Unit 2: Empathy in Engineering Design

Content Area: **Applied Technology**
Course(s):
Time Period: **Marking Period 1**
Length: **15 days**
Status: **Published**

Essential Questions/Enduring Understandings

Essential Questions:

Why is it important to have a plan when undertaking a problem?

What is empathy and why is it important in design?

Whose wants and needs should be considered when designing or solving a problem?

How can we use our resources to solve a problem?

Enduring Understandings:

Technology is the human process of finding solutions to solve problems and meet needs.

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

The process of design in engineering is one that does not end.

It is important to consider the needs of others when designing a product.

Summary

Introduction: In this unit students will focus on the concepts of empathy in design and using the engineering design process to create a product to meet a the needs of a specific person. The importance of following a procedure and iteration will be reviewed and students will finish the unit with the completion of a design challenge using an activity that will provide them with the opportunity to work through the process in its entirety in a design team setting. Following the challenge's completion, groups will present their design and explain how their design meets the needs of the character they were designing for.

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.ED	Engineering Design
WRK.9.2.8.CAP	Career Awareness and Planning
TECH.9.4.8.CI	Creativity and Innovation
TECH.9.4.8.CT	Critical Thinking and Problem-solving
TECH.9.4.8.TL.3	Select appropriate tools to organize and present information digitally.
TECH.K-12.1.2.b	engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices.
TECH.K-12.1.3.d	build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.
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-12.1.7.b	use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints.

Objectives

Students will know that the engineering design process is cyclical in nature.

Students will know how to identify constraints in a design problem

Students will know vocabulary as it applies to the design process: scientific method, alternate solutions, brainstorming, design brief, evaluation, safety, criteria, constraints, model, prototype, analysis.

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 using this process to solve a problem in technology.

Students will know the definition of the term empathy and how it relates to design.

Learning Plan

Introduction to the Concept of Empathy in Design: Teacher will present information including the definition of empathy, its importance in the world, and its importance when engineers are designing products and/or solving a problem. The teacher will ask students the following question: "If someone followed you around for a week, what three things would they say that you would need to make your life easier? This could involve your studies or responsibilities, the place where you live or hang out, or any sport or hobby that you enjoy." Students write their responses and share them either with a partner of as part of a brief whole class discussion. The teacher will point out to students that some of their needs may not be obvious to the casual viewer or even to a close friend. If there is time, the teacher may ask the following second question: "What does it take to truly understand what other people need to make their lives better?"

Extraordinaires Design Studio Introduction: Students will be introduced to the Extraordinaires Design Studio and how the design challenge will be completed. Teacher will distribute graphic organizers to groups and explain procedure. Teacher will show the character card on Smart Board and instruct student groups to complete graphic organizer. Students will work collaboratively to complete packets.

Design Challenge Completion: Teacher will randomly distribute character cards and design problems to groups. Students will work in their groups to research, design, build, and test a prototype that is specifically made for their Extraordinaire. Teacher should explain the materials available for making prototypes and reinforce the importance of iteration, creativity, and teamwork. Teacher will oversee the process, encouraging iteration throughout and supplying materials.

Presentation: Working collaboratively, student groups will prepare a Google Slides presentation that will be shown to the class as students present their prototypes and explain the wants and needs of their Extraordinaire.

Evaluation and Redesign: Following presentations, teacher will guide students through the process of self-evaluation and a written redesign of their solution.

Assessment

Formative Assessments:

Google Forms

Guided notes

Engineering Notebook

Brainstorming Sketches

Graphic Organizer

Benchmark Assessments:

Extraordinaires Documentation

Extraordinaires Prototype

Summative Assessment:

Evaluation and Redesign written assignment/Google Form

Alternative Assessment:

Checklist

Questioning

Discussion

Materials

Guided note packets/Google Docs (teacher developed)

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

Google Slides/PowerPoints

Graphic Organizers

Extraordinaires Design Studio Pro

Safety Equipment

Paper

Rulers

Tissue paper

Masking tape

Scissors

Popsicle sticks

Glue

Paint

Cool melt glue guns

Cardboard

Sequins

Glitter

Paint

Paintbrushes

Construction paper

String

Twine

Yarn

Aluminum foil

Additional decorative materials

Integrated Accommodation and Modifications

See attached document:

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