




DIGITAL LITTERACY

 60-90 minutes

 Grade 5 to 8

 Individual

 Intermediate

Micro:bit Step Counter

The goal of this activity is to learn some basic functions of the micro:bit by coding a simple device that counts the number of steps you take.

Goals

1. Write a program that counts the number of steps you take
2. Design, build and test a prototype and explain what improvements can be made

Skill development

- Collaboration
- Communication
- Critical thinking
- Problem Solving

Equipment

Each participant requires:

- Micro:bit
- USB cable
- Battery Pack
- Batteries
- Computer with internet access

Curriculum links

All grades	A1. Apply to the best of their ability, a variety of social-emotional learning skills to support their use of the mathematical process and their learning in connection with the expectations in the other five stands of the mathematics curriculum.
Grade 5	C3.1 Solve problems and create computational representations of mathematical situations by writing and executing code C3.2 Read and alter existing code, and describe how changes to the code affect the outcomes.
Grade 6	C3.1 Solve problems and create computational representations of mathematical situations by writing and executing efficient code. C3.2 Read and alter existing code that involves events influenced by a defined count and/or sub-program and other control structures, and describe how changes to the code affect the outcomes and the efficiency of the code.
Grade 8	C2. Students will investigate a working system and the ways in which components of the system contribute to its desired function C3.2 students will identify the purpose, inputs, and outputs of various systems.



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Coding Concepts

To build an understanding of coding language and logic, here are the blocks students will use in this activity, along with the purpose they serve:

Block	Description
on start	An event that runs when the program starts
"steps"	Variable to track the number of steps detected by the micro:bit
set (variable) to (0)	Assigns a value to the specified variable
on shake	Something will happen when you shake the micro:bit
change (variable) by (1)	Increase the value of the specified variable by a specified amount (can be negative).
show number	Shows a number on the LED screen



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Preparation

Load the tutorial: **Step Counter**

- https://makecode.microbit.org/beta#tutorial:github:exploratekcat/rent-a-tech_tech-a-louer/Step_Counter

Confirm that Makecode is set to the participants' language. Click the gear logo on the top right, and choose the language tab to modify it (if required).

Discuss the meaning of the words 'input' and 'output'. Ask students to think about an example, like a computer, and identify specific inputs (e.g., clicking the mouse, typing, voice command, etc.) and outputs (e.g., screen display, sound, etc.).

Each student will need a micro:bit, USB cable, battery pack, and batteries for this activity.

Facilitation

Present the activity

Technology is everywhere in our everyday lives. A step counter, or pedometer, is a tool that many people wear to help them keep track of their physical activity and achieve their fitness goals. By creating our own simple version using a micro:bit, we will learn how a step counter receives an input (movement from taking a step), and turns it into an output (displaying the number of steps).

Before starting

Distribute one micro:bit, one USB cable, and one battery holder (with battery) per student.



Safety notes

The micro:bit is an exposed circuit board. This allows you to see all the electrical parts and understand how computers work. This does pose a small risk of parts being damaged, so remind students to handle with care.

During the activity

1. Instruct students to plug in the micro:bit to their computer, using the USB cable.
2. Ask your participants to open the Step Counter tutorial, using the URL provided.
3. Each student will have to code their own micro:bit to count steps.



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Some questions that students might have:

1. Why isn't my micro:bit working?
 - a. Make sure the code is saved and downloaded to the micro:bit. It needs to be updated every time you make a change to the code.
2. Why doesn't it show the right number of steps?
 - a. The screen can only display one digit at a time, so for numbers with two digits or more, the number scrolls across the screen. The micro:bit may still be counting steps but it might not be able to display them fast enough.

Assessment

List of questions to ask participants, to assess if the goals were met.

1. Were you able to make your micro:bit count your steps?
2. Was the count accurate? What might account for any differences between the actual number of steps and what the micro:bit was able to detect?
3. What was the most challenging part of the activity? Why was it difficult? How did you navigate the challenge?

Tinker with this activity

Using tinkering supplies, such as cardboard and paper, task your participants to create a way to wear the step counter.



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Appendix

Overview of tutorial block functions

- **Basic functions:** These consist of pieces of code preprogrammed to do specific actions, such as launching programming, displaying on the micro:bit screen, or repeating the code that will be inserted.
- **Logic function:** These blocks account for different possible outcomes, and program their next action.
- **Variable function:** This is what the micro:bit software remembers and refers to, when requested. It can be a text, known as a string, or a series of functions. The first step to using a variable is to define what it is.
- **Input functions:** Each micro:bit device has buttons and integrated sensors that detect movement, light, temperature, and magnetic field; all of these can be activated through the various blocks of input functions.

Terminology	Definition
Function	Function refers to a category of blocks that are pre-programmed to perform one or many specific tasks.
Block	A block is a command container that holds ready-to-use code. Once added to other blocks, like a puzzle, the blocks create the program. If learners click on Javascript, they will see the long code written for each block.
Radio	Radio refers to the radio emitter embedded in the micro:bit device.
Variable	A variable is an “object” coded by the user in the micro:bit program.
Sequence	A sequence is a series of programming blocks.
Decomposition	Decomposition is an aspect of computational thinking, which consists of the breakdown of a complex problem into smaller tasks.