



The Story of Stuff: Increasing Environmental Citizenship

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ABSTRACT

Objectives: After this lesson, students will be able to: (1) list the five stages of materials production, (2) report key facts related to the materials economy, (3) identify sustainable solutions that positively impact the environment, and (4) recognize how the environment affects health. **Target Audience:** This activity is designed for students in middle school and junior high school.

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INTRODUCTION

Environmental health involves the assessment and control of physical, chemical and biological factors that potentially affect health,¹ and it encompasses a vast range of topics including air quality, climate change, water safety, natural disasters, conservation and waste management.² As it affects every human being, environmental health is a hot topic in political, educational and health care arenas around the world. As such, it is becoming increasingly necessary to effectively prepare young people to become responsible stewards of the global environment.

In the United States, increasing environmental health education is important, especially in the area of sustainability. Sustainability involves “meeting the needs of the present without compromising the ability of future generations to meet their own needs.”^{3(p1)} In the National Environmental Policy Act of 1969, the United States declared it would create and maintain sustainable environmental health conditions.⁴ Unfortunately, the United States has not met its sustainability goal. If everyone on the planet consumed as much of the earth’s resources as the United States, three to five more planets would be needed to supply the amount of finite (limited) resources in demand.⁵ In ad-

dition to high rates of resource use, there are also high rates of product consumption and waste. For many products, such as electronics, consumer use in America continues to climb while the recycling rate for out-of-date electronic devices remains under 20%.⁶ That means much of the waste in the United States ends up in landfills.

Despite the national policy of 1969 and the statistics regarding consumption and waste, current environmental education approaches continue to be fundamentally inadequate and inconsistent.⁷ According to Berkowitz, Ford and Brewer, “As humans’ capacity to alter the environment reaches unprecedented levels, the urgency of fostering environmental citizenship in all people has never been greater and, perhaps, more difficult”^{8(p262)} Environmental citizenship involves being aware of environmental issues and having the determination and ability to improve environmental conditions.⁸

Environmental literacy is key for people to develop environmental citizenship. Environmental literacy “is the capacity of an individual to act successfully in daily life on a broad understanding of how people and societies relate to each other and to natural systems, and how they might do so sustainably. This requires sufficient awareness,

knowledge, skills and attitudes in order to incorporate appropriate environmental considerations into daily decisions about consumption, lifestyle, career and civics, and to engage in individual and collective action.”^{9(p1)} There are three primary stages of environmental literacy: nominal literacy, functional literacy and operational literacy.¹⁰ People with nominal literacy have little or no understanding of environmental topics. People with functional literacy have a basic level of knowledge, understanding and thinking skills with which they can address environmental concerns. In the final stage, operational literacy, people have higher levels of knowledge and awareness, along with a highly developed set of critical

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thinking skills (i.e., questioning, analysis, deduction, logic and objectivity), with which to understand and address imperative environmental issues.

This lesson helps students in the nominal stage of environmental literacy develop the skills and understanding to move toward the stage of functional environmental literacy. In other words, students will gain a basic level of knowledge and understanding of environmental issues, which corresponds to National Health Education Standard I: Students will comprehend concepts related to health promotion and disease prevention to enhance health.¹¹ Specifically addressed in this lesson is performance indicator 1.8.3: analyze how the environment affects personal health. The lesson is centered on the web-based animation, “The Story of Stuff,” narrated by Annie Leonard.¹² This video shows how human consumption impacts the earth and, in it, the stages in which materials are processed from beginning to end are explained. The activities provided in this lesson give students a chance to learn about environmental issues and consider innovative and sustainable solutions.

OBJECTIVES

After the lesson, students will be able to: (1) identify the five stages of materials production, (2) report key facts related to the materials economy, (3) identify sustainable solutions to positively impact the environment, and (4) recognize how the environment affects health.

MATERIALS AND RESOURCES

- Computer, Internet access, projector, screen, chalkboard/whiteboard
- Downloadable Materials from the Story of Stuff website
 - a. Story of Stuff Video¹²
 - b. Story of Stuff Fact Sheet⁵
 - c. OPTIONAL: Story of Stuff Referenced and Annotated Video Script¹³
 - d. OPTIONAL: Story of Stuff Glossary¹⁴
- Lecture notes (Figure 1)
- Worksheet (Figure 2)

- Quiz (Figure 3)
- Answer keys for worksheet and quiz (Figure 4)

TARGET AUDIENCE

This activity is designed for students in middle school and junior high school. It may be used in a health class or in a social studies class that is concentrated on community issues.

PROCEDURE

Preparation

To prepare for the Story of Stuff learning activity, the instructor should access each of the following:

- Go to the Story of Stuff website and access the materials.
 - a. Story of Stuff Fact Sheet⁵
 - b. Story of Stuff Video¹²
 - c. OPTIONAL: Story of Stuff Referenced and Annotated Video Script¹³
 - d. OPTIONAL: Story of Stuff Glossary¹⁴
- Review all procedures provided in this section, the video, and/or lecture notes (Figure 1), and any additional support materials listed in the Materials and Resources section.
- Copy the following documents (1 each per student)
 - a. Story of Stuff Fact Sheet⁵
 - b. Worksheet (Figure 2)
 - c. Quiz (Figure 3)

Class Period Prior to the Story of Stuff Lesson

The instructor should distribute the Story of Stuff Fact Sheet as an assigned reading due the next class period. This reading will increase awareness and interest in the upcoming Story of Stuff lesson.

Class Period for the Story of Stuff Lesson: Total Time available: 50 minutes

Introduction (Figure 1): 2 minutes: Introduce “The Story of Stuff,” citing that it is narrated by Annie Leonard, who has over 20 years of experience in international sustainability and environmental health issues¹⁵ Additional content for the introduction is

provided in Figure 1. Before beginning the video or lecture, distribute the worksheet (Figure 2), which serves as a foundation for upcoming discussions and prepares the students for the assessment activity (Figure 3). Inform students that they will be quizzed on the content of the worksheet at the end of the lesson.

Video¹² or Lecture (Figure 1): 21 minutes: Choose one of two options: (1) show the Story of Stuff video¹² or (2) provide a lecture on the Story of Stuff video content using the provided lecture notes (Figure 1).

Conclusion (Figure 1): 5 minutes: Address the interconnected relationship between the environment and human health. Content for the conclusion is provided in Figure 1.

Small Group Discussion: 7 minutes: Divide students into groups of 3–4 students. Require students to compare and discuss their worksheet answers.

Class Discussion & Review: 7 minutes: Review each question with the class and provide correct responses. See Figure 4 for worksheet answer key. The worksheets are not graded. They are used solely as a learning tool to facilitate discussion among students and help them prepare for the lesson assessment.

ASSESSMENT TECHNIQUE

Assessment: 8 minutes: This teaching idea is designed to increase students’ knowledge regarding environmental health issues surrounding the materials economy. A quiz that stems from the Story of Stuff worksheet and aligns with the objectives of this learning activity is provided in Figure 3. Students should be informed that they will be quizzed on the content of the Story of Stuff worksheets before the lesson begins. The quiz may be adapted to the needs of the course, students, or instructor. See Figure 4 for quiz answer key. Administer the quiz during the last eight minutes of class. At the conclusion of the class, collect and grade the quiz.

REFERENCES

1. World Health Organization. Environmental health. 2009. Available at: <http://www.who>



Figure 1. Lecture notes extracted from *The Story of Stuff* referenced and annotated script¹³ and *The Story of Stuff* glossary.¹⁴ Additional resources are also cited.

I. Introduction

- A. Environmental health involves the assessment and control of physical, chemical and biological factors that potentially affect health,¹ and it encompasses a vast range of topics including air quality, climate change, water safety, natural disasters, conservation and waste management.²
- B. The things we do impact the environment. For example, the stuff we buy has a big impact on the environment, but most of us don't realize it.
- C. Annie Leonard, who has over 20 years of experience in international sustainability and environmental health issues, wanted to know where stuff comes from.¹⁵ She researched the question, "Where does stuff come from and where does it go when we're done with it?" This video/lecture is what she discovered.

II. Materials Economy

- A. Definition: the natural and human-made structures, systems, rules, policies and practices that guide how materials move from extraction to production to distribution to consumption to disposal
- B. Five Stages of the Materials Economy
 - 1. Extraction Stage: taking out (extracting) resources (metal, trees, water, animals)
 - 2. Production Stage: using energy and chemicals to make products
 - 3. Distribution Stage: selling of materials
 - 4. Consumption Stage: buying of products (shopping)
 - 5. Disposal Stage: disposing of products

III. Facts about Each Stage of the Materials Economy

- A. Extraction Stage
 - 1. Due to extraction, the world is running out of resources.
 - a. In past three decades, 1/3 of the planet's natural resources have been consumed.
 - b. The U.S. (5% of world's population) uses 30% of world's resources and creates 30% of world's waste.
- B. Production Stage
 - 1. Over 100,000 synthetic chemicals used in production today. Only 5% have been tested for their effects on human health.
 - a. Humans often unknowingly exposed to chemicals.
 - b. There are unknown effects on our health now and in the future.
 - 2. Toxic chemicals build up in the food chain and concentrate in our bodies.
 - a. Toxins present in our products but also released into the air, land, and water as pollution through factories production.
 - b. Toxic chemicals (toxics) are chemicals or physical agents that produce an adverse effect on an organism or a biological system or a community.
 - c. The food chain is a relationship between organisms in an ecological community in which each consumes a lower member and in turn is preyed upon by a higher member: the little fish eats insects » the big fish eats the little fish » the big fish is eaten by the bear, or the eagle, or the fisherman. In this example, the bear, or the eagle, or the fisherman is at the top of the food chain.
 - d. Many toxic chemicals persist in the environment and "bio-accumulate," meaning they accumulate in increasingly larger amounts as they move up the food chain; organisms higher on the food chain have higher concentrations of these chemicals in their bodies. For some foods, humans are at the top of the food chain; because Moms also bio-accumulate toxics, breast-feeding babies are at the tippy-top of the food chain.
 - 3. U.S. industry releases 4 billion pounds (equivalent to 500,000 elephants) of toxic chemicals annually.
 - 4. Toxics in, Toxics out: If we continue to put toxins into our production, we will yield only toxins in our environment and body.
- C. Distribution Stage
 - 1. Goals: keep prices down, keep people buying, keep inventory moving.
 - 2. Externalizing the costs (how businesses keep prices down)



Figure 1. Lecture notes extracted from *The Story of Stuff* referenced and annotated script¹³ and *The Story of Stuff* glossary.¹⁴ Additional resources are also cited. (Con't)

- a. Definition: Any kind of loss or damage such as illness, environmental degradation, or economic disruption caused by industries engaged in natural resource extraction, production, distribution and disposal, but not paid for by those industries.
 - b. When costs are externalized, it means we aren't really paying the price for the products we buy, someone else is. For example, the radio that Annie bought cost only \$4.99, but it had many hidden costs such as the loss of natural resources, the illness of workers who breathed in toxic chemicals to produce it, the global warming gases released by transporting it across the ocean and the low wages of the person in the store who sold it. Externalized costs are most often borne by workers, community members and the environment, rather than by industries and corporations.
- D. Consumption Stage
1. This is the heart of the materials economy. It is driven by consumers continually shopping.
 2. The average U.S. citizen consumes twice as many material goods as they did 50 years ago.
 3. Only 1% of products that we harvest, mine, process, transport and buy are still being used six months after it was bought. The other 99% is thrown out.
 4. Two strategies to keep consumers buying
 - a. Planned obsolescence
 - i. Products made to be disposed of as quickly as possible. Examples of disposable products include plastic bags, coffee cups and computer chips.
 - ii. Industrial designers have actually discussed such topics as how fast they can make stuff break and still leave the consumer with enough faith in the product to buy another one.
 - b. Perceived obsolescence
 - i. Marketers use creative strategies to convince people to throw away products that are perfectly fine. One example of this is fashion. The clothes are still in good condition, but people consider them out-of-style and are convinced they need newer and brand name items.
 - ii. Advertisements make us unhappy with what we have. They lead us to purchase new products to assert our value in consumerist society. One example is cars. People often associate the type of car they drive with their social status.
- E. Disposal
1. In the U.S., each person creates about 4 ½ pounds of garbage a day.
 2. Trash is disposed of through landfill dumping or incineration, while some trash is exported to other countries. These procedures result in polluted land, air, and water. For example, during the incineration process, dioxin, which is the most toxic man-made substance known to man, is released by burning the trash.
 3. Recycling helps but it is not enough
 - a. For every one garbage can of waste, 70 garbage cans full of waste were used to produce the contents filling that one garbage can.
 - b. Much trash cannot be recycled because it contains too many toxins or the products were designed not to be recycled in the first place. For example, juice boxes have plastic and metal smashed together, which makes them unable to be recycled.
- IV. Methods for Increasing Sustainability
- A. Sustainability
1. Definition: "meeting the needs of the present without compromising the ability of future generations to meet their own needs."^{3(p1)}
- B. New methods are becoming popular based on concepts of equity and sustainability. Here are five new methods:
1. Closed-loop production
 - a. Definition: Making the chain of extraction-production-distribution-consumption-disposal work in a circle or cycle rather than as a straight line. Closed loop production means



Figure 1. Lecture notes extracted from *The Story of Stuff* referenced and annotated script¹³ and *The Story of Stuff* glossary.¹⁴ Additional resources are also cited. (Con't)

- i. increasing productivity (thereby reducing waste) along the whole system and reusing the waste products that are made as raw materials rather than allowing them to pollute our environment;
 - ii. reusing the renewable energy for power rather than letting it escape into the atmosphere to cause global warming;
 - iii. requiring producers to take full responsibility for their products from extraction through disposal;
 - iv. protecting workers and communities rather than treating them as disposable;
 - v. manufacturing products that will last for many years and can be repaired, reused, or recycled, rather than products that break immediately and must be dumped or burned.
2. Renewable energy
 - a. It is important to choose energy from sources that are renewable, as opposed to finite.
 - b. This method uses natural resources such as sunlight, wind, tides and geothermal heat, which are naturally replenished.
 - c. Renewable energy technologies include solar power, wind power and hydroelectricity, as well as biomass and biofuels for local transportation.
 - d. Garbage is not renewable energy, in spite of many waste industries' attempt to have it classified as such.
 - e. Energy is only renewable if the resources it came from can be renewed as quickly as they are consumed.
 3. Local living economies
 - a. Local living economies are economic systems that prioritize human and community needs and interests by providing local resources, fair wages and low environmental impacts.
 - b. A business owned by workers, community members, customers and/or suppliers who directly bear the consequences of its actions is more likely to...
 - i. provide workers with safe, meaningful, family-wage jobs;
 - ii. produce useful, safe, high-quality products;
 - iii. encourage local investment, stable markets and fair prices for suppliers and consumers
 - iv. promote the trust and responsibility required for a healthy and sustainable social and natural environment.
 4. Green chemistry
 - a. Definition: A way of approaching industrial chemistry that protects the environment not by cleaning up pollution, but by inventing new chemical processes that do not pollute in the first place.
 5. Zero waste:
 - a. Definition: A way of thinking about, designing, and managing products and processes to reduce the volume and toxicity of materials and thus waste, to conserve and recover all resources and to ensure materials are neither burned nor buried.
 - b. The goal is to eliminate all pollution to land, water or air that may threaten the environment, animals, or humans¹⁶
- V. Conclusion
- A. We affect the environment; and the environment affects our health and us. Some examples of this interaction include:
 1. Natural resources (e.g., air, water, plants) are essential to human life.
 2. Of all the chemicals used in production today, only 5% have been tested for their effects on human health.
 3. In working to keep prices low, many businesses employ strategies such as skimping on health insurance for their workers.
 4. By putting toxins into our products and environment, we are essentially putting them into our bodies.
 5. By releasing pollution into the environment, we are increasing our incidence of asthma and certain types of cancers.
 6. Toxic chemicals build up in the food chain and concentrate in our bodies.
 7. Toxins present in our products but also released into the air, land and water as pollution through factories production.
 8. In the U.S. each person creates about 4 ½ pounds of garbage a day, leaving less healthy and livable environments in which to live.
 9. By incinerating products, we create supertoxins, which are released into our environment. Our bodies take them in and they make us sick.



Figure 1. Lecture notes extracted from The Story of Stuff referenced and annotated script¹³ and The Story of Stuff glossary.¹⁴ Additional resources are also cited. (Con't)

- B. The human/environment interaction is a cyclical process.
 - 1. If we put toxins into the environment, we put them into ourselves. If we treat the environment in positive ways, we benefit our own health.
- C. Sustainable solutions for the environment means that people of today and those in future generations will be healthier.
- D. Ways to get involved or learn more
 - 1. Celebrate Earth Day
 - a. Visit <http://www.epa.gov/earthday/> to learn ways to volunteer as well as things you can do at home, school, and in the community.¹⁷
 - b. Visit <http://www.earthday.net/earthday2009> to learn about ways to get involved. April 22, 2010, marks the 40th anniversary of Earth Day.¹⁸
 - 2. Visit the EPA Student Center¹⁹ (<http://www.epa.gov/students/>) or EPA Environmental Kids Club²⁰ (<http://www.epa.gov/kids/>) for links to more environmental information for students/kids.

Figure 2. Worksheet on Story of Stuff video¹² and lecture notes (Figure 1)

Story of Stuff Worksheet

Complete the following statements while viewing the short animation or listening to lecture.

- | | |
|--|---|
| <p>1. In order, list the five stages of the materials economy. Also, provide a brief description of each stage:</p> <ul style="list-style-type: none"> a. b. c. d. e. <p>2. What percentage of the earth's natural resources has been consumed in the past three decades? _____</p> <p>3. The U.S. has 5% of the world's population but consumes _____% of the world's resources and creates _____% of the world's waste.</p> <p>4. U.S. industry releases _____ billion pounds of toxic chemicals each year.</p> <p>5. Complete the phrase: Toxics in = _____</p> <p>6. The three goals of the distribution stage are to:</p> <ul style="list-style-type: none"> a. b. c. | <p>7. The actual cost of making an item, not the price sold for, is known as _____.</p> <p>8. After one year of purchase, _____% of products bought by U.S. consumers is still in use.</p> <p>9. The average U.S. citizen consumes _____ times as much as they did 50 years ago.</p> <p>10. Each person in the U.S. creates _____ pounds of garbage a day.</p> <p>11. List and define five methods for increasing sustainability:</p> <ul style="list-style-type: none"> a. b. c. d. e. <p>12. Explain three ways that environmental factors affect human health.</p> <ul style="list-style-type: none"> a. b. c. |
|--|---|



Figure 3. Quiz on content from Story of Stuff video¹² and lecture notes (Figure 1)

Story of Stuff Quiz

50 points possible (5 points per question)

Score: ____/50

FILL IN THE BLANK: Write the answers in the space provided

1. In order, list the five stages of the materials economy:
- a.
 - b.
 - c.
 - d.
 - e.

MULTIPLE CHOICE: Circle the best answer for each question.

2. How much of the world's resources have been consumed in the past three decades?
- a. 60%
 - b. 33%
 - c. 85%
3. How many pounds of garbage do Americans create each day?
- a. 3 pounds
 - b. 10 pounds
 - c. 4 ½ pounds
4. Americans consume how much compared to 50 years ago?
- a. The same
 - b. More
 - c. Less

MATCHING: Place the letter next the definition that best describes the term.

- a. Closed-loop Production
 - b. Renewable Energy
 - c. Local Living Economies
 - d. Green Chemistry
 - e. Zero Waste
5. ____ focuses on local resources, fair wages, and low environmental impacts
6. ____ inventing new chemical processes that do not pollute
7. ____ using resources that are naturally replenished, such as sunlight and wind
8. ____ producing products in a way that will not have waste
9. ____ changing from a linear to a circular materials economy

SHORT ANSWER: Answer the following question as thoroughly as possible.

10. Describe one way that environmental factors affect human health.



Figure 4. Answer keys for worksheet (Figure 3) and quiz (Figure 4)

Answer key for worksheet	Answer key for quiz
<ol style="list-style-type: none"> 1. Stages of the materials economy in order <ol style="list-style-type: none"> a. Extraction: Taking resources out of the earth b. Production: Using energy and chemicals to make products c. Distribution: Selling of products d. Consumption: Shopping and use of products e. Disposal: Getting rid of used products 2. 33% 3. 30 and 30 4. 4 5. toxics out 6. keep prices down, keep people buying, keep inventory moving 7. externalized cost 8. 1 9. 2 10. 4 ½ 11. Five methods for increasing sustainability (in any order) <ol style="list-style-type: none"> a. Renewable energy: using resources that are naturally replenished such as sunlight and wind b. Local living economies: focuses on local resources, fair wages, and low environmental impacts c. Green chemistry: inventing new chemical processes that do not pollute d. Zero waste: producing products in a way that will not have waste e. Closed loop production: changing from a linear materials economy to a circular one 12. Possible answers for ways that environmental factors affect human health <ol style="list-style-type: none"> a. Provides natural resources (air, water, plants, etc.), which are essential to life. b. Of all the chemicals used in production today, only 5 percent have been tested for their effects on human health. c. In working to keep prices low many businesses employ strategies such as skimping on health insurance for their workers. d. By putting toxins into our products and environment we are essentially putting them into our bodies. e. By releasing pollution into the environment we are increasing our incidence of asthma and certain types of cancers. f. Toxic chemicals build up in the food chain and concentrate in our bodies. g. Toxins present in our products but also released into the air, land, and water as pollution through factories production. h. In the U.S. each person creates about 4 ½ pounds of garbage a day, leaving less healthy and livable environments to live in. i. By incinerating products we create supertoxins, which are released into our environment, our bodies take them in, and they make us sick. 	<ol style="list-style-type: none"> 1. Stages of the materials economy in order <ol style="list-style-type: none"> a. Extraction b. Production c. Distribution d. Consumption e. Disposal 2. 33% 3. 4 ½ pounds 4. more 5. c 6. d 7. b 8. e 9. a 10. Possible answers for ways that environmental factors affect human health: <ol style="list-style-type: none"> a. Provides natural resources (air, water, plants, etc.), which are essential to life. b. Of all the chemicals used in production today, only 5 percent have been tested for their effects on human health. c. In working to keep prices low many businesses employ strategies such as skimping on health insurance for their workers. d. By putting toxins into our products and environment we are essentially putting them into our bodies. e. By releasing pollution into the environment we are increasing our incidence of asthma and certain types of cancers. f. Toxic chemicals build up in the food chain and concentrate in our bodies. g. Toxins present in our products but also released into the air, land and water as pollution through factories production. h. In the U.S. each person creates about 4 ½ pounds of garbage a day, leaving less healthy and livable environments to live in. i. By incinerating products we create supertoxins, which are released into our environment, our bodies take them in, and they make us sick.



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