Unit 3 - 3D Design and Printing

Content Area: **Technology**
Course(s): **Technology 5**
Time Period: **March**
Length: **10 Classes**
Status: **Published**

Unit Overview

This unit will take approximately 10 classes.

Vocabulary for this unit includes: CAD, workplane, scroll, group, ungroup, hole, mirror, pan, scale, x-axis, y-axis, z-axis, die

Priority Standards

CS.3-5.8.2.5.ED.1	Explain the functions of a system and its subsystems.
CS.3-5.8.2.5.ED.2	Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
CS.3-5.8.2.5.ED.3	Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.
CS.3-5.8.2.5.ED.4	Explain factors that influence the development and function of products and systems (e.g., resources, criteria, desired features, constraints).

Essential Questions

- How can 3D printing be utilized to create objects and solve problems?
- How can computer aided design assist in the creation of a 3D object?
- How can constraints and possible trade-offs affect a final product?
- What role does a prototype play in the design process?

Unit Learning Goals

- SWBAT create a computer aided design based off of a set of constraints.
- SWBAT create a physical model by utilizing a prototype.
- SWBAT describe the basic functionality and capability of 3D printing.
- SWBAT design a prototype of a possible 3D object in addition to explaining how the final design was arrived at.
- SWBAT utilize an online tutorial to create a computer aided design.

Unit Learning Targets

- I can create a computer aided design while taking in account constraints and trade-offs.
- I can create a physical model by utilizing a prototype.
- I can describe the basic functionality and capability of 3D printing.
- I can design a prototype of a 3D object and explain how this design was arrived at.
- I can use an online tutorial to help me create a computer aided design.

Marzano Elements

- Examining Errors in Reasoning
- Examining Similarities and Differences
- Helping students examining their reasoning (DQ3)
- Helping students practice skills, strategies and processes (DQ3)
- Helping students process new content (DQ2)
- Helping students record and represent knowledge (DQ2)
- Identifying critical content (DQ2)
- Previewing new content (DQ2)
- Providing Resources and Guidance

Strategies for Differentiating Instruction

- Modeling and practice with 3D pen and manipulation of CAD resources
- Advanced students to assist others (groupings as needed)
- Independent practice with additional resources available
- One on one monitoring and conferences as needed
- Assignment adadaptations as required and needed as per IEP/504
- Allow and encourage more advanced students to create/design more complex objects
- Allow and encourage less advanced students to create/design less complex objects

Unit Assessments (Required)

- Assessment of creation of a 3D object based on constraints and trade-offs (completed object ad explanation of the process)

Unit Assessments (Optional)

- Knowledge assessment of 3D printing capabilities
- Assessment of justification of design

- Vocabulary term assessment

Unit Learning Goals / Targets / Plans

Class	Topic	Lesson / Activity	Standard / Learning Goal / Target
1	Introduction to 3D Design	What is 3D Design, preparation for 3D Pens	**Standard**: **CS.3-5.8.2.5.ED.1 -** Explain the fi **Learning Goal**: SWBAT describe the basic f **Learning Target**: I can describe the basic fu
2	Creation of a 3D Object	3D Pens and creation of a prototype	**Standard**: **CS.3-5.8.2.5.ED.2 -** Collaborate v problem, and evaluate all possible solutions t models. **Learning Goal**: SWBAT design a prototype the final design was arrived at. **Learning Target**: I can design a prototype of at.
3-5	Build an object based off of a design	Utilize a prototype to continue to build a 3D object with a 3D pen	**Standard**: **CS.3-5.8.2.5.ED.3 -** Follow step b problem, using appropriate tools to accomplis **Learning Goal**: SWBAT create a physical m **Learning Target**: I can create a physical mo
6	Introduction to computer aided design	Learn how to utilize a computer to assist with 3D design	**Standard**: **CS.3-5.8.2.5.ED.3 -** Follow step b problem, using appropriate tools to accomplis **Learning Goal**: SWBAT utilize an online tut **Learning Target**: I can use an online tutorial

7-10	CAD design of 3D object / assessment	Unit assessment on 3D design	**Standard**: **CS.3-5.8.2.5.ED.3 -** Follow step b problem, using appropriate tools to accomplis **Standard: CS.3-5.8.2.5.ED.4 -** Explain facto products and systems (e.g., resources, criteria **Learning Goal**: SWBAT create a computer a **Learning Target**: I can create a computer aic trade-offs.

Cross Curricular Connections

- 3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- 3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
- 5.G.A Graph points on the coordinate plane to solve real-world and mathematical problems.
- 5.G.B Classify two-dimensional figures into categories based on their properties.

21st Century Themes

For this unit, students will work on the following 21st century themes:

- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP11. Use technology to enhance productivity.

Materials and Resources

Google Classroom

Tinkercad

3D Printing Video

Tinkercad Video