Setup

- Share slides: http://siever.info/mbpython/MicroBit_Python_NJCSTA2021.pdf
- Cameras / audio
- Terminal for Python
- Mu Editor
- Boxed Micro:bit
- Multi-editor w/ Left/Right
- Jam Board
- Tutorials

Programming the Micro:bit with Python

Bill Siever
Washington University in St. Louis

Diane Horvath
Medfield Public Schools

Questions…

- “What about” (tangents): Please post in the chat
- “I’m stuck / missed something”:
  - Chat (for community support)
  - Zoom Hand (more soon)
  - Unmute & ask

Outline

- Intros: Us, Micro:bit, Python, You
- Python Environments: MicroPython (web or local), MakeCode, Firia
- Management of Micro:bit+Python
- Q&A

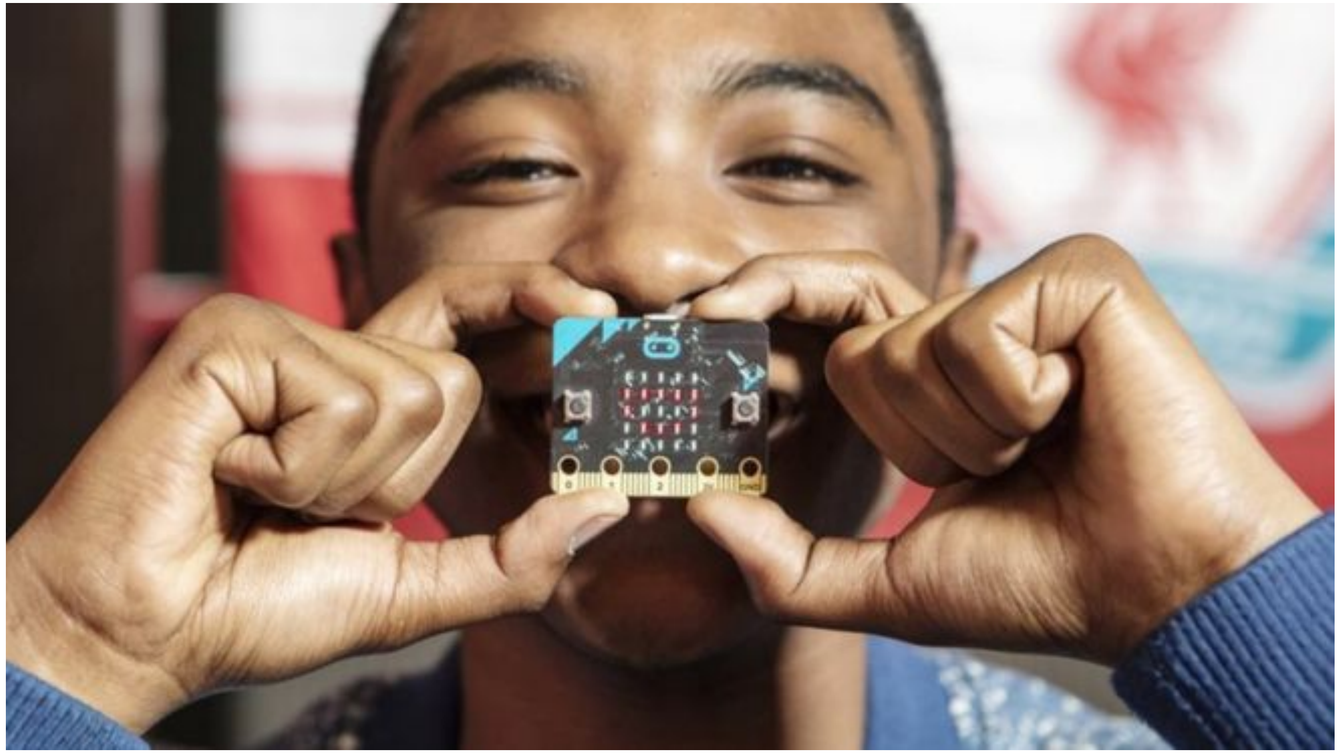
Intros: Us

- Bill Siever
  - Where, teaching / audience(s) / context
- Diane Horvath
  - Where, teaching / audience(s) / context

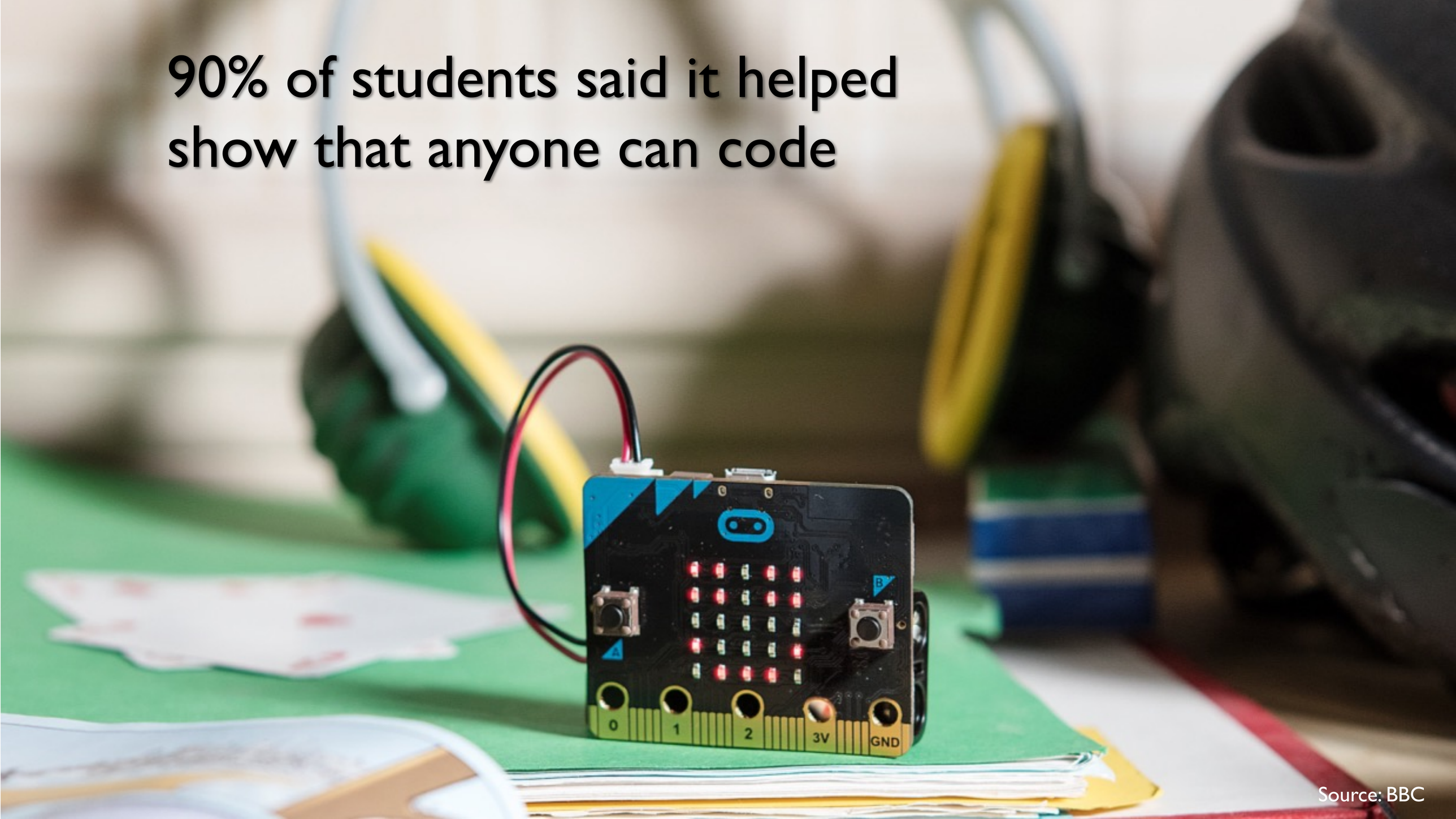
Intros: the micro:bit

2015

- BBC Make It Digital
- 29 partners
- 1 million micro:bit devices
- 11-12 year olds
- Across the U.K.

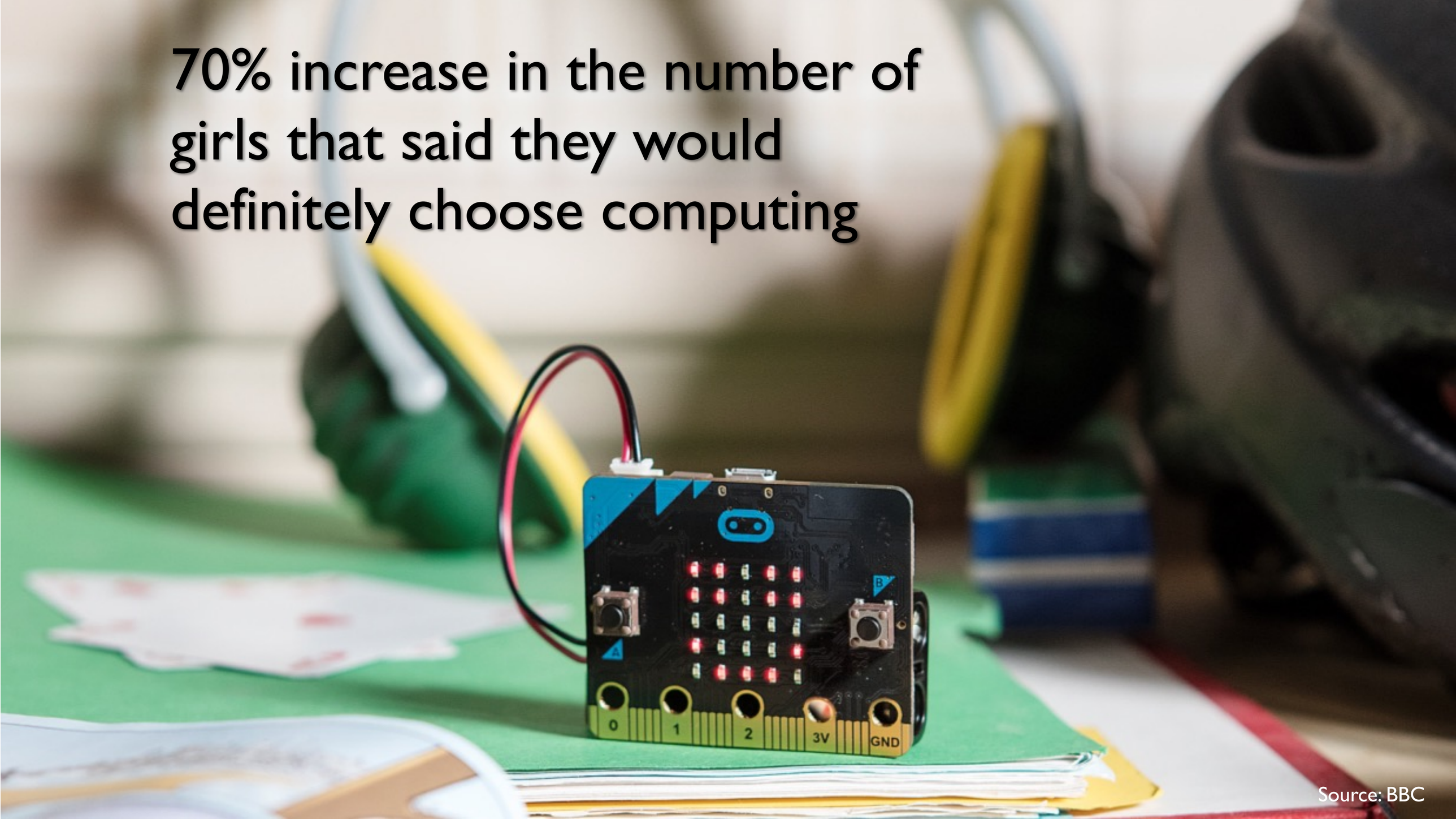


90% of students said it helped show that anyone can code



Source: BBC

70% increase in the number of girls that said they would definitely choose computing



Source: BBC

2016 Micro:bit Educational Foundation Formed

To empower children, parents and teachers around the globe to learn and innovate using the micro:bit

2017

micro:bit available in the U.S.

10 New & Innovative EdTech Products Announced at ISTE 2017

http://www.gettingsmart.com/2017/06/10-innovative-new-products-announced-at-iste-2017/

micro:bit

Third-Party Curricula

Microsoft MakeCode Intro to CS

https://aka.ms/intro2cs

1. Making
2. Algorithms
3. Variables
4. Conditionals
5. Iteration
6. Review/Mini-Project
7. Coordinate Grid System
8. Coordinate Grid System
9. Booleans
10. Music and Arrays
11. Bits, Bytes, and Binary
12. Radio
13. Arrays
14. Independent Final Project

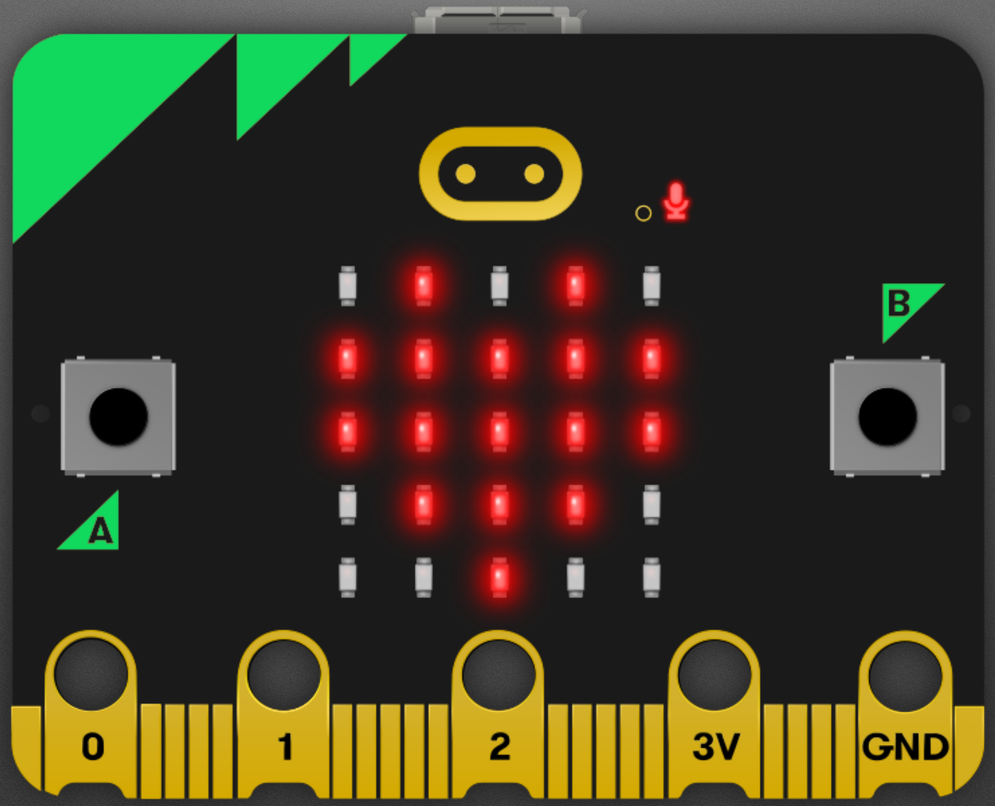
PLTW Gateway:
Computer Science for Innovators and Makers

https://www.pltw.org/our-program/pltw-gateway-curriculum#curriculum-4

A Tool for Physical Computing

Micro:bit v2

- Released Oct. ‘20
- Small
- Cheap



Basic I/O

- Inputs
  - Buttons
  - Touches
- Outputs
  - LED Matrix
  - Voltage on Edge Connector

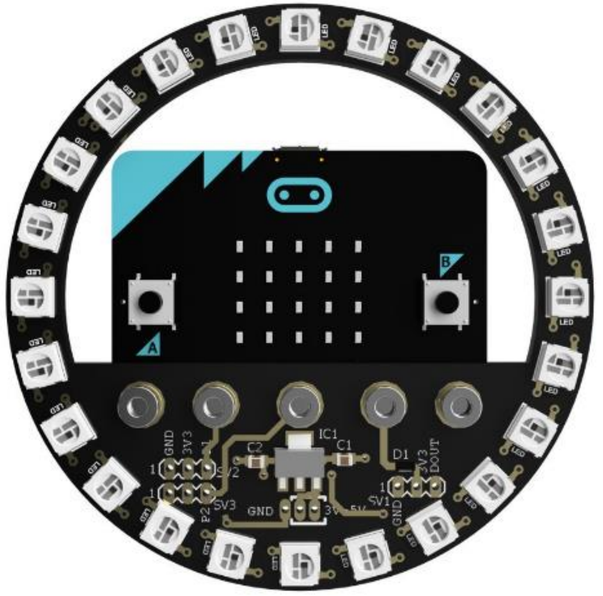
More Basic I/O

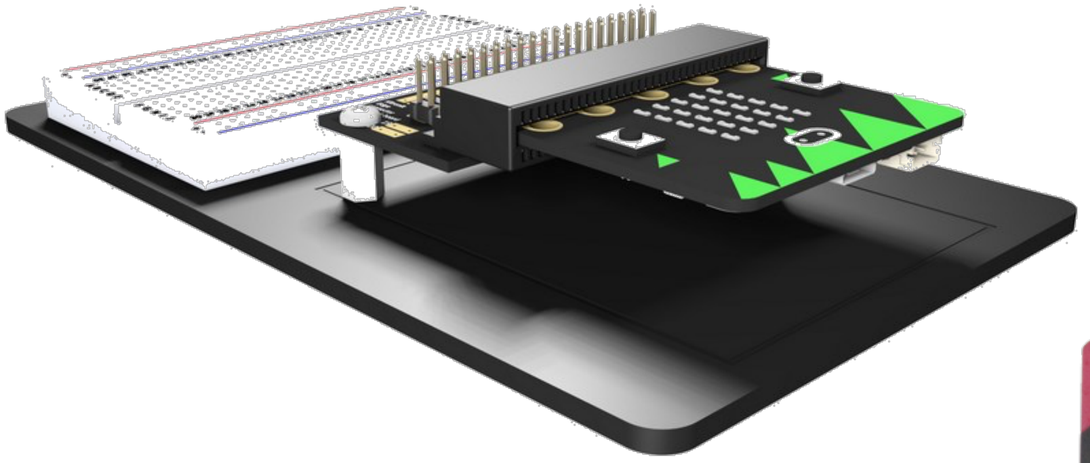
- Inputs
  - Accelerometer
  - Compass
  - Light level
  - Temperature
- Outputs
  - Music

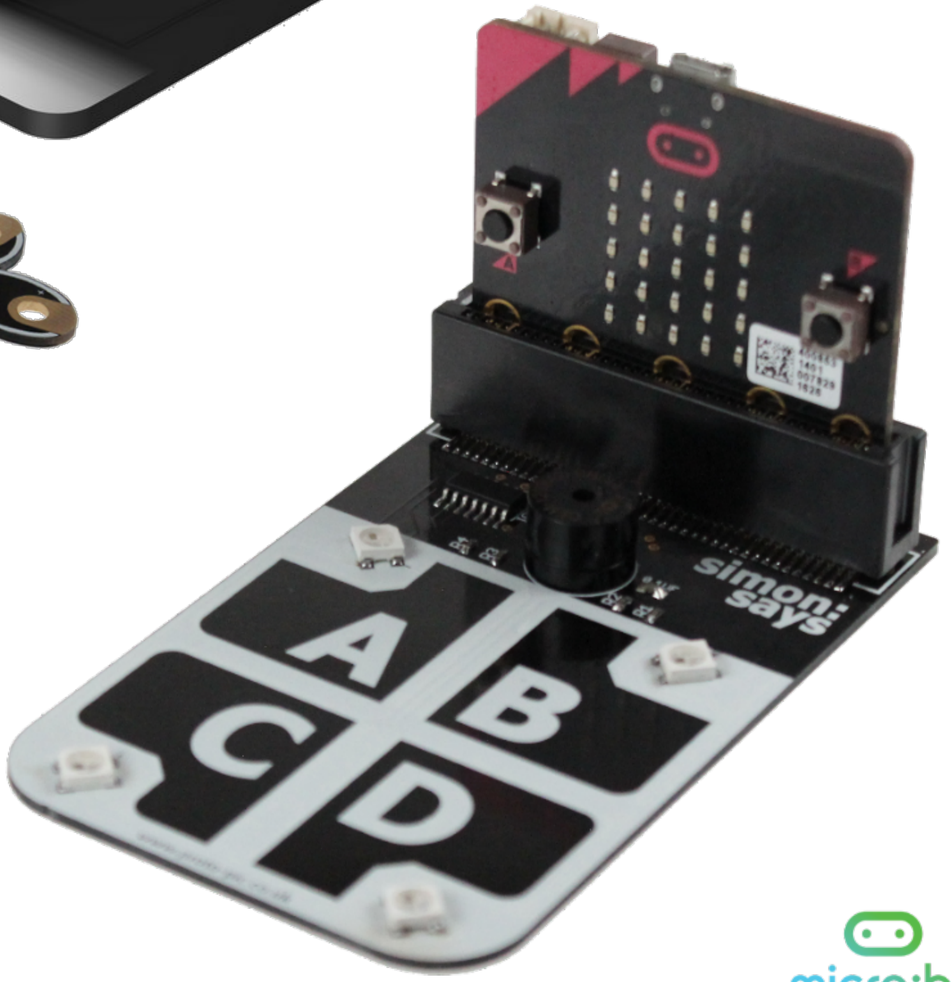
Less Basic I/O

- Input & Output
  - Radio

Hardware Ecosystem

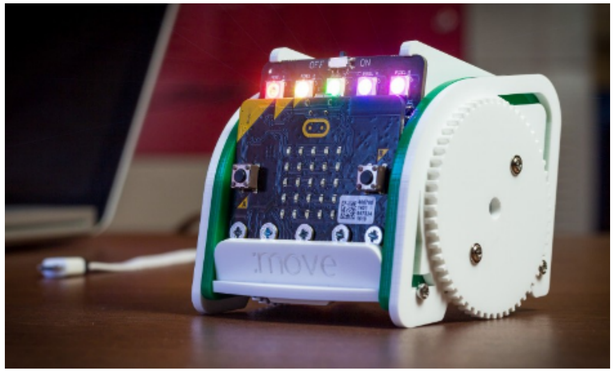


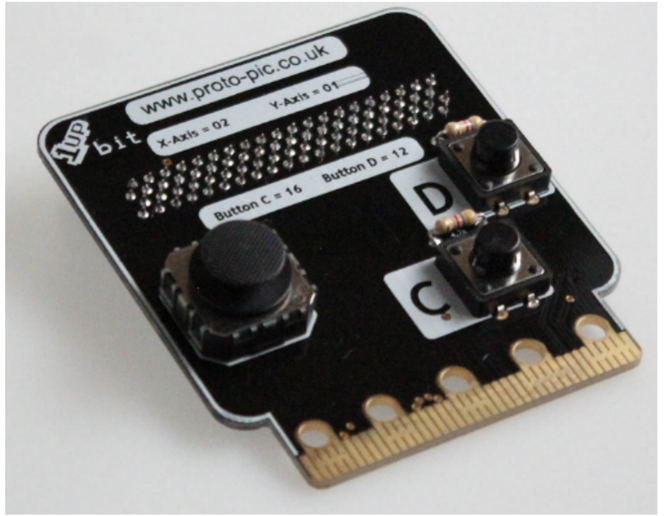


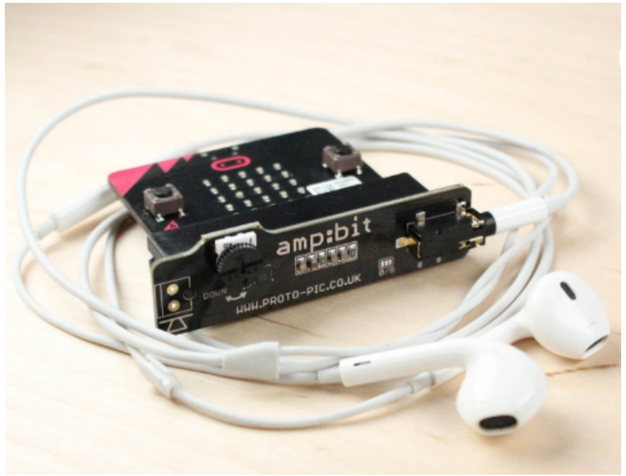


http://microbit.org/assets/documents/microbit-accessories.pdf

micro:bit







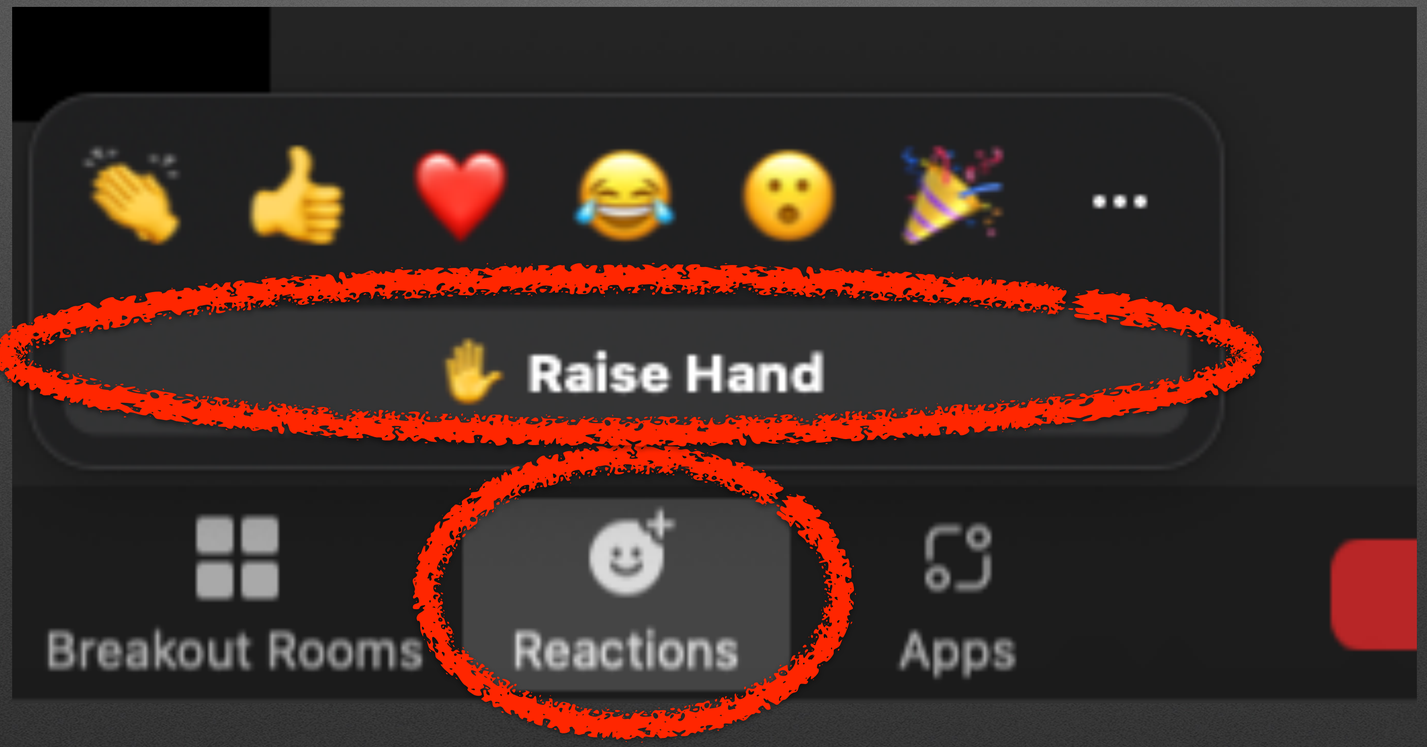
http://microbit.org/assets/documents/microbit-accessories.pdf

micro:bit

Example Projects
https://microbit.org/projects/

Your Micro:bit: Unboxing & Basic Setup

“Raise (Zoom) Hand” when ready



Intros: Python

Python

- “General Purpose” programming language
- Developed in 1980s / released in 1991
- Goals
  - Readable code
  - Fun (e.g., namesake)
- Second most popular programming language

Python

- Text based (vs. Blocks)
  - Picky about syntax!

```
print(“Hello”)
```

  - Picky about indentation!

```
while True:
    print("Hello")
    print("World")
```

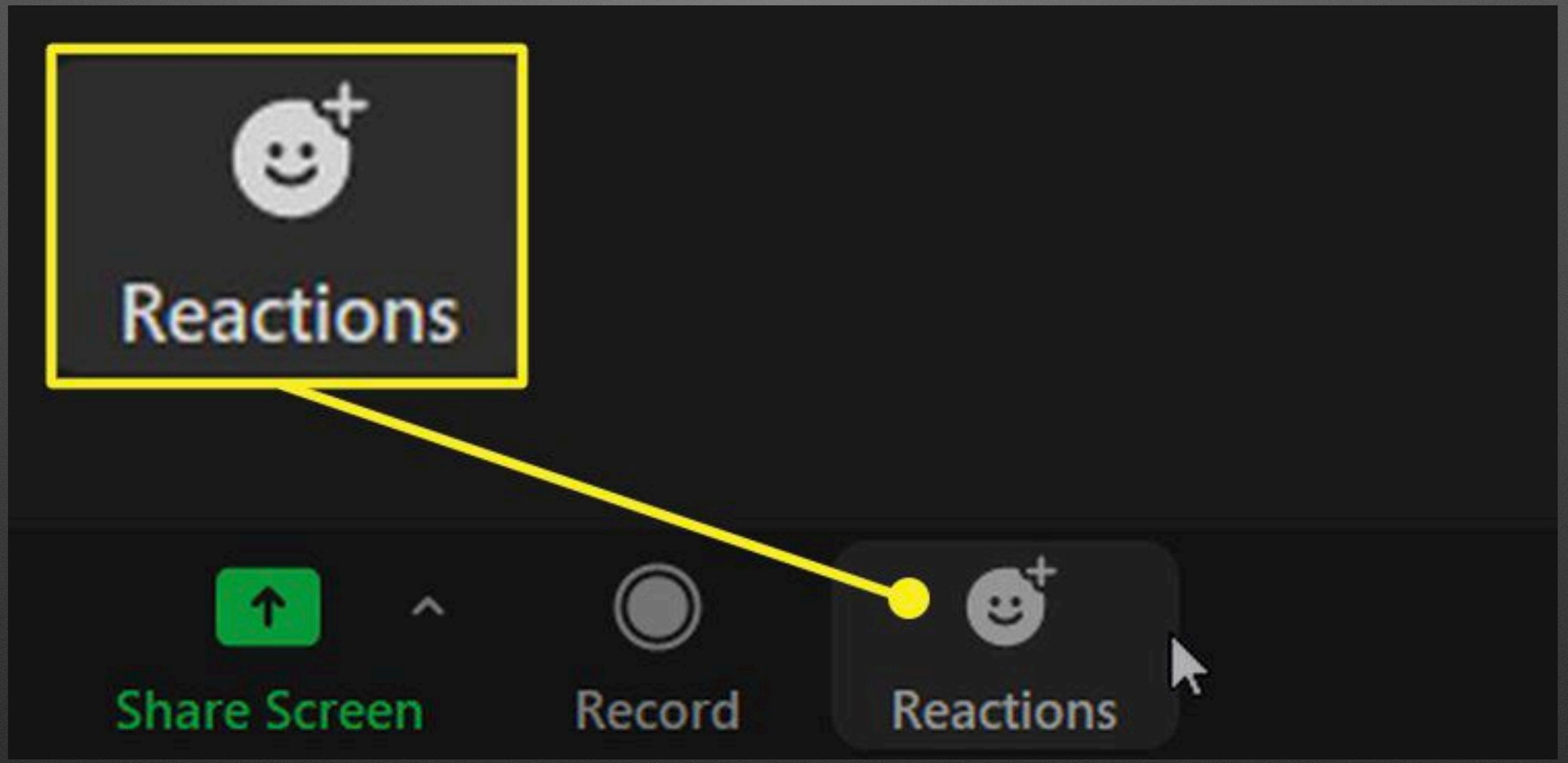
  - Powerful: More expressive than blocks
  - Pedagogy Perks: Read-Eval-Print-Loop (REPL)

Demo: Python on a PC/Mac

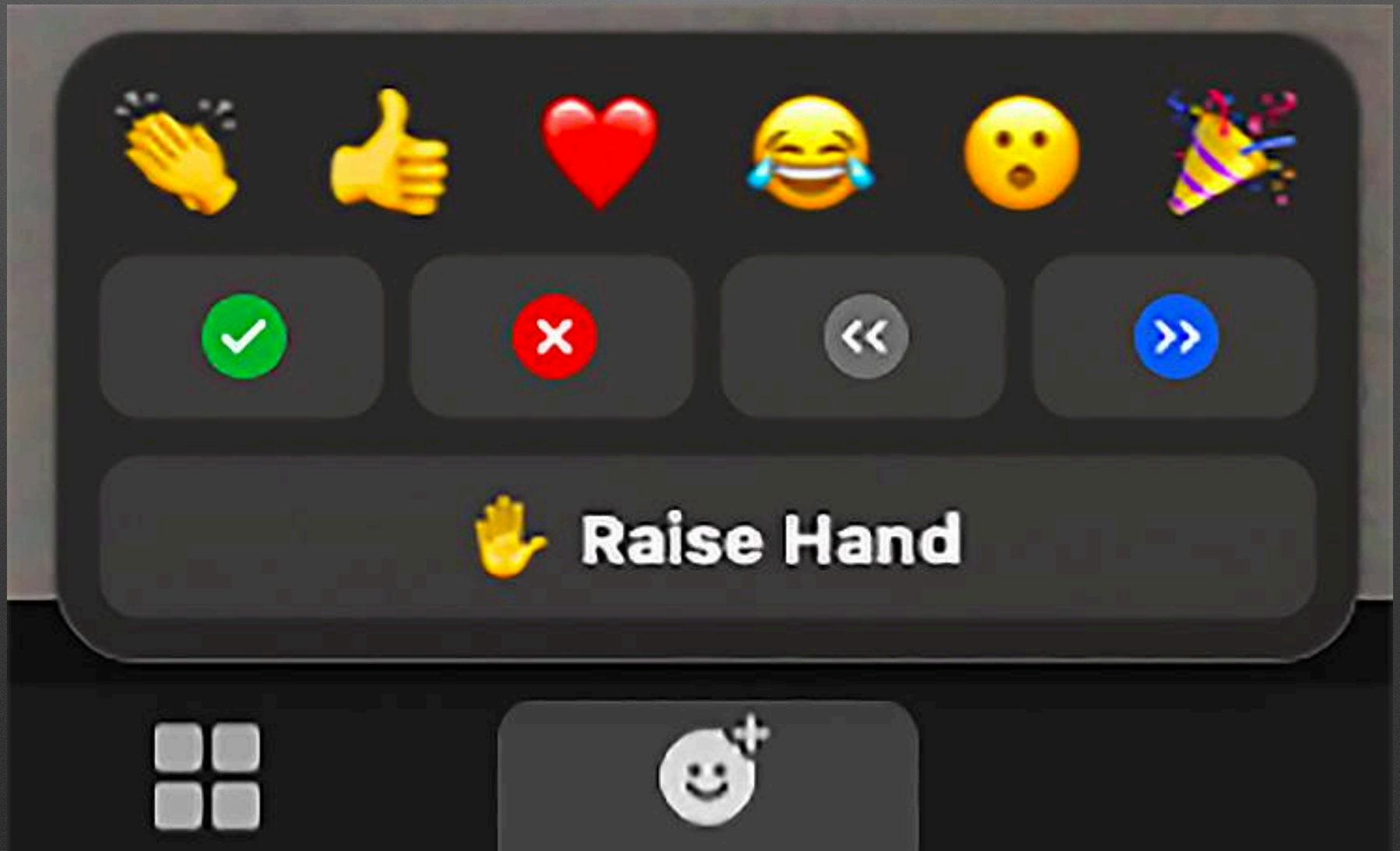
Intros: You

- I’ll call on you: Unmute (Camera on preferred)
- Three things in <30 seconds
  - Who & Where are you?
  - What’s your context? (What type of work / students?)
  - Why are you here? (What do you hope to learn?)

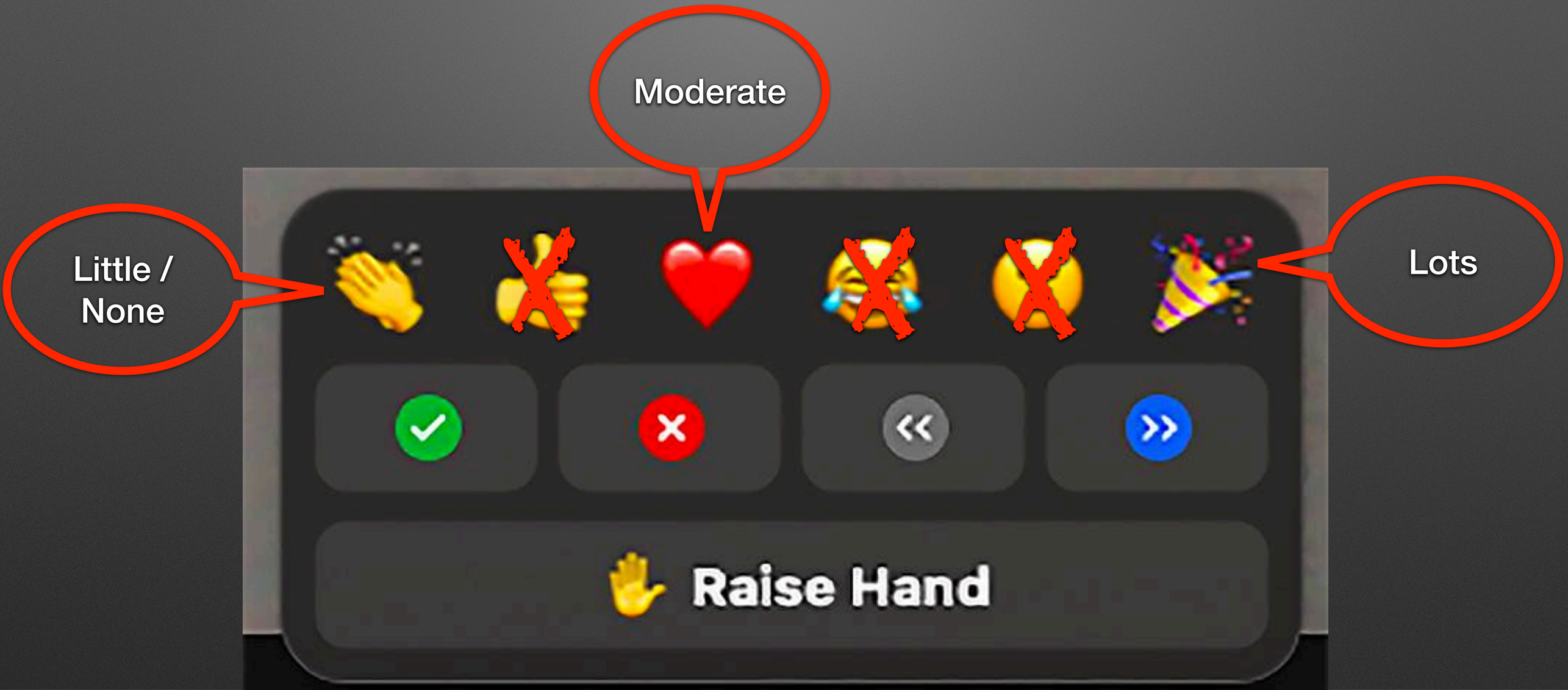
You



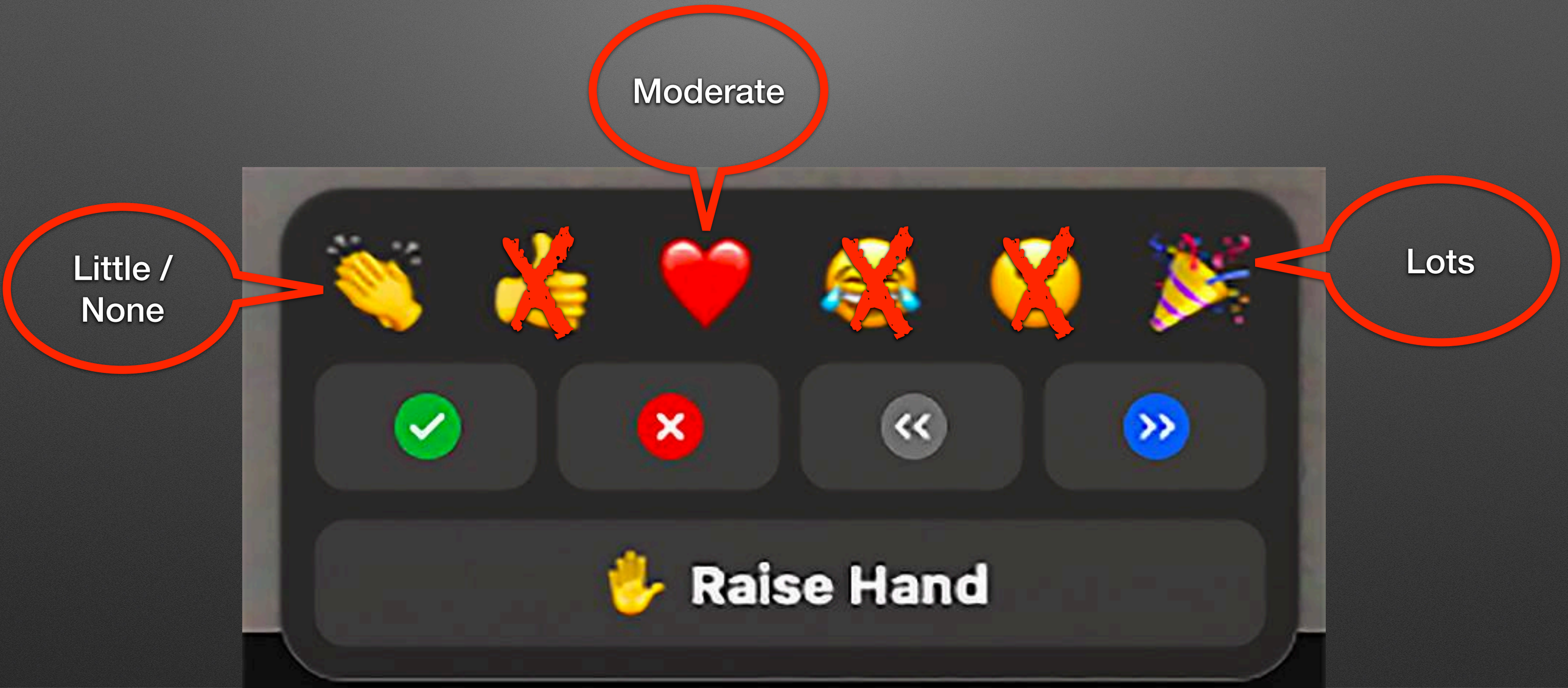
You



You: Python Experience



You: Micro:bit Experience



Micro:bit + Python Environments

- Good: You’ve got choices!
- Bad: You’ve got decisions!
- Ugly: Each is a compromise on something

Environment 1: MicroPython

More Options: Local vs. Web

- Local: Mu Editor https://codewith.mu/
- Web: https://python.microbit.org/

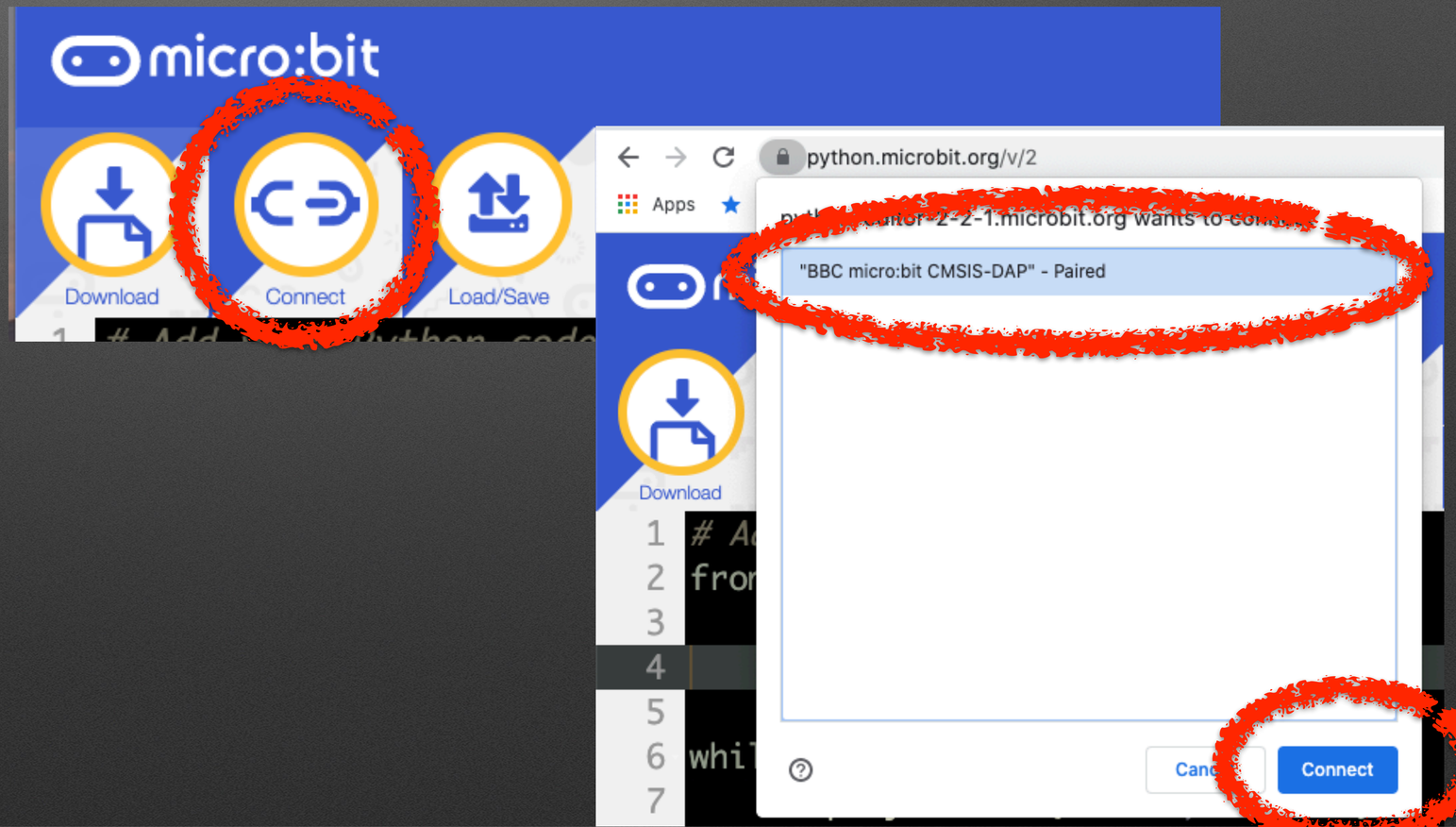
Local: Demo + Collaboration

JamBoard

Web-based (Chrome or Edge)
https://python.microbit.org/
&
Hello World Tutorial
https://microbit-micropython.readthedocs.io/en/v2-docs/tutorials/hello.html

Run it: Pair Your Micro:bit

1. Plug in USB / Micro:bit
2. Connect Button
3. Select Micro:bit
4. Select Connect



Run it: Pair Your Micro:bit

Make a Marquee Name Badge

More Marquee

App. Programming Interface (API)

Controlling speed & advanced `display`

Button Basics

- Polling: “Polling, or polled operation, in computer science, refers to actively sampling the status of an external device by a client program as a synchronous activity.” — Wikipedia

- Button API

Polling

```
while True:
    if button_a.is_pressed():
        display.show(Image.HAPPY)
    else:
        display.show(Image.SAD)
```

5 min challenge:

Button A:

Scrolls “Hello”

Then shows Happy Face

Button B:

Scrolls “Goodbye”

Then shows a Sad Face

5 min challenge:

Button A:

Scrolls “Hello”

Then shows Happy Face

Button B:

Scrolls “Goodbye”

Then shows a Sad Face

Funsies

- Gestures
- Speech

Break: 10 min

Breakout tutorial adventure!

- Breakout rooms for ~15 minutes
- Pair Programming
  - “Driver” writes code
  - “Navigator” reviews and provides guidance
- Each room has a tutorial topic (name of the room)

Prep

- One you’re in the room one person will share their screen
- The will open https://microbit.org/join
  (Close old tab/window or “Disconnect” micro:bit in old tab)
- You’ll have to enter a Classroom name sequence and a PIN (in chat)

Sharing…

Updates Under Construction

https://python.microbit.org/v/alpha

JamBoard Page 2
(And revisit page 1)

Environment 2: MakeCode
https://makecode.microbit.org/
A Tour

MakeCode

- Entirely different API
- Different approach to events
  - Notion of “callback function” to respond
  - A common approach in modern software

Marquee: Take 2

```
def on_forever():
    basic.show_string("Hello!")

basic.forever(on_forever)
```

A function contains
“What to do"

The function is passed to
`basic.forever()`

“Connecting” in MakeCode

1.Click the “…” to the right of Download

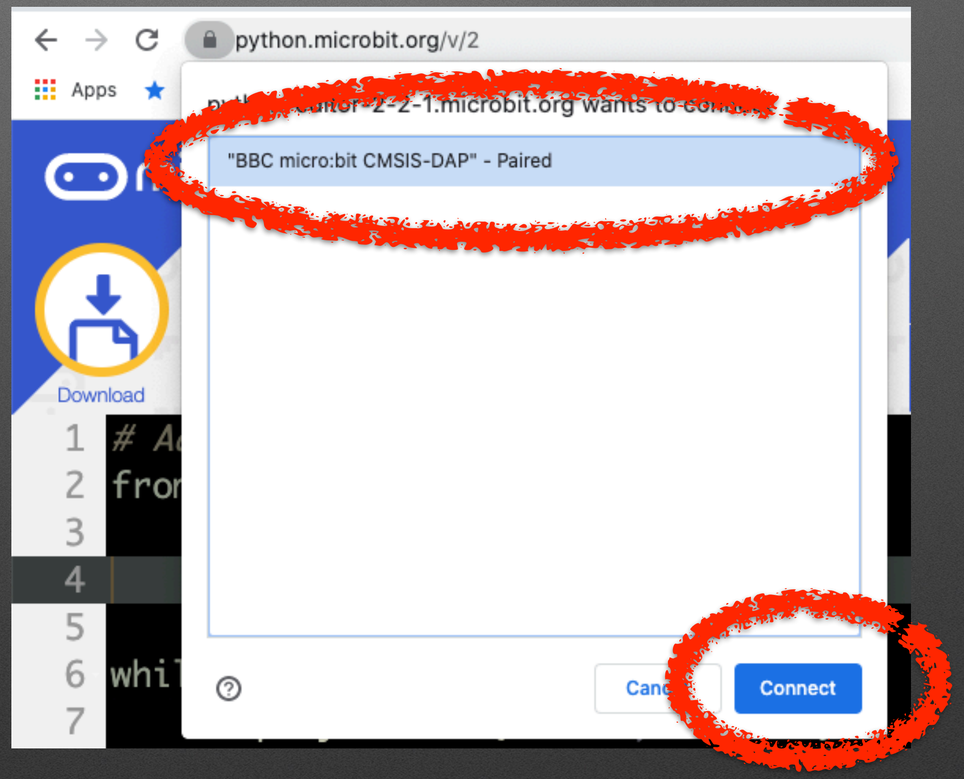
2.Click “Next” on the next two windows

“Connecting” in MakeCode

3.Select Micro:bit

4.Select Connect

5.Click Download



Breakout tutorial adventure take 2!

Recreate

Button A:
    Scrolls “Hello”
    Then shows Happy Face
Button B:
    Scrolls “Goodbye”
    Then shows a Sad Face

Adding Music

- Starting from
  Button A:
    Scrolls “Hello”
    Then shows Happy Face
  Button B:
    Scrolls “Goodbye”
    Then shows a Sad Face

- Add “Funky music” on A and “Blues music” on B

Tutorial Time: An overview and 10 minutes of exploration

JamBoard Page 3
(And revisit pages 1 & 2)

Environment 3

- Firia Labs: https://firialabs.com/
  - Jumpstart Python + CodeSpace

Management of Micro:bit+Python

- Where is code saved and how is it restored/retrieved?
- Live activities with Microbic Classroom
  https://classroom.microbit.org/
  (Python editor, not MakeCode)

Resources

- MicroBit Slack Channel
- MakeCode micro:bit Forums

Questions / Discussion / Requests