions relative to the chosen global issue. • Fails to accept responsibility for actions. • Does not collect evidence of civic action for later evaluation (such as notes, interviews, photographs).
Reflection of Civic Action	• Articulates whether the goals of the civic action were met using collected evidence and examples. • Reflects upon what was learned with examples and articulates implications for future civic action. • Relates civic action to the knowledge, skills, and attitudes of a global citizen.	• Describes whether he/she believes the goals of the civic action were met. • Reflects upon what was learned. • Relates civic action to the knowledge, skills, and attitudes of a global citizen.	• Explains what occurred but does not articulate whether goals were met. • Reflects upon what was learned. • Does not relate civic action to the knowledge, skills, and attitudes of a global citizen.

Using 21st Century Tools To Support Environmental Education

Students in the new millennium can no longer rely on tools from the previous century to support them as they investigate, inquire about, learn about, and apply solutions to the world around them. To prepare children to be fully engaged citizens and learners, educators must use tools and approaches that reflect the world in which we live today. Learning with digital technologies is a 21st century skill as are critical thinking, collaboration, leadership, global awareness, and environmental literacy[18]. Teachers in K–12 schools are beginning to explore the usefulness of Web 2.0 tools to support teaching and learning across the curriculum and to address common core and essential standards in their instruction. These 21st century tools, used in support of environmental studies, help to provide authentic, real-world learning that is relevant to the learner and sustain the inquiry process. This process encourages students to identify questions, research answers, and apply acquired knowledge to the development of solutions to important issues, including those related to the environment.

The table below provides suggested Web 2.0 tools with sample activities for specific tasks as they relate to this unit of study. These tools may extend beyond the scope of this particular content and support student learning in other areas of environmental education and beyond. Teachers are encouraged to explore these tools to determine the best fit for their specific subject areas and the needs of their students.

Function	Tools	Sample Activities	Sample Project
Animation	Blabberize: http://blabberize.com GoAnimate: http://goanimate4schools.com/public_index Voki: http://www.voki.com Xtranormal: http://www.xtranormal.com Zimmer Twins: http://www.zimmertwins.com	• Students can create animations from graphics or photos with a persuasive message about the environment. • Students can also use a photo of an inventor describing his or her invention based on research the student may have conducted. • Teachers can use an animation tool to introduce the unit or lessons with a photo or graphic asking a series of questions for the students to consider.	See a PSA-type message from Planet Earth: http://blabberize.com/view/id/754226
Cartooning	Bitstrips: http://www.bitstrips.com Make Beliefs Comix: http://www.makebeliefscomix.com Pixton: http://www.pixton.com ToonDoo: http://www.toondoo.com	• Students can create PSA comic strips about environmentally focused issues. • Students, in groups or individually, can create political cartoons related to a controversial environmental topic or create two comic strips comparing diverse perspectives on an issue.	The Joys of Recycling: http://www.pixton.com/schools/gallery/ii0fij1y

18 Partnership for 21st Century Skills, "P21 Framework Definitions," accessed August 1, 2013, http://www.p21.org/storage/documents/P21_Framework_Definitions.pdf.

Function	Tools	Sample Activities	Sample Project
Cartooning		• As an introduction to a unit of study, students can create a comic strip demonstrating what they know about a specific topic in environmental education.	
Collaboration (asynchronous)	Blog websites: Blogger: http://www.blogger.com Edublogs: http://edublogs.org Edmodo: http://www.edmodo.com Edublogs: http://www.edublogs.org Voxopop: http://www.voxopop.com	• Teachers can share ideas, collaborate on lessons, coordinate community activities, etc., either publicly or using a password-protected option. • Students can plan and provide feedback on projects and initiatives related to environmental problems, using the blog to support their work as solutionaries. • Students can practice taking a stand on environmental issues and have opportunities to explore the opinions of others.	View how one classroom uses their blog to share their work on environmental education: http://5s2012.edublogs.org/2012/07/23/human-impacts-on-the-environment NOTE: View their embedded concept map using Popplet (http://popplet.com)
Collaboration (synchronous)	Ning: http://www.ning.com Skype in the Classroom: http://education.skype.com VoiceThread: http://voicethread.com Yugma: https://www.yugma.com	• Students can connect with other classes taking action on environmental problems in their communities. • Students can video conference with experts to gain more understanding and ask questions about a particular topic related to the environment.	Fifth graders connect with recycling experts: http://education.skype.com/projects/313-ps-62-skypes-with-the-experts-about-recycling
Concept-Mapping and diagraming	Bubbl.us: https://bubbl.us Popplet: http://popplet.com MindMeister: http://www.mindmeister.com Mindomo: http://www.mindomo.com	• Teachers can introduce the unit by mapping with students all that they think they know about an environmental topic. At the end of the unit, the map can be revisited and updated. • Students can use mind-maps to organize their ideas related to an environmental solution project they wish to implement at their school or community. • Students can create individual maps to demonstrate their understanding of complex concepts such as rights and responsibilities.	Concept map on recycling: http://www.mindmeister.com/60847503/recycling

Function	Tools	Sample Activities	Sample Project
Digital Storytelling, e-Book, or Zine Maker	Little Bird Tales: http://www.littlebirdtales.com Lulu: http://www.lulu.com PicLit: http://www.piclits.com Storybird:http://storybird.com StoryJumper: http://www.storyjumper.com ZooBurst: http://www.zooburst.com	• Teachers can create online books to communicate information about key concepts in the unit. Once made "public," they can be shared with students as well as with their families. • Students can create stories based on the content in the unit and their stories can be fiction (an environmental tale of caution or hope) or nonfiction (based on the inquiry-focused research).	See an example of an environmental story: http://storybird.com/books/helping-the-environment
Document Sharing	Dropbox: http://www.dropbox.com Google Docs: https://docs.google.com Wikispaces: http://www.wikispaces.com	• Classes can maintain a Web-based page or set of pages with notes, updates, questions, and research results related to their inquiry about a topic. • This page can be shared with other classes that may be partnering on a project with students in a classroom. • Families can also access this site from the Internet to see what their children are developing as a result of their work in the classroom.	Student group takes action on recycling: http://hkaex2010-recycling.wikispaces.com/Action
Geographical Mapping	CommunityWalk: http://www.communitywalk.com HistoryPin: http://www.historypin.com Mapwing: http://www.mapwing.com Panoramio: http://www.panoramio.com	• Students, in groups or individually, can create interactive maps that designate significant locations relative to the environmental unit, such as locations of landfills in a particular state or region or designated green space in a community.	View a map of recycling resources in the greater Boulder area: http://www.communitywalk.com/recycle_boulder_valley/map/154#0002
Graphic Organizers	Cacoo: https://cacoo.com Creately: http://creately.com Exploratree: http://www.exploratree.org.uk Gliffy: http://www.gliffy.com LucidChart: https://www.lucidchart.com	• Teachers can use a graphic organizer to brainstorm ideas related to key concepts in the unit, including natural resources, rights and responsibilities, and different perspectives. • Students can draw a Venn diagram to compare renewable and nonrenewable resources.	Renewable & nonrenewable resources: http://www.gliffy.com/pubdoc/3872616/L.png

Function	Tools	Sample Activities	Sample Project
Graphic Organizers		• Groups can use the SWOT analysis template to analyze environmental situations specific to their school and community.	
Interactive Pinboard/ Whiteboard	CorkboardMe: http://hello.corkboard.me Padlet: http://padlet.com Pinterest: http://pinterest.com Scribblar: http://www.scribblar.com Squidoo: http://www.squidoo.com Stixy: http://www.stixy.com	• Teachers can pose a question and ask students to post what they think they know as the answer or research to support an accurate response. • Students can post their questions at the start of a new unit on environmental education—either what they think they know or what they want to know more about.	Student questions about recycling: http://padlet.com/wall/recyclewonderings
Movie Makers and Editors	Animoto: http://animoto.com Dvolver: http://www.dvolver.com/moviemaker/make.html Masher: http://www.masher.com	• Students can make a movie using a combination of photos, graphics, video, music, and narration to showcase their environmental solution. • Teachers can use a movie making tool tool as a way to engage learners as they begin a new lesson or unit by presenting visuals paired with audio to introduce curricular content.	View a sample video with photos and music: http://animoto.com/play/OsAhU8P3GAPoU00FpcvgLQ
Presentation	Glogster: http://edu.glogster.com PhotoPeach: http://photopeach.com Prezi: http://prezi.com Sliderocket: http://www.sliderocket.com Wordle: http://www.wordle.net	• Teachers can create a glog [a graphical blog] that provides an overview of the environmental unit for students and their families. • Students can create glogs that organize the findings, based on their research, related to the wonderings that were generated in a class brainstorming session.	This glog, created by a student, shows various elements of sustainability: http://diggerdynamo.edu.glogster.com/sustainability
Timeline Maker	Capzles: http://www.capzles.com Dipity: http://www.dipity.com TimeRime: http://timerime.com	• Students can research and represent the history of significant inventions and innovations that changed our environment—for instance, a timeline on how we manage our consumption (e.g., recycle trash).	View an interactive timeline of environmental milestones in history: http://www.timetoast.com/timelines/24219

Function	Tools	Sample Activities	Sample Project
Timeline Maker	Timetoast: http://www.timetoast.com	• Teachers can create timelines that reinforce unit concepts such as the amount of time it takes for certain materials to decompose or break down in a landfill.	
Website Creation	EducatorPages: http://www.educatorpages.com Google Sites: https://sites.google.com/?pli=1 Weebly: http://education.weebly.com Wix: http://www.wix.com	• Teachers can use a website creation tool much like a blog or wiki to share information, but can also use it to present information and resources for students' research and inquiry. • Student groups can use a website to share information and gain support from classmates, the school, and larger community for their solutionary initiatives.	View a sample website about the environment: http://environment.weebly.com/index.html

Common Core State Standards[19]

	Lesson					
	1	2	3	4	5	6
College and Career Readiness Anchor Standards for Reading						
1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.		✓	✓	✓		✓
2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.		✓	✓	✓		✓
6. Assess how point of view or purpose shapes the content and style of a text.			✓			
7. Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.		✓	✓	✓		
8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.		✓	✓			
9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.		✓	✓	✓		
College and Career Readiness Anchor Standards for Writing						
1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.						✓
2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.	✓	✓	✓	✓	✓	✓
4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	✓	✓	✓	✓	✓	✓
6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.						✓

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	Lesson					
	1	2	3	4	5	6
7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.	✓	✓	✓	✓	✓	
8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.		✓	✓	✓		
9. Draw evidence from literary or informational texts to support analysis, reflection, and research.		✓	✓	✓	✓	
10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.	✓	✓	✓	✓	✓	✓
College and Career Readiness Anchor Standards for Speaking and Listening						
1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.	✓	✓	✓	✓	✓	✓
2. Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.	✓	✓	✓	✓	✓	✓
3. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric.			✓		✓	
4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience			✓	✓	✓	✓
5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.			✓	✓		✓
6. Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.			✓	✓	✓	✓
College and Career Readiness Anchor Standards for Language						
1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.	✓	✓	✓	✓	✓	✓

	Lesson					
	1	2	3	4	5	6
2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.	✓	✓	✓	✓	✓	✓
3. Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.		✓	✓	✓	✓	✓
6. Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.	✓	✓	✓	✓	✓	✓

National Content Standards

	Lesson					
	1	2	3	4	5	6
National Curriculum Standards for Social Studies[20]						
2. TIME, CONTINUITY, AND CHANGE: Social studies programs should include experiences that provide for the study of the past and its legacy.	✓	✓				
3. PEOPLE, PLACES, AND ENVIRONMENTS: Social studies programs should include experiences that provide for the study of people, places, and environments.				✓		
4. INDIVIDUAL DEVELOPMENT AND IDENTITY: Social studies programs should include experiences that provide for the study of individual development and identity.			✓			
5. INDIVIDUALS, GROUPS, AND INSTITUTIONS: Social studies programs should include experiences that provide for the study of interactions among individuals, groups, and institutions.						✓
6. POWER, AUTHORITY, AND GOVERNANCE: Social studies programs should include experiences that provide for the study of how people create, interact with, and change structures of power, authority, and governance				✓		
7. PRODUCTION, DISTRIBUTION, AND CONSUMPTION: Social studies programs should include experiences that provide for the study of how people organize for the production, distribution, and consumption of goods and services.	✓	✓	✓	✓	✓	✓
8. SCIENCE, TECHNOLOGY, AND SOCIETY: Social studies programs should include experiences that provide for the study of relationships among science, technology, and society.	✓	✓	✓	✓	✓	✓
9. GLOBAL CONNECTIONS: Social studies programs should include experiences that provide for the study of global connections and interdependence.				✓		✓
10. CIVIC IDEALS AND PRACTICES: Social studies programs should include experiences that provide for the study of the ideals, principles, and practices of citizenship in a democratic republic.					✓	✓

20 National Council for the Social Studies, *National Curriculum Standards for Social Studies: A Framework for Teaching, Learning, and Assessment* (Silver Spring, Maryland: NCSS, 1994), 14–23.

	Lesson					
	1	2	3	4	5	6
Standards for the English Language Arts[21]						
1. Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace.	✓	✓	✓	✓	✓	✓
4. Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.	✓	✓	✓	✓	✓	✓
5. Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.	✓	✓	✓	✓	✓	✓
7. Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and non-print texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience.		✓	✓	✓	✓	
8. Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.		✓	✓	✓	✓	✓
11. Students participate as knowledgeable, reflective, creative, and critical members of a variety of literacy communities.	✓	✓	✓	✓	✓	✓
12. Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).	✓	✓	✓	✓	✓	✓
National Geography Standards[22]						
Essential Element V. ENVIRONMENT AND SOCIETY: The geographically informed person knows and understands...						
14. How human actions modify the physical environment.	✓	✓	✓	✓	✓	✓
16. The changes that occur in the meaning, use, distribution, and importance of resources.	✓	✓	✓	✓	✓	✓

21 National Council of Teachers of English and International Reading Association, *Standards for the English Language Arts* (Urbana, IL, and Newark, DE: National Council of Teachers of English and International Reading Association, 1996), 25. For a full list of standards, see http://www.ncte.org/standards.

22 National Geography Standards, Geography Education Standards Project, *Geography for Life: The National Geography Standards* (Washington DC: National Geographic Society Committee on Research and Exploration, 1994), 34–35.

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