Unit 4: The Universal Design Process & Problem Solving

Content Area: **Technology**
Course(s):
Time Period: **October**
Length: **2 weeks**
Status: **Published**

Enduring Understandings

- The engineering design process is a series of steps that engineers follow to come up with a solution to a problem.
- The design process is a cyclical process as opposed to a linear process.
- Engineers often cycle through the steps or go back and forth between steps in developing an ideal solution to a problem.
- Engineers and architects both utilize the universal design process to develop ideas.

Essential Questions

- How are products developed?
- What is the human designed world?
- How has technology progressed with time?
- What is the difference between design criteria and constraints?
- How do the constraints of a design challenge ultimately impact the final product?

Content

Skills

- Students will be able to explain the universal design process.
- Students will be able to create a product and document the engineering design process.

Resources

Resources:

1. PC or Laptops with internet access, able to run TinkerCAD (or similar program) and the various 3D printer software platforms.

2. TinkerCAD (or other equivalent solid modeling program). TinkerCAD is a free, web-based 3D modelling application which allows users to create objects utilizing constructive solid geometry applications.

3. 3D Printers allow students to realize their designs by producing physical objects from their three-dimensional digital models.

4. Engineers scales allow students to measure items graphically depicted within technical drawings and physical objects according to a set scale.

5. AutoCAD is a computer-aided design (CAD) and drafting program used for producing 2-D and 3-D technical drawings.. AutoCAD is considered an industry standard and was developed and marketed by Autodesk Inc. A free version is available for education.

6. Autodesk Design Academy https://academy.autodesk.com/ , supports educators by providing free, authentic project based learning guides and supporting videos.

7. Monmouth County Executive Airport locally positioned in Wall Township, New Jersey, is a potential location for an authentic learning experience through a field trip, supporting the Exploring Flight unit.

8. Consumable Materials such as bass and balsa wood, foam, hot glue, project kits, aluminum foil, wax paper, balloons, fishing line, cups and other materials are needed to support project based learning. Suggested projects include building a model architectural structure, room or facility, bridge, tower, aircraft and more.

9. Personal protection equipment such as safety goggles and gloves are required when students are at risk of injuring themselves while creating projects or utilizing tools and/or machinery.

10. Hand Tools various hand tools such as easy cutters, craft knives, hot glue guns and hot wire cutting machine will be utilized within the classroom. Safety precautions and training will be taken and provided at all times.

Standards

TECH.8.2.8.C.2	Explain the need for optimization in a design process.
TECH.8.2.8.C.8	Develop a proposal for a chosen solution that include models (physical, graphical or mathematical) to communicate the solution to peers.
TECH.8.2.8.D.1	Design and create a product that addresses a real world problem using a design process under specific constraints.