

# Unit 04: Upcycling - Make Life Easier and Saving the Planet

Content Area: **Template**  
Course(s):  
Time Period: **Full Year**  
Length: **FY**  
Status: **Published**

## Standards Alignment

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### New Jersey Student Learning Standards

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#### **Practice 1. Asking questions (for science) and defining problems (for engineering)**

**Asking questions and defining problems in 6–8 builds on K–5 experiences and progresses to specifying relationships between variables, and clarifying arguments and models.**

Ask questions to clarify and/or refine a model, an explanation, or an engineering problem.

#### **Practice 2. Developing and using models**

**Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.**

Evaluate limitations of a model for a proposed object or tool.

#### **Practice 3. Planning and carrying out investigations**

**Planning and carrying out investigations in 6–8 builds on K–5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or solutions.**

Plan an investigation individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim.

Collect data about the performance of a proposed object, tool, process or system under a range of conditions.

#### **Practice 4. Analyzing and interpreting data**

**Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.**

Analyze data to define an optimal operational range for a proposed object, tool, process or system that best meets criteria for success.

#### **Practice 5. Using mathematics and computational thinking**

**Mathematical and computational thinking in 6–8 builds on K–5 experiences and progresses to identifying patterns in large data sets and using mathematical concepts to support explanations and arguments.**

Use mathematical representations to describe and/or support scientific conclusions and design solutions.

Apply mathematical concepts and/or processes (e.g., ratio, rate, percent, basic operations, simple algebra) to scientific and engineering questions and problems.

Use digital tools and/or mathematical concepts and arguments to test and compare proposed solutions to an engineering design problem.

**Practice 6. Constructing explanations (for science) and designing solutions (for engineering)**

**Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.**

Apply scientific ideas or principles to design, construct, and/or test a design of an object, tool, process or system.

Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints.

Optimize performance of a design by prioritizing criteria, making tradeoffs, testing, revising, and re-testing.

**Practice 7. Engaging in argument from evidence**

**Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).**

Respectfully provide and receive critiques about one's explanations, procedures, models, and questions by citing relevant evidence and posing and responding to questions that elicit pertinent elaboration and detail.

Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.

**Practice 8. Obtaining, evaluating, and communicating information**

**Obtaining, evaluating, and communicating information in 6–8 builds on K–5 experiences and progresses to evaluating the merit and validity of ideas and methods.**

Communicate scientific and/or technical information (e.g. about a proposed object, tool, process, system) in writing and/or through oral presentations.

**NJSLS-S: Crosscutting Concepts****NJSLS-S: 6-8****Connections to Engineering, Technology and Applications of Science****Interdependence of Science, Engineering, and Technology**

Engineering advances have led to important discoveries in virtually every field of science and scientific discoveries have led to the development of entire industries and engineered systems.

Science and technology drive each other forward.

**Influence of Engineering, Technology, and Science and the Natural World**

The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions.

**Connections to the Nature of Science: Most Closely Associated with Crosscutting Concepts****Science is a Human Endeavor**

Scientists and engineers rely on human qualities such as persistence, precision, reasoning, logic, imagination and creativity.

Scientists and engineers are guided by habits of mind such as intellectual honesty, tolerance of ambiguity, skepticism and openness to new ideas.

Advances in technology influence the progress of science and science has influenced advances in technology.

**Capacities of the Literate Individual****Students Who are College and Career Ready in Reading, Writing, Speaking, Listening, & Language**

They demonstrate independence.

They build strong content knowledge.

They respond to the varying demands of audience, task, purpose, and discipline.

They comprehend as well as critique.

They value evidence.

They use technology and digital media strategically and capably.

They come to understand other perspectives and cultures.

LA.K-12.NJSLSA.R3	Analyze how and why individuals, events, and ideas develop and interact over the course of a text.  Craft and Structure
LA.K-12.NJSLSA.R4	Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.  Integration of Knowledge and Ideas
LA.K-12.NJSLSA.R7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
LA.RST.6-8	Reading Science and Technical Subjects
LA.RST.6-8.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LA.RST.6-8.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.
LA.RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

## **Integration of Career Readiness, Life Literacies and Key Skills**

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CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.

CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.

## **Technology / Integration of Computer Science and Design Thinking**

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TECH.8.1.8	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.8.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
TECH.8.1.8.E	Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.
TECH.8.1.8.E.1	Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.
TECH.8.1.8.F	Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.
TECH.8.1.8.F.1	Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.
TECH.8.2.8	Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.
TECH.8.2.8.A	The Nature of Technology: Creativity and Innovation: Technology systems impact every aspect of the world in which we live.
TECH.8.2.8.A.1	Research a product that was designed for a specific demand and identify how the product has changed to meet new demands (i.e., telephone for communication - smart phone for mobility needs).
TECH.8.2.8.A.2	Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system.
TECH.8.2.8.A.4	Redesign an existing product that impacts the environment to lessen its impact(s) on the environment.
TECH.8.2.8.B	Technology and Society: Knowledge and understanding of human, cultural and society values are fundamental when designing technology systems and products in the global society.
TECH.8.2.8.B.7	Analyze the historical impact of waste and demonstrate how a product is up cycled, reused or remanufactured into a new product.
TECH.8.2.8.C	Design: The design process is a systematic approach to solving problems.
TECH.8.2.8.C.1	Explain how different teams/groups can contribute to the overall design of a product.

TECH.8.2.8.C.3	Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.
TECH.8.2.8.C.4	Identify the steps in the design process that would be used to solve a designated problem.
TECH.8.2.8.C.8	Develop a proposal for a chosen solution that include models (physical, graphical or mathematical) to communicate the solution to peers.
TECH.8.2.8.C.5b	Create a technical sketch of a product with materials and measurements labeled.
TECH.8.2.8.D	Abilities for a Technological World: The designed world is the product of a design process that provides the means to convert resources into products and systems.
TECH.8.2.8.D.1	Design and create a product that addresses a real world problem using a design process under specific constraints.
TECH.8.2.8.D.2	Identify the design constraints and trade-offs involved in designing a prototype (e.g., how the prototype might fail and how it might be improved) by completing a design problem and reporting results in a multimedia presentation, design portfolio or engineering notebook.
TECH.8.2.8.D.5	Explain the impact of resource selection and the production process in the development of a common or technological product or system.
TECH.8.2.8.D.6	Identify and explain how the resources and processes used in the production of a current technological product can be modified to have a more positive impact on the environment.

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## **Interdisciplinary Connections: NJSL for ELA, Social Studies, Science and/or Math Section**

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## **Integration of Diversity, Equity and Inclusion; Climate Change; Informational and Media Literacy New Section**

see Crosswalks

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## **21st Century Life and Careers**

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## **Stage I: Desired Results**

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## **Transfer/Overview/Rationale**

<b>Transfer / Overview / Rationale</b>
Unit Rationale

The purpose of this unit...

Recycling has become more and more important in the world as scientists find that the negative effects of industrialization have had terrible consequences for the environment. One form of recycling that has gained a following is known as “upcycling.” Students will use found and broken objects as a base for a design of a better, more useful product. Creating a new design from a given (mostly useless) object and transforming it into a useful product motivates them to view everyday objects differently and think critically about their surroundings.

## **Meaning**

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### **Essential Questions**

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Essential Questions

What kinds of materials can be recycled locally?

What is the importance of the waste hierarchy to the environment?

What products lend themselves directly to upcycling?

### **Enduring Understanding/Indicators of Understanding**

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Enduring Understanding/Indicators of Understanding

An object that has passed its useful life can be reimagined as something new and live a new useful life.

Thinking critically about an object’s previous purpose and its end-of-life shape and structure can lead an engineer to design something new, better, or more robust.

Reusing an object is just one facet of the waste hierarchy, and second in importance to reducing demand and

production.

Certain materials are unable to be recycled at the state or municipal levels, and should be targeted for reduction and reuse.

## **Acquisition (Student Learning Objectives)**

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### **Knowledge**

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Knowledge  
Students will know...

Upcycling is the reuse of discarded objects or material in such a way as to create a product of a higher quality or value than the original.

The basic waste hierarchy and its necessity in a post-industrial world.

The specific kinds of recyclable goods in their locality.

### **Skills**

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Skills  
Student will be skilled at ...

Looking critically at found and broken objects to procure useful information or parts.

Differentiating between recyclable markings on products.

Designing around an existing object to create something new and useful.

## **Stage 3: Learning Plan**

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## **Resource and Mentor Texts**

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### Resources and Mentor Texts

Chromebooks  
Internet/videos  
Google Drive  
Google Slides/Forms/Docs/Classroom  
Interactive websites  
Document camera/digital camera  
Design notebooks  
Design materials  
Measuring devices

## **Formative Assessment Strategies**

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### Formative Assessment Strategies

Observations  
Questions/polling  
Group discussions/critiques  
Digital design notebooks/checks  
Peer/self assessment (reflection)

## **Learning Activities/Unit of Study**

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### Learning Activities/Unit of Study

Daily warm-ups  
Inquiry-based learning  
Non-fiction reading/writing  
Note taking/annotations  
Prompted designs  
Classroom/small group discussion/critique

## **Modifications and/or Accommodations**

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### **Suggested Modifications (ELL, Sp. Ed, Gifted, At-risk of Failure)**

#### **English Language Learners**

Native language support: The teacher provides auditory or written content to students in their native language.

Adjusted Speech: The teacher changes speech patterns to increase student comprehension. This could include facing the students, paraphrasing, clearly indicating the most important ideas, and speaking more slowly.

Visuals: The teacher uses graphics, pictures, visuals, and manipulatives. This helps ELL students better understand and comprehend the subjects at hand.

Front-Loading Vocabulary: The teacher front loads vocabulary. This means providing students with a list of important vocabulary words they will need to know for a book, lesson, etc. prior to the lesson being taught. Including pictures to go with the vocabulary words is also very beneficial for the students.

#### **Special Education Students**

Chunking: The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

Checking for Understanding: It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the concepts being covered in a way that makes sense to them.

Extra time: The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

Oral Reading: The teacher will read work orally to students. Class work such as tests and literature circles may need to be read aloud to the student.

Timers: The teacher will use timers as an instructional tool. The use of timers is beneficial for students who have trouble completing tasks. Timers can be helpful so the student is aware of how much time they have to complete an assignment.

#### **Students with 504 Plans**

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## Gifted & Talented Strategies

**Extensions/Enrichments:** Teachers will provide gifted and talented students with extension/enrichment projects. Students will be challenged to further their understanding, to apply acquired knowledge, and/or to produce something in reference to acquired knowledge.

**Modify/Change Activities:** Teachers will monitor and modify activities to accommodate those students who need to be challenged further. Additional reading, problem-solving, writing, or project work is necessary for those students who are ready to move on at a rate more accelerated than their peers. In this way, G & T students are provided the same opportunity for support as special needs students.

## Students at Risk of School Failure

**Directions or Instructions:** Make sure directions and/or instructions are given in limited numbers. Give directions/instructions verbally and in simple written format. Ask students to repeat the instructions or directions to ensure understanding occurs. Check back with the student to ensure he/she hasn't forgotten.

**Peer Support:** Peers can help build confidence in other students by assisting in peer learning. Many teachers use the 'ask 3 before me' approach. This is fine, however, a student at risk may have to have a specific student or two to ask. Set this up for the student so he/she knows who to ask for clarification before going to you.

**Alternate or Modified Assignments:** Always ask yourself, "How can I modify this assignment to ensure the students at risk are able to complete it?" Sometimes you'll simplify the task, reduce the length of the assignment or allow for a different mode of delivery. For instance, many students may hand something in, the at-risk student may jot notes and give you the information verbally. Or, it just may be that you will need to assign an alternate assignment.

**Increase One to One Time:** When other students are working, always touch base with your students at risk and find out if they're on track or needing some additional support. A few minutes here and there will go a long way to intervene as the need presents itself.

**Contracts:** It helps to have a working contract between you and your students at risk. This helps

prioritize the tasks that need to be done and ensure completion happens. Each day write down what needs to be completed, as the tasks are done, provide a checkmark or happy face. The goal of using contracts is to eventually have the student come to you for completion sign-offs.

**Hands On:** As much as possible, think in concrete terms and provide hands-on tasks. This means a child doing math may require a calculator or counters. The child may need to tape record comprehension activities instead of writing them. A child may have to listen to a story being read instead of reading it him/herself.

**Tests/Assessments:** Tests can be done orally if need be. Break tests down in smaller increments by having a portion of the test in the morning, another portion after lunch and the final part the next day.

**Seating:** Seat students near a helping peer or with quick access to the teacher. Those with hearing or sight issues need to be close to the instruction which often means near the front.