Unit 5: Upcycled Engineering

Content Area: **Applied Technology**
Course(s):
Time Period: **Marking Period 1**
Length: **10 days**
Status: **Published**

Summary

Introduction: In this unit students will learn about how materials can be repurposed to meet our needs and solve problems. Students will use the Engineering Design Process and work through it as they work individually or cooperatively with classmates to complete a design challenge. Students will learn how upcycling positively affects our environmental sustainability and climate change.

Revision Date: July 2021

CS.6-8.8.2.8.ED.1	Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.
CS.6-8.8.2.8.ED.2	Identify the steps in the design process that could be used to solve a problem.
CS.6-8.8.2.8.ED.3	Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).
CS.6-8.8.2.8.ED.5	Explain the need for optimization in a design process.
CS.6-8.8.2.8.ED.6	Analyze how trade-offs can impact the design of a product.
CS.6-8.8.2.8.ED.7	Design a product to address a real-world problem and document the iterative design process, including decisions made as a result of specific constraints and trade-offs (e.g., annotated sketches).
CS.6-8.ED	Engineering Design
LA.L.8.6	Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.
LA.W.8.2.D	Use precise language and domain-specific vocabulary to inform about or explain the topic.
LA.W.8.4	Produce clear and coherent writing in which the development, organization, voice and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)
WRK.9.2.8.CAP	Career Awareness and Planning
WRK.9.2.8.CAP.1	Identify offerings such as high school and county career and technical school courses, apprenticeships, military programs, and dual enrollment courses that support career or occupational areas of interest.
TECH.K-12.1.4.a	know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.
TECH.K-12.1.4.b	select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.
TECH.K-12.1.4.c	develop, test and refine prototypes as part of a cyclical design process.
TECH.K-12.1.4.d	exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.
TECH.K-12.1.6.a	choose the appropriate platforms and tools for meeting the desired objectives of their

	creation or communication.
TECH.K-12.1.6.b	create original works or responsibly repurpose or remix digital resources into new creations.
TECH.K-12.1.7.c	contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.

Essential Questions/Enduring Understandings

Essential Questions:

How can we recycle and repurpose materials to meet our needs?

How does recycling/upcycling benefit our environment?

How is the Engineering Design Process helpful when designing and engineering?

Enduring Understandings:

Technology is constantly changing to meet our wants and needs.

Technology has both positive and negative effects on our lives and planet.

Materials can be repurposed and upcycled to meet our needs and solve problems.

Objectives

Students will know that technology is defined as the human quest for solutions.

Students will know the definitions of recycling and upcycling.

Students will be skilled at demonstrating safe work habits when using tools, equipment, and technical processes.

Students will be skilled at explaining the role of trouble shooting, research and experimentation with regards to design.

Students will be skilled at explaining the reasoning behind their design.

Students will be skilled at explaining how repurposing materials is beneficial to the environment.

Learning Plan

Overview of Design Challenge: Students will be provided with an overview of the unit's design challenge to establish understanding of the problem, its constraints, materials, and how the Engineering Design Process will be utilized. Students will be provided with a paper or online document where the steps taken to complete the process will be documented throughout the completion of the unit.

Cardboard Design: Teacher will provide students with information about cardboard engineering and how various materials are used in design. Students will watch "Caine's Arcade" as a class, followed by a class discussion on the video and the ways in which various materials were used to solve problems and create the games.

Cardboard Arcade/Carnival Game Design: Working individually or in small groups, students will design a game to be made from repurposed materials. Students will be responsible for designing the game, explaining its purpose, its rules, and how to win.

Reflection: Following the opening of the carnival/arcade, students will self-evaluate and reflect on their designs and experiences while working through this challenge and the engineering design process. Students will complete the self-evaluation and reflection form.

Assessment

Formative Assessments:

Google Forms

Video reflection and discussion

Engineering Notebook

Benchmark Assessments:

Cardboard Design Challenge Documentation

Summative Assessment:

Completed Cardboard Design Prototype and Reflection

Alternate Assessment

Checklist

Questioning and Discussion

Materials

Guided note packets/Google Docs (teacher developed)

Technology (student & teacher laptops, SmartBoard, document camera)

Google Slides/PowerPoints

Worksheets/notes

YouTube links

Safety Equipment

Cardboard

Paint

Paintbrushes

Crayons

Markers

Colored Pencils

Pencils

Duct tape

Rulers

Construction paper

Masking tape

Scissors

Clear tape

Glue

Glue Sticks

Cool melt glue guns

Integrated Accommodation and Modifications

See attached document:

https://docs.google.com/spreadsheets/d/1bW0L5xhslCD9IsWWnzfbMJoRUI5vOFrgbQJ2saYTgLU/edit?usp=sharing