Micro:Bit Lockbox Camp

A summary for a 1-day program built around the *Micro:Bit Lockbox* project by Jon Stapleton

Summary

In this lesson sequence, students will work in teams to learn the MakeCode and Micro:Bit Development platform. They'll develop basic programming skills, implementing input, output, variables, and conditional control structures. At the end of the sequence, students will complete in a "puzzle box" challenge, attempting to create a puzzle using their Micro:Bit, code, and craft supplies and earning points based on how challenging their puzzle is to solve.

Objectives

The students will be able to . . .

- Use display, input via events, variables, and conditional control structures to build a "puzzle box" using the Micro:Bit platform
- Read, debug, trace, and write programs written using the MakeCode development platform that include display, events, variables, and conditional statements.

Standards Alignment

- **CSP.12/PRG.4** The student will systematically debug a program using an appropriate set of data.
- **PRG.4** The student will design and implement a program working individually and in teams
- **PRG.7** The student will implement programs that accept input from a variety of sources and
- produce output based on that input.
- **CSP.9/PRG.6** The student will design and implement an algorithm a. with compound conditional execution, and analyze and evaluate complex Boolean conditions; *[. . .]*
- **CSP.11** The student will store, process, and manipulate data contained in a data structure

Materials

- Micro:Bit devices, 1 per student
- Computers (must have USB A port for programming Micro:Bit), at least 1 per 2 students
- *Display & Lifcycle*, *Micro:Bit Input*, *Variables with Micro:Bit*, and *Conditionals with Micro:Bit* lesson plans from the *ECS+Micro:Bit* sequence
- Crafting supplies for the lockbox puzzles (e.g., cardboard boxes, conductive foil tape, scissors, glue, paper, markers, etc.)
- Projector (to display slides)
- *Micro:Bit Lockbox* Resource Site (view on the web)

High-Level Agenda

		Essential Skills & Knowledge
7:45-8:15	**Introduction to Micro:Bit Lockbox Project:** Introduce the goal of the day, and provide an overview of the tools and parameters for the competition in the afternoon.	**Understand the purpose of the day's work with Micro:Bit**
8:20-8:50	**Display & Lifecycle with Micro:Bit:** Teach the *Display & Lifecycle* lesson (view on Google Drive), and have students complete the *Challenge #1: Unlocking Animations* project.	**Write, test, & upload code; display LEDs**
9:00-9:50	**Input & Events with Micro:Bit:** Teach the *Input with Micro:Bit* lesson (view on Google Drive), and have students create prototype "fidget cube" projects which will serve as a foundation for their puzzle boxes.	**Use input event blocks & display functions**
10:00-10:30	**Variables with Micro:Bit:** Teach the *Variables with Micro:Bit* lesson (view on Google Drive), and have students create scorekeeping devices to practice writing code with variables.	**Creating & modifying variables**
10:35-11:45	**"If" Statements with Micro:Bit:** Teach the *Conditions with Micro:Bit* lesson (view on Google Drive) where students learn the basics of "if" statements, relational expressions, and logical expressions.	**Conditional control structures, relational expressions, logic expressions**
11:45-12:00	**Competition Setup:** Introduce the competition, assign teams	
12:00-12:45	*— Lunch Break —*	
1:00-2:00	**Puzzle Development Time:** Unstructured time for teams to develop and test their puzzle boxes.	
2:00-3:30	**Micro:Bit Lockbox Competition:** Students compete to see whose puzzle box was the hardest (but not too hard) to complete in under a minute, making revisions and improvements as they go.	

Micro:Bit Lockbox Competition Summary

Working in pairs, students will use the Micro:Bit, MakeCode, and crafting materials to create a puzzle box. Students will compete with other teams, and will earn points based on how difficult their puzzle was to solve:

- **0 points:** Took longer than 60 seconds to complete the puzzle (puzzle was too hard)
- **1 point:** Took between 0 and 15 seconds to complete the puzzle
- **2 points:** Took between 15 and 45 seconds to complete the puzzle
- **3 points:** Took between 45 and 60 seconds to complete the puzzle

Students will compete in a round-robin format, making revisions to their puzzle box as they go. The team with the best record at the end of the competition window will win.