

“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 10: Effects of Climate Change
Duration	45 minutes

Lesson Overview

In the previous lesson students are presented with an overview of BBC micro:bit, a pocket sized computer and use its hardware and software capabilities to use with their Engineering Design Process to create the prototypes for their problem of interest. For this lesson students continue creating their rapid prototype integrating the micro-bit into their projects.

Learning Objectives

Students will create Rapid Prototype for integrating the BBC micro-bits into their projects
Students will identify and complete the design process after receive peer feedback on their problem statements & Rapid Prototypes
Students will work on the final iteration of their projects.

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/1qbY6tW305SCTDzkteO8qmMMHIGsT-e-JuyAH8cLXL8Y/edit?usp=sharing>

Activity/Task	Description	Time (min)
Getting into Groups	Students will meet in groups based on their interest and which article they read, students will be reminded to review their Problem Statements	5
Who are you designing for?	After students review the problem statements, the group will determine which step they are at in the design process.	5

Micro-Bit Controllers	Students will determine how to incorporate the use of the micro-bit Controller into their projects.	10
Rapid Prototype	Students will build Rapid Prototype (Using the micro-bit)	10
Gallery Walk	Students will give & get feedback from at least one group before moving forward with iteration discussions.	10
Document in notebook	Students will record their build process in their notebooks	5

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](#)