

# Virginia Beach City Public Schools “Sustainability Design Project”



Student Team Directors:

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Advanced Technology Center

Engineering Technology Pathway

# Project Summary

This project is designed to allow student(s) to work within the area of sustainable green technology and Additive Manufacturing using and implementing topics that have been covered in their experiences in K-12. This project provides a hands-on experience during both virtual and face-2-face learning that provides students the background and skills to design products for 3d printing using industry standard software.

## The Challenge:

Students will utilize SolidWorks CAD software to design and evaluate the sustainability of products to be 3d printed, following the industry requirements for Additive Manufacturing.

# Project Goals



- Identify the criteria and constraints of the project.
  - Criteria to be met.
    1. Student products will be designed using SolidWorks CAD software.
    2. Students will study sustainability and the related industry standards.
    3. Integrate sustainability concepts into the product designs.
    4. Develop a sustainability report for each product designed.
    5. Students will prepare for the SolidWorks Associate Level Additive Manufacturing (CSWA-AM) certification exam.
    6. Students will sit for the CSWA-AM certification exam.
    7. Students will prepare for the SolidWorks Associate Level Sustainable Design (CSWA-SD) certification exam.
    8. Students will sit for the CSWA-SD certification exam.

# Criteria and Constraints

- Constraint's of the project:
  - Because of the Covid-19 crisis students will need to access the following using both a virtual and face-2-face environment:
    - Online training materials, lectures and webinars for studying additive manufacturing.
    - Online training materials, lectures and webinars for studying sustainability.
    - An online cloud environment, (3dExperience).
    - SolidWorks software for product design
    - Certification testing



# Brainstorm possible solutions

Utilize a computer “cloud” based platform that will allow students:

1. To present advantages of the 3dExperience platform to the administration for possible purchase.
2. Access online training materials for studying additive manufacturing and sustainability.
3. Utilize SolidWorks software for product design online.
4. Practice for and sit for certification testing.



# Generate Ideas

- Implement a cloud-based platform, such as the SolidWorks 3dExperience platform.
- Teacher/school will provide online access or free access to SolidWorks software.
- Teacher will adapt instructional lessons to both a Virtual and face-2-face format.

# Explore Possibilities

- Tie into Energy Education lessons within the other Engineering classrooms located at the ATC.
- Relate the possibilities of a cloud-based platform for distribution of instructional materials across the school division.
- Model project for other K-12 schools looking for innovative ways to teach about sustainability.



# Select an approach

## Current Project Timeline (Completed)

- Request a meeting with school administration for presenting the cloud-based platform environment. (September 2020)
- Purchase the cloud-based environment, 3D Experience platform. (September 2020)
- Instructor in-service on the 3DExperience platform (November 2020)
- Develop materials for student instruction. (November 2020- January 2021)
- Begin instruction with the students. (January 2021)



# Begin the instruction

## Current Timeline (Completed)

- Student training on the use of 3dExperience cloud-based platform (January 2021).
- Student instruction on the theory of sustainable practices. (January-February 2021)
- Student training on additive manufacturing, specifically sustainability design using SolidWorks.(January-February 2021)
- Students sit for the additive manufacturing and sustainability certifications. (March/April 2021)

# Refine the Design

- During the process of learning SolidWorks students developed products implementing the sustainability models available within the software.
- Students developed a personal study guide containing questions related to additive manufacturing and sustainability to help prepare for the eventual certification testing.

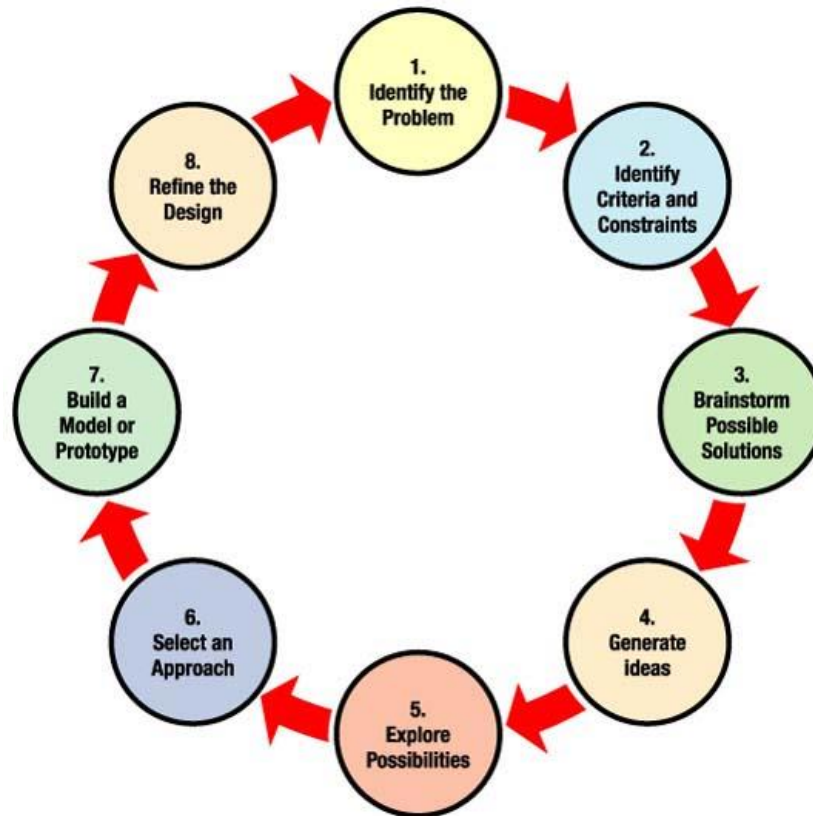
# Evaluation of the Project

Items to be assessed:

1. SolidWorks student Designs
2. Sustainability Theory
3. Results of the CSWA-AM practice test
4. Results of the CSWA-AM certification exam.
5. Results of the CSWA-SD practice test.
6. Results of the CSWA-SD certification exam.

# Overall Observations

- The project adapted the NASA Engineering Design model,



# Success Stories

- On March 30, 2021 41 students took the CSWA-AM practice test. 100% scored above an 80% on this practice test.
- On March 31, 2021 41 students sat for the CSWA-AM certification test. 41 passed the certification exam, which represents a 100% pass rate.
- On April 28, 2021, students will take a CSWA-SD practice test. Students will need an 80% or higher to be eligible to sit for the certification exam.
- On April 29 & 30, 2021, students will sit for the CSWA-SD certification test. Numbers of students passing the exam and being certified by SolidWorks will be reported to the Advanced Technology Center and School Division administration.

# Success Stories

- Students developed interest in the software programs that could be utilized in a cloud-based environment in addition to and in conjunction with SolidWorks.
- Students also discovered the advantages of using cloud-based collaborative communities within the 3dExperience platform to work through solutions to problems in the design process.

# Recommendations/Improvements Needed

- Improvements could include:
  - General
    - More powerful computers assigned to the students to allow for better utilization of the CAD software online.
  - Project Specific
    - Expand the certification training into other cloud-based software applications.