

Unit 2: The Engineering Design Process

Content Area: **Applied Technology**
Course(s):
Time Period: **Marking Period 1**
Length: **2 days**
Status: **Published**

Summary

Introduction: In this unit students will be introduced to the Engineering Design Process. Students will learn about its steps, the similarities to and differences from the Scientific Method, and how this process is used in the field of engineering. The concepts of following a procedure and iteration will be discussed and students will finish the unit with the completion of a design challenge that will provide them with the opportunity to work through the process in its entirety.

Revision Date: July 2021

TECH.K-12.1.3.a	plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.
TECH.K-12.1.3.c	curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.
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.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-12.1.7.c	contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.
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).
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.

Essential Questions/Enduring Understandings

Essential Questions:

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

How have developments and changes in technological design impacted our world.

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, environment and planet.

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

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.

Learning Plan

Overview of the Engineering Design Process: Teacher will present information including the definition of technology, engineering, the scientific method, and the 8 steps of the engineering design process. Students should complete guided notes and/or complete a Google Slide/worksheet highlighting the steps of the process. Teacher will lead discussion on how this process is used in engineering. Concepts may be supported through showing videos that explain the process and how it has been used by engineering throughout history.

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.

Design Challenge Completion: Students will work individually or in small groups to research, design, build, and test a prototype. Challenges may include: Paper Structure Challenge, World's Tallest Golf Tee, Spaghetti Tower, or similar. Teacher will oversee the process, encouraging iteration throughout and supplying materials.

Evaluation and Redesign: Following testing, 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

Benchmark Assessments:

Design Challenge Documentation

Design Challenge Prototype

Summative Assessment:

Evaluation and Redesign written assignment/Google Form

Alternative Assessment:

Checklist

Questioning and discussion

Integrated Accommodation and Modifications

See attached document:

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