Coding and Human Health	Grade 5 Human Health and Body Systems

Lesson Plan

Description

As medical techniques progress, it is quite common for vital organs to be monitored using technology. This lesson will use a coding tool to monitor vital signs such as a person's heartrate.

Learning Outcomes

- How to record and analyze changes in body systems (respirations, pulse, etc.) because of increased or decreased physical activity identifying and controlling variables.
- Identify ways that technology and innovations related to data collection, storage and processing are helping to identify risks and predict potential dangers of common diseases and medical disorders
- Identify how wearable technology can work to help us, and medical professionals, learn more about our health and the health of large populations

Specific Expectations

A1.3 use the engineering design process and associated skills to design, build, and test devices, models, structures, and/or systems
A2.1 write and execute code in investigations and when modelling concepts, with a focus on using different methods to store and process data for a variety of purposes
B1.2 evaluate beneficial and harmful effects of various technologies on human health and body systems, while taking different perspectives into consideration

Introduction

Devices are used throughout the medical field. From right at home on your wrist, to the doctor's office, we rely on digital devices to reliably feed us with data to help monitor our health and improve our lives.

Using codable devices like Micro:bits we're able to recreate some of these instruments in the classroom. We can do in class tests and experiments to demonstrate how we can monitor our health and keep track of data using these machines.

In the real world, tech like wearable smartwatches and step trackers are commonplace. But how do they work?

Using gyro sensors and light detecting diodes, smartwatches can track things like your steps in a day, your pulse rate, and even your blood pressure.

The Micro:bit has several sensors that can help it emulate a device like a smartwatch, and this workshop will help us code the Micro:bit and then track data through a few experiments we can run with the final coded devices.

Materials

Here are the materials needed for this lesson plan:

- Computer or laptop
- Class-set of Micro:bits

Action

Explain the use of medical technology and how we use machines and computers every day to monitor our health. Medical technology, like all things computerised, needs to be coded by programmers and designed by engineers.

- Ask questions like: "Even though these coding and design skill sets don't necessarily mean they're working in the hospital do you think these designers and programmers are still working in the medical field?" Programmers and engineers work in all sorts of careers and fields!

Quickly show off the Micro:bit, explain that it is a microcontroller, a small computer that can be programmed to do all sorts of things. This micro controller is equipped with several sensors which can be used in many ways to create devices for everyday use or run experiments. It has an LED matrix on the front that allows it to show us information and it is small and portable and can be powered by a battery.

Part 1: Pedometer

Talk about health devices we see every day, prompt the class for examples of things we see people using to tracker their health. One of the main things we use is a smart watch, and smart watches have all sorts of functions to track our health, today we are going to code a create our own devices that kind of mimic that.

1. First, we will create a pedometer, a device that tracks your steps.
2. With your class, access makecode.microbit.org to access the IDE and press the + icon to create a new program.
3. Follow the **Pedometer Teacher Coding Sheet** provided with this lesson plan.
4. The students should now have a functioning pedometer, when it shakes, the number should increase thanks to the sensors in the micro: bit storing each shake as a number in the steps variable and displaying it on the LED matrix.

Part 2: Heartrate Monitor

Now that your class has created a pedometer, you can talk about heartrate monitors. Explain that the Micro:bit does not have the equipment to be a heart rate monitor, but it can become a tool that can count your BPM or Beats Per Minute.

1. Show students how to track their own pulses by recording their heart beats over 10 seconds and multiplying it by 6.
2. Explain that the device they will be coding will make this task easier.
3. Follow the BPM **Tracker Teacher Coding Sheet** provided with this lesson plan.
4. Have measure their BPM by starting the timer on their Micro:bit by pressing A and then press B every time they feel their heart beat. Once the timer stop, the Micro:bit will display their BPM.
5. Student can record their BPM in a still relaxed state, and then run-in place to build up their BPM and rerecord their findings.
6. Discuss with your students the difference and talk about why it is important to track your BPM, for exercise and other health reasons. Heart health is particularly important and devices like smart watches help keeping track of these things much easier.

Consolidation/Extension

- Extend the coding with the Micro:bit by challenging students to combine both the pedometer and the BPM tracker by having it beep once you reach a certain number of steps while running to remind you to check your BPM.
- Can your class turn fitness and health into a game using these devices?

Accommodations/Modifications

- This program can be done using the built-in emulator included on makecode.microbit.com if the class does not have access to the physical ones.

Assessment

Students can share their working code which can be used as Assessment *for* Learning or Assessment *of* Learning. Gather information from the students throughout the activity to gauge their level of understanding or examine the quality of their code to provide a summative evaluation.