

Unit Title: Engineering Design Challenges and 4 Cs

Grade Level: Grade 3

Subject Area: Science, Engineering, Social/Emotional Learning

Duration/Length/Number of class periods: 6 lessons: 50 - 70 minutes each

Description:

This unit will be taught at the beginning of the school year. The focus will be teaching and creating opportunities for students to build on the 4Cs and social/emotional learning through the use of engineering design challenges. Students will use the six step Engineering Design Process from The Works Museum. Social/emotional learning skills will be explicitly taught, modeled, and students will have opportunities to apply skills in engineering design challenges. There will be time for student reflection to help promote and push student understanding of skills further.

Established Goals (National, State, Local):

Students build skills and strategies for using **4Cs (critical thinking, creativity, collaboration, communication)**.

ISTE:

1. Creativity and Innovation Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

a. Apply existing knowledge to generate new ideas, products, or processes

2. Communication and collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

a. Interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media

b. Communicate information and ideas effectively to multiple audiences using a variety of media and formats

d. Contribute to project teams to produce original works or solve problems

4. Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

a. Identify and define authentic problems and significant questions for investigation

b. Plan and manage activities to develop a solution or complete a project

c. Collect and analyze data to identify solutions and/or make informed decisions

d. Use multiple processes and diverse perspectives to explore alternative solutions

Science Standards

3P.1.1.1.1 Exploring phenomena or engineering problems 1.1 Asking questions and defining problem 1.1.1 Students will be able to ask questions about aspects of the phenomena they observe, the conclusions they draw from their models or scientific investigations, each other's ideas, and the information they read.

3P.1.2.1 1 Exploring phenomena or engineering problems 1.2 Planning and carrying out investigations 1.2.1 Students will be able to design and conduct investigations in the classroom, laboratory, and/or field to test students' ideas and questions, and will organize and collect data to provide evidence to support claims the students make about phenomena.

3E.2.1.1.1 Looking at data and empirical evidence to understand phenomena or solve problems 2.1 Analyzing and interpreting data 2.1.1 Students will be able to represent observations and data in order to recognize patterns in the data, the meaning of those patterns, and possible relationships between variables.

What Enduring Understandings are desired?

- Students build skills and strategies for using **4Cs (critical thinking, creativity, collaboration, communication)**.
- Students become comfortable and able to use the engineering design process to solve problems.
- Students learn how to work with others, listen to each other's' ideas: to both lead and follow. (Learn strategies and value collaborating and sharing of ideas)

What Essential Questions will be considered?

- How can we use and apply to engineering design process? When can we use it?
- What skills are essential in solving these engineering design challenges/problems?
- How do critical thinking, creativity, collaboration, and communication play an important role in solving these challenges/problems?
- Where else in our daily lives and in school can the engineering design process be used?

Students will know / be able to:

- Students will follow the engineering design process to solve problems.
- Students will use the **4Cs (critical thinking, creativity, collaboration, communication)** when working through the engineering design process.
- Students will be able to apply these skills to other content areas and activities in the classroom and outside of it.

Description <i>Units must include at least one of each formative, summative, introductory activity and learning activity. Check the appropriate box; one per row.</i>	Formative	Summative	Introductory Activity	Learning Activity	Student Technology Used	Teacher Technology Used	ISTE Standards
Day 1: Clay Boats: Review the engineering design process. Set students up with the engineering design challenge of clay boats.			✓			Google slides	
Day 1: Clay Boats: Engineering Design Challenge: Students will use Flip Grid to reflect at the end of each time they go around the process. Students share on Flip Grid: <i>What were the aspects which worked and which aspects didn't work? Why? What will you do next? How will you make it better?</i> Lesson focus is on the engineering design process				✓			1A 2A,B, &D 4A & D
Day 1: Clay Boats: Engineering Design Challenge: Students will use Flip Grid to reflect at the end of each time they go around the process. Students share on Flip Grid: <i>What were the aspects which worked and which aspects didn't work? Why? What will you do next? How will you make it better?</i> Lesson focus is on the engineering design process	✓				Flip Grid	Flip Grid (responses)	
Day 2: 4Cs and the Marshmallow Challenge Teach 4Cs and watch the Above and Beyond video. Apply 4Cs to Marshmallow challenge. Students record and post to SeeSaw the progress along the way.				✓		Above and Beyond Video	1A 2A,B, &D 4A & D
Day 2: 4Cs and the Marshmallow Challenge Teach 4Cs and watch the Above and Beyond video. Apply 4Cs to Marshmallow challenge. Students record and post to SeeSaw the progress along the way.	✓				See Saw		1A 2A,B, &D 4A & D
Day 3: Second Step What makes a group work well? What are some ways we can communicate and solve problems that arise within our group. Complete Marshmallow Challenge for the second time with new insight.				✓			1A 2A,B, &D

<p>Day 3: Second Step What makes a group work well? What are some ways we can communicate and solve problems that arise within our group. Complete Marshmallow Challenge for the second time with new insight. Students share their design today on flip grid and watch classmates flip grid videos and leave comments.</p>	✓				Flip Grid		2A
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<p>Materials, tools and resources See Individual Lesson Plans</p>
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<p>Additional credit given to Jodi Burling for sharing additional lessons she has used for 4Cs.</p>

[Link to Engineering Lessons](#)