Micro:bit - huge potential

The Experiences and Outcomes in the Technologies area of Curriculum for Excellence were refreshed in March 2017. A key focus of the refresh was the introduction of organisers relating to Computer Science and Digital Literacy to reflect the rapidly changing prevalence and central position of digital technology within our society.

In the Computer Science Experiences and Outcomes, computational thinking is the golden thread that runs throughout. Computational thinking is a problem-solving approach that can be developed in an interdisciplinary way. It entails simplifying problems and breaking them down into smaller, more manageable steps to create solutions.

Block-based programming platforms are an ideal way to develop computational thinking. Each block is a distinct visual instruction that connects to a trigger or another block of code to create and design solutions. There are many block-based programming apps and platforms available; such as Scratch and Scratch JR, Tynker, Hopscotch, Tickle, Lightbot, Cargo-Bot, Kodable, Box Island and many more.
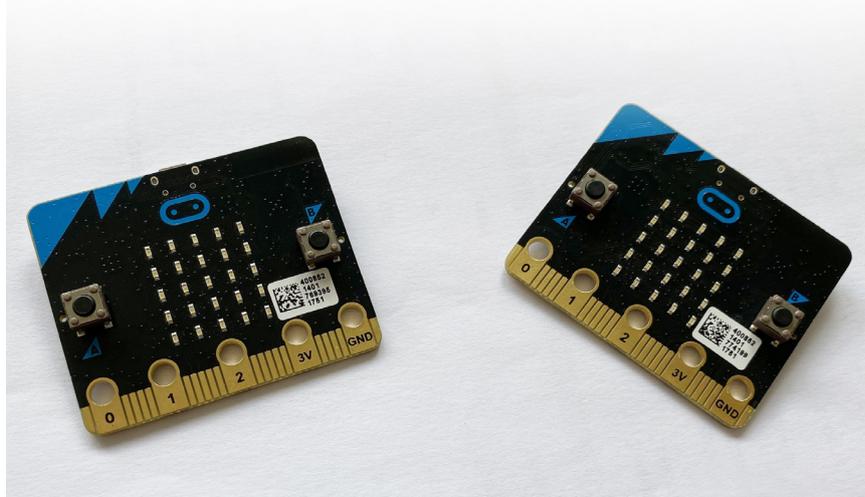

Figure 1 - BBC Micro:bit.

Learning to programme solely on a device can be too abstract for developing a sound understanding of new concepts. Having a physical device that can be programmed and observed running code can add value to the coding experience. That is where companion devices like Dash and Dot, Spheros, Parrot Drones and the Beebot come in. Pupils can collaborate to design code to complete challenges, run their code and evaluate and improve the code that they have written. Many of these companion devices are prohibitively expensive for schools operating on limited budgets, but the BBC Micro:bit (Figure 1) is an extremely versatile alternative that comes at a fraction of the price.

The Micro:bit is a tiny computer that is easily programmed by beginners using a variety of programming languages. The Makecode website [1] has a programme of progressive tutorials that explain and explore the capabilities of the device (Figure 2). The Makecode website allows for programming using both block code or using Javascript, a text based programming language that allows more complex programming. >>
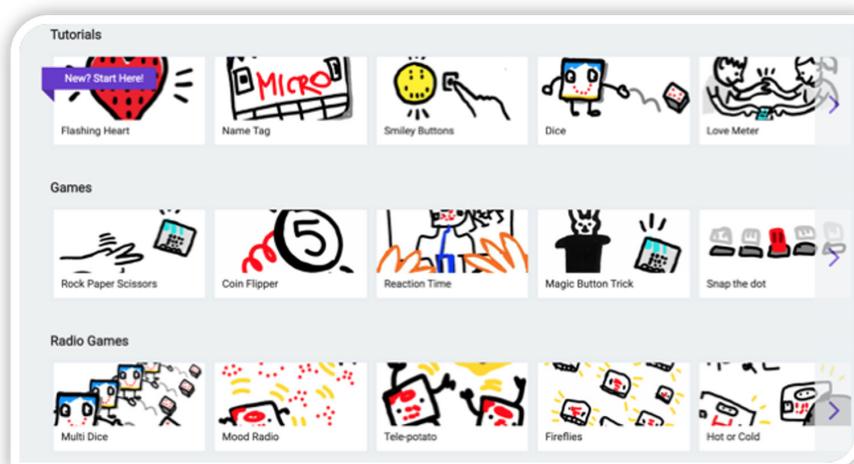

Figure 2 - The Makecode website [1] has a programme of progressive tutorials that explain and explore the capabilities of the device.
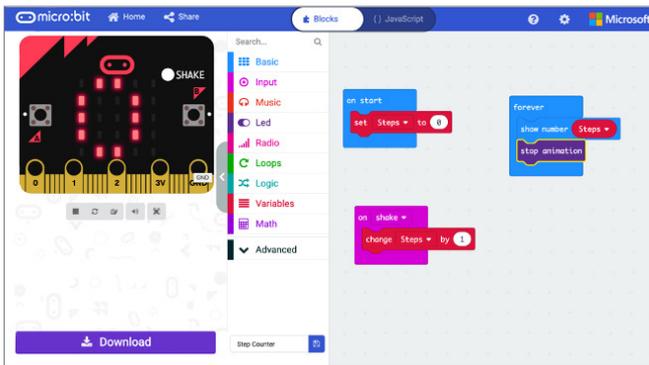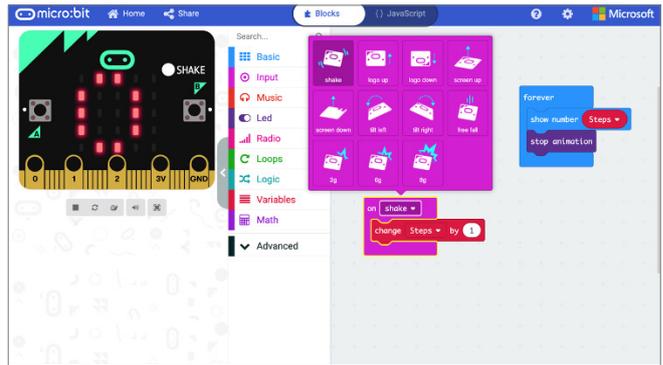
Figure 3

Figure 4

Micro:bit activity tracker project

Using a few blocks of code, it is possible to create a simple activity tracker that has the potential to be the basis of an interdisciplinary STEM project. The lines of code needed to create step counter are shown in Figure 3.

One of the main teaching points in this activity is developing an understanding of variables. If you want your Micro:bit to store and interpret information like a score, or in this case steps, you will have to create a variable called steps. The code in Figure 3 shows that when the Micro:bit accelerometer detects a shake, it adds 1 to the step score. To reset the activity tracker to 0, you would press the reset button on the Micro:bit to restart.

The Micro:bit uses an accelerometer to detect subtle movements of the device. There is a more detailed explanation of what an accelerometer is and how it works, created by educators on the Microsoft Makecode team [2].

You could also investigate if any of the other accelerometer gestures, as shown in Figure 4, could give a more accurate recording of a step like motion for the Micro:bit to record.

Once you have created your activity tracker, you could then design a 'watch strap' to attach it to your wrist or ankle while powered by a battery pack. This will allow some experimentation as to where the best place to attach the Micro:bit is to get an accurate reading.

There is an online tutorial available from Microbit.org [3] that explains how you can make a step counter that can be easily customised to an individual and introduces you to the Makecode Classroom environment. Through this you can create a closed classroom environment that allows you as the teacher to assign code to pupils, and to collect their finished code for assessment and evaluation purposes.

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Figure 5

CfE Experiences and Outcomes
- I can explore and experiment with digital technologies and can use what I learn to support and enhance my learning in different contexts - *TCH 1-01a*.
- I can extend and enhance my design skills to solve problems and can construct models - TCH 1/2-09a.
- I understand how computers process information - *TCH 1-14b*.
- I understand the operation of a process and its outcome. I can structure related items of information - *TCH 1/2-13a*.
- I can create, develop and evaluate computing solutions in response to a design challenge - *TCH 1/2-15a*.

References
[1] https://makecode.microbit.org (accessed 24th of March 2020).
[2] https://www.youtube.com/watch?v=byngcwjO51U (accessed 24th of March 2020).
[3] https://microbit.org/projects/make-it-code-it/sensitive-step-counter/ (accessed 24th of March 2020).