

Unit 3: 3D Design and Printing

Content Area: **Applied Technology**
Course(s):
Time Period: **Marking Period 1**
Length: **14 Days**
Status: **Published**

Brief Summary of Unit

Students will work through the Engineering Design Process as they develop a solution to a given problem with respect to criteria and specifications of the challenge given. In this unit, students will gain a familiarity with a CAD program such as Tinkercad where they will use their design and engineering skills to create a project. This project will then be used to create a 3D model using materials available or sent to a 3D printer within the classroom, enabling the student to print and create a product.

Revision Date: June 2021

CS.6-8.8.1.8.AP.6	Refine a solution that meets users' needs by incorporating feedback from team members and users.
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
LA.W.6.4	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.)
LA.SL.6.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.
SCI.MS-ETS1-3	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
SCI.MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
SCI.MS-ETS1-4	Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
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.9.4.8.TL	Technology Literacy
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.

Essential Questions/Enduring Understandings

Essential Questions

Why should engineers follow the Engineering Design Process?

How has the evolution of 3D printing affected our technological world?

How would the elimination of even one step in the Engineering Design Process affect the outcome?

In what ways will 3D printing impact our future as a society?

Enduring Understandings

Computer Aided Design (CAD) is a tool used by engineers and designers to create products that utilize computer technologies to enhance detail and precision.

Precise measurement is essential in product design.

Using technological resources we have available helps people to turn ideas into reality.

Objectives

Students will know the vocabulary relevant to CAD and 3D printing: bed, filament, extruder, workplane, curing, parametric, prototype, align, open source, grouping, ungrouping, etc.

Students will know how to create an STL file using CAD programs, such as Tinkercad.

Students will know how to share their work and add collaborators to projects.

Students will know how to send their STL file to the 3D printer.

Students will be skilled at using research skills to explore the areas of CAD and 3D printing.

Students will be skilled at designing objects with precision to the given specifications.

Students will be skilled at saving and converting their files to STL format.

Students will be skilled at expressing their findings orally and through the creation of 2D and 3D printed objects.

Learning Plan

Vocabulary Project: Students will take the vocabulary for this unit and create their own review game that will be shared with other students. Students can use sites like Quizlet, Kahoot, Gimkit, Blooket, Quizizz, etc. They may also create a non-digital review game. The review game must be played by a minimum of five other students, and those students will provide feedback on the review game. Students will finish by completing a reflection on their review game.

Model a Project: Students will select one project they have completed in technology class and make a scaled 3D model of it (the project can be from a previous year, and some ideas are bridges, rockets, dragsters, robots, etc.). If students have never taken technology class before, they can make a scaled model of the project they would have liked to complete the most.

"Movable" 3D Project: Students will complete an advanced challenge of creating a 3D item that either had movable parts, interconnected pieces, or requires circuits. Some project ideas could be: an octopus that has interlocked and wiggling legs, a block puzzle that is made up of various shapes, a 3D toy that requires a movement motor circuit to vibrate across the table. Students will select their own projects, get them approved, create prototypes, and meet with first a classmate, then the teacher to discuss if there is a need for any improvements.

Assessment

Formative:

Do Nows

Class discussions

Vocabulary Project

Summative:

"Movable" 3D Project

Google Forms

Benchmark:

Exit tickets

Model Project

Alternative:

Checklists

Verbal discussions

2nd Model Project vs "Movable" 3D Project

Materials

Chromebooks

Projector

YouTube

Tinkercad website

Google Docs

Google Forms

Google Slides

3D printers

3D filament

Models of previous technology class projects

Grid paper

Pencil

Ruler

Integrated Accommodation and Modifications, Spec Ed Students, ELL, At-Risk, G&T, 504's

See attached document:

<https://docs.google.com/spreadsheets/d/1pzkODxxGOSxESwthnE0jQW8hVfMaZ9ygEBg5QsKBcDA/edit?usp=sharing>

