“Extending the CTE-STEM Pipeline into Middle Schools”

CTE Awareness Module: Engineering and Architecture

What are the effects of Climate Change in the Bay Area?

Solutionary Phase	Problem Cycle 2
Lesson # and title	Lesson 14: Effects of Climate Change
Duration	45 minutes

Lesson Overview

In the previous lesson students tested and iterated their designs, they will now create a presentation using a display board, slide deck, or adobe spark presentation. Students will present to their classmates during a Galley Walk and will complete peer evaluation rubrics. Students will include PPI and Engineering Design processes, and information they learned about Sea Level Rise, and the Effects of Climate Change. Students must also show their physical project during the presentation.

Learning Objectives

For students to communicate their designs, and content knowledge.

Content Standard(s)

CA NGSS, EP&Cs, CCSS-ELA, CCSS-Math, EP&Cs, History/Social Studies, Visual and Performing Arts, Computer Science, Health, CTE, PE

Insert the standards' codes and language verbatim

MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. (Grades 6 - 8)
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. (Grades 6 - 8)
CTE.EA.B.6.1. Understand the steps in the design process.
CTE.EA.B.6.5. Demonstrate the process of developing multiple details, within design constraints, into a single solution.
CTE.EA.C.3.2. Produce proportional two- and three-dimensional sketches and designs.
CTE.EA.C.3.1. Apply sketching techniques to a variety of architectural models.
CTE.EA.C.2.1. Employ engineering design equipment using the appropriate methods and techniques.

College and Career Connection(s)

Engineers apply their in-depth understanding of scientific and mathematical subjects to design and create devices, structures and systems that improve our lives. While scientists investigate what already exists and discover new knowledge by peering into the unknown, engineers create what has not been—they make things that have never existed before. Engineering teams follow the steps of the engineering design process: understand the need/problem, brainstorm different designs, select the best design, make a plan, create and test a prototype(s), and improve it until a satisfactory solution is achieved. The process is cyclical and may begin at, and return to, any step.

Equipment, Instructional Resources, and Materials

Materials:
BBC micro:bit kit (One kit for 2-3 students)
Chromebook
Technology Tools:

- Access to Google Apps for Education: Google Slides
- Youtube
- Book Creator App: (optional) for Engineering Notebook and for student Reflection (Google Slides can also be used as a Engineering Design Notebook)

Optional Materials

Suggested Student Grouping

Groups of three to four based on articles read
Group peer Feedback using TAG

Vocabulary

Prototype:
Medium to high res prototype

The Lesson

Preparation

Have articles on environmental issues ready (printed out or linked)
Maker Materials for quick prototypes
BBC Micro-Bit Computers

Lesson Procedure

Link to Lesson Slide Deck:
https://docs.google.com/presentation/d/1rQnmD2AuMhedEPzEmWAsy38-gK_xkJ-Tg-OqOZAJ9vY/edit?usp=sharing

Activity/Task	Description	Time (min)
Groups work on presentation	Students will work with their groups to create presentations.	25

Students groups present	Student do presentation	20

Assessment

Please insert the relevant assessment, including if this is done synchronously, asynchronously or as a homework assignment.

Looking at:

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. (Grades 6 - 8)

Engineering Design Student Notebook
Sample Book Creator Notebook