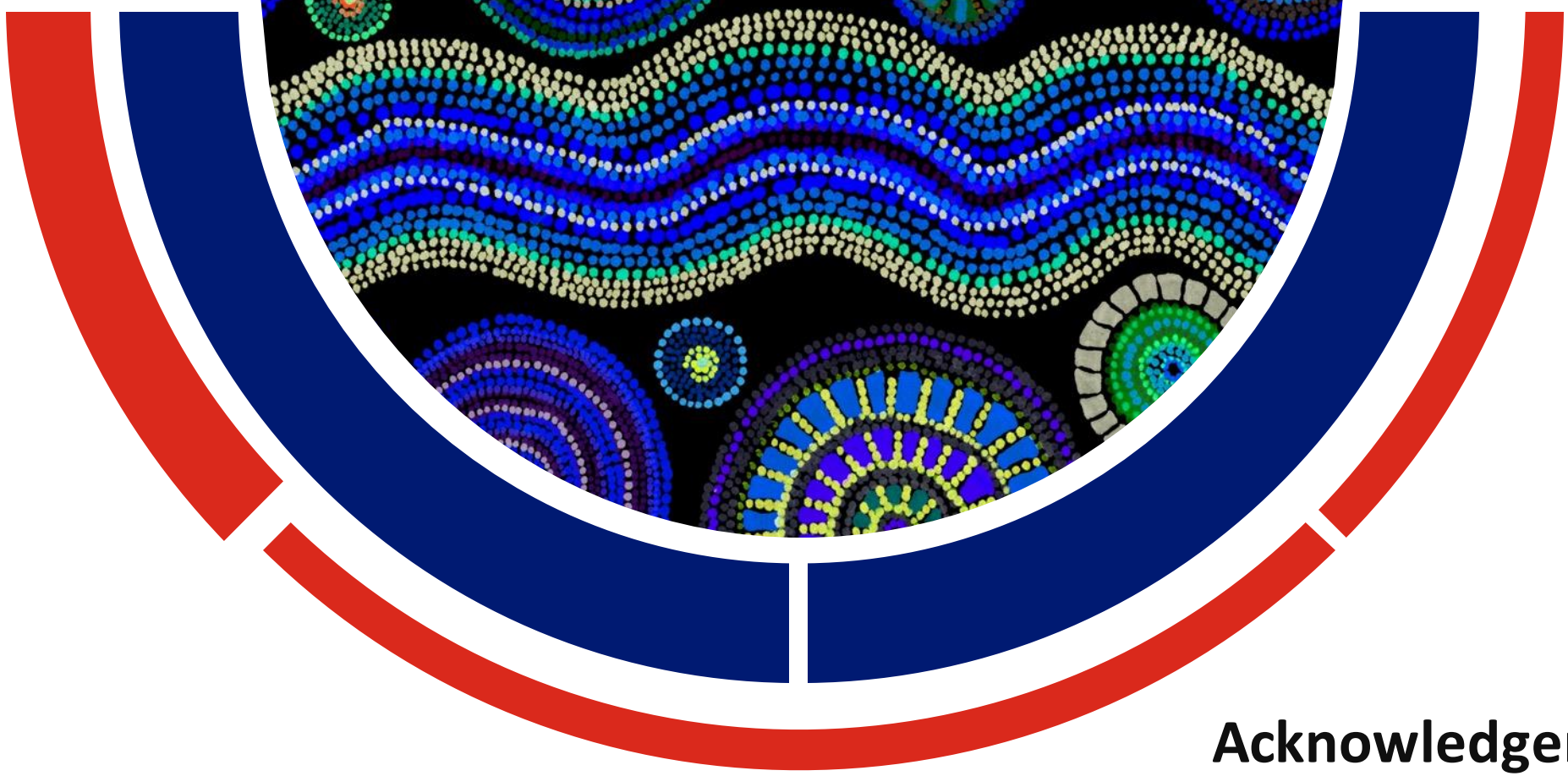
micro:bit

Access the presentation and materials here:

Presented by: Catherine Newington, ACS



Acknowledgement of Country

The ACS would like to acknowledge the traditional custodians of all the lands from which we join. We pay our respects to the Elders past, present and emerging and extend that respect to other Indigenous Australians present.

Agenda

01

Introduction to micro:bit

Back to the basics with micro:bit (perfect for newbies or use in your class)

02

Exploration of micro:bit

Let’s get our hands dirty and have a go at using micro:bit

03

Planning a unit of work

Take you through a process I used to create of units of work.

04

Resources

Sharing resources to support your lesson planning

Meeting Catherine

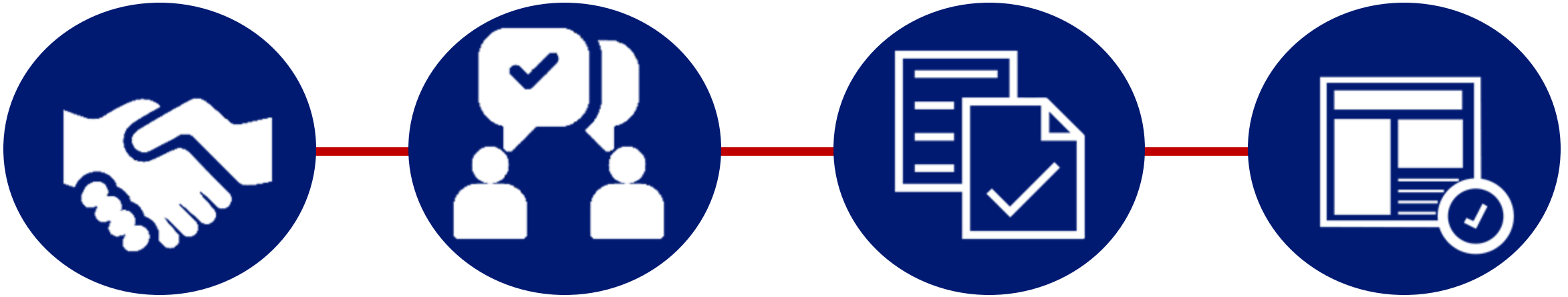
I lead a national program to support the implementation of the Digital Technologies Curriculum across Australia. I have produced around 200 resources to help teachers.

I was a Primary School teacher for 12 years

5 of those years included being a learning and teaching leaders (technologies).

I studied at Monash University to get my postgraduate degree specialising in Education Technologies. This has tightened my knowledge of how technology has the potential to redefine education, and the impact of pedagogical practices when using technologies.

Introduction to ACS



ACS is the peak body for IT professionals. They support all IT professionals – including educators.

ACS ICT Educators is a program to support the implementation of the Digital Technologies Curriculum. We connect with teachers across Australia.

Create resources and help build scope and sequences and lesson plans. Moving to STEM units.

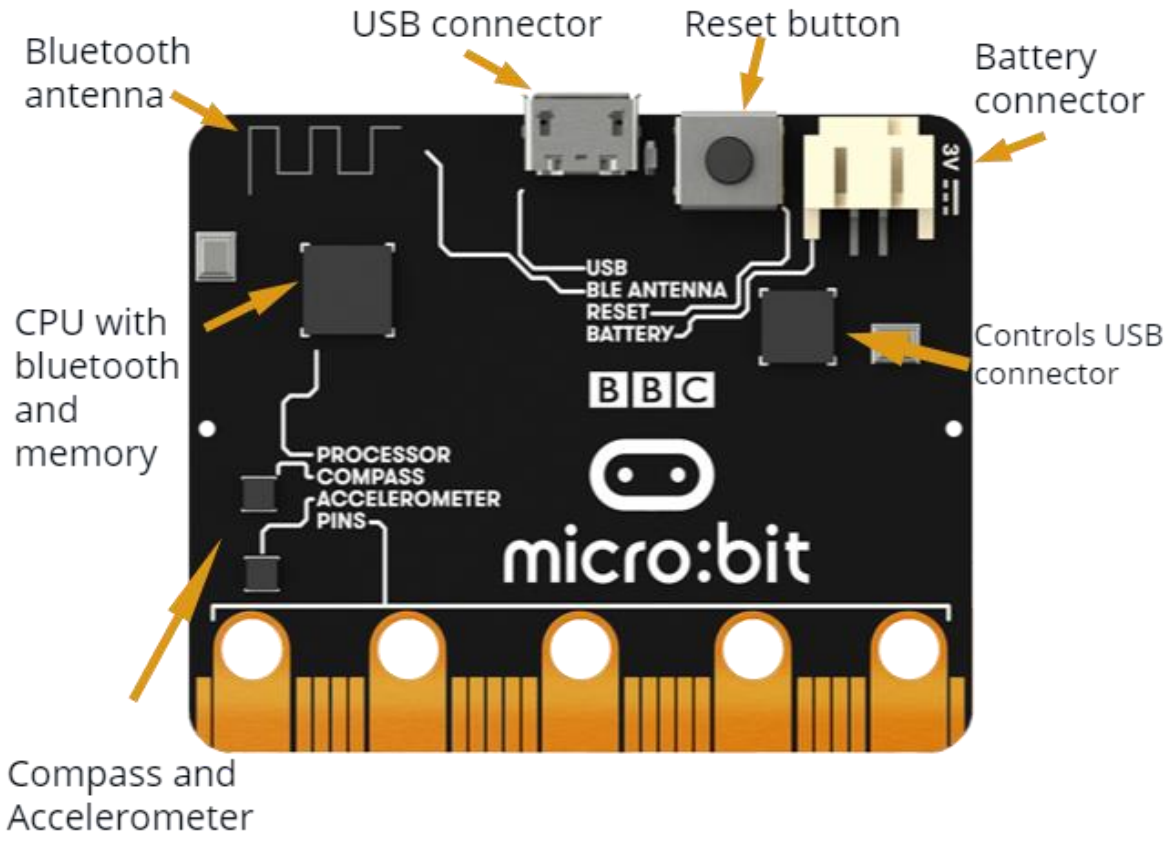
We have a dedicated platform to help connect teachers and share resources.

Introduction to micro:bit

A micro:bit is a really simple **microcontroller** - a very small computer that can be put inside a device (fridge, watch, car) and run programs.

micro:bits have no keyboard, so you need to write the program you want it to run on a computer and then transmit the data to the micro:bit:

- From a laptop - use the USB cable
- From an iPad - use Bluetooth

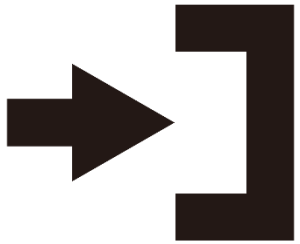


Inputs and Outputs

radio signal

inputs

light sensor



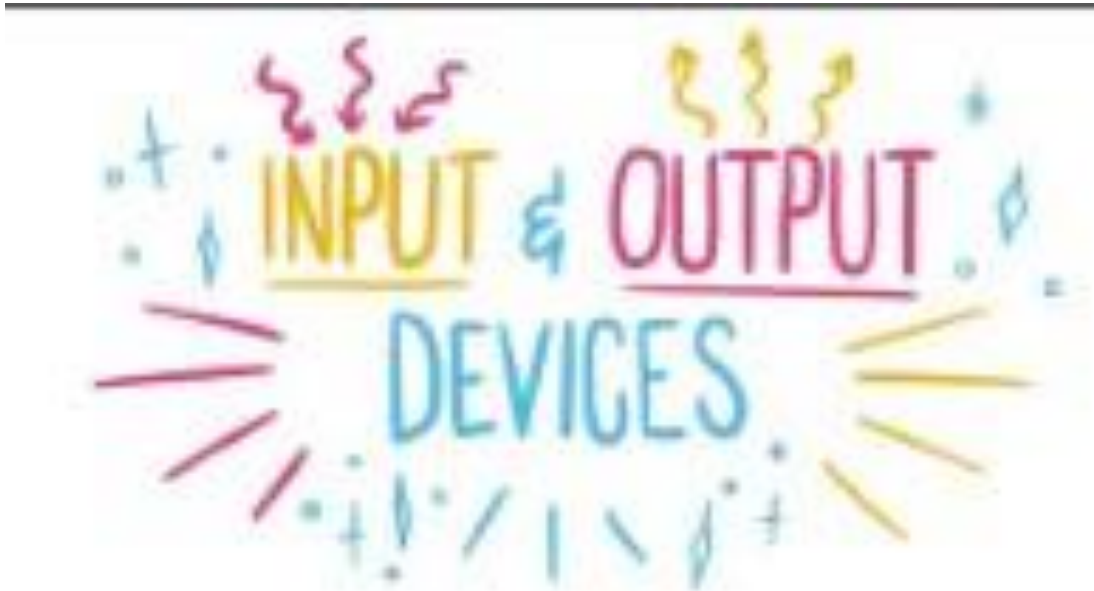
magnetism

buttons

touch sensor

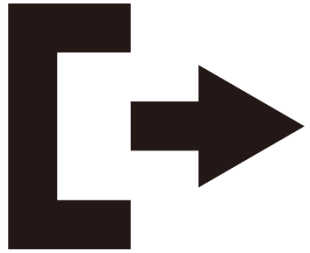
temperature

microphone



outputs

radio signal

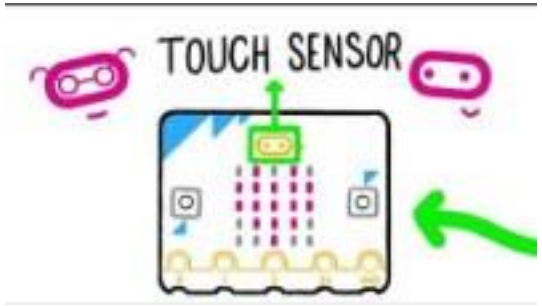


via pins
speaker

via pins
headphones

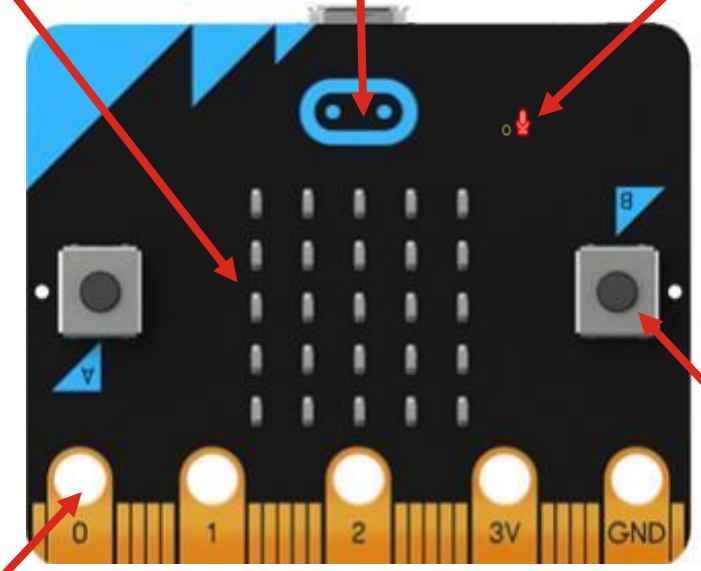
LED display

Functions of a micro:bit



Touch logo (new)
Located next to the logo. Can be used as another button.

LEDs
Display words, pictures and numbers



Microphone (new)
Located next to the logo. Create programs to react to sounds.

Buttons
Can be used separately or together to teach input and branching

Pins
Used to complete electrical circuits that act like switches.

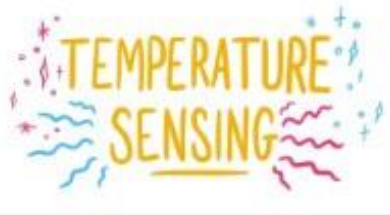
Functions of a micro:bit

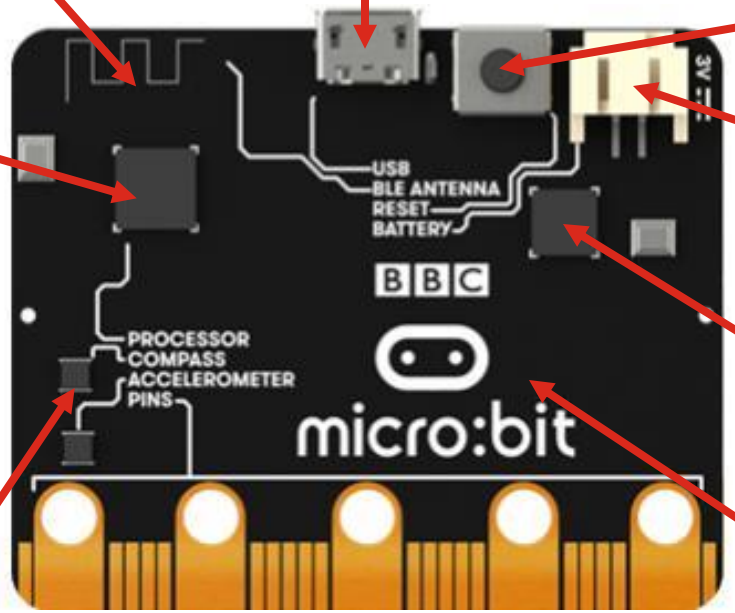
Micro USB socket
Plug your micro:bit into your device to download program to it.

Radio and Bluetooth
Plug battery pack into the socket to make it mobile.

Reset button
Reset your micro:bit.

Processor and Temperature
The processor is the brains and the temperature measures heat/cold.





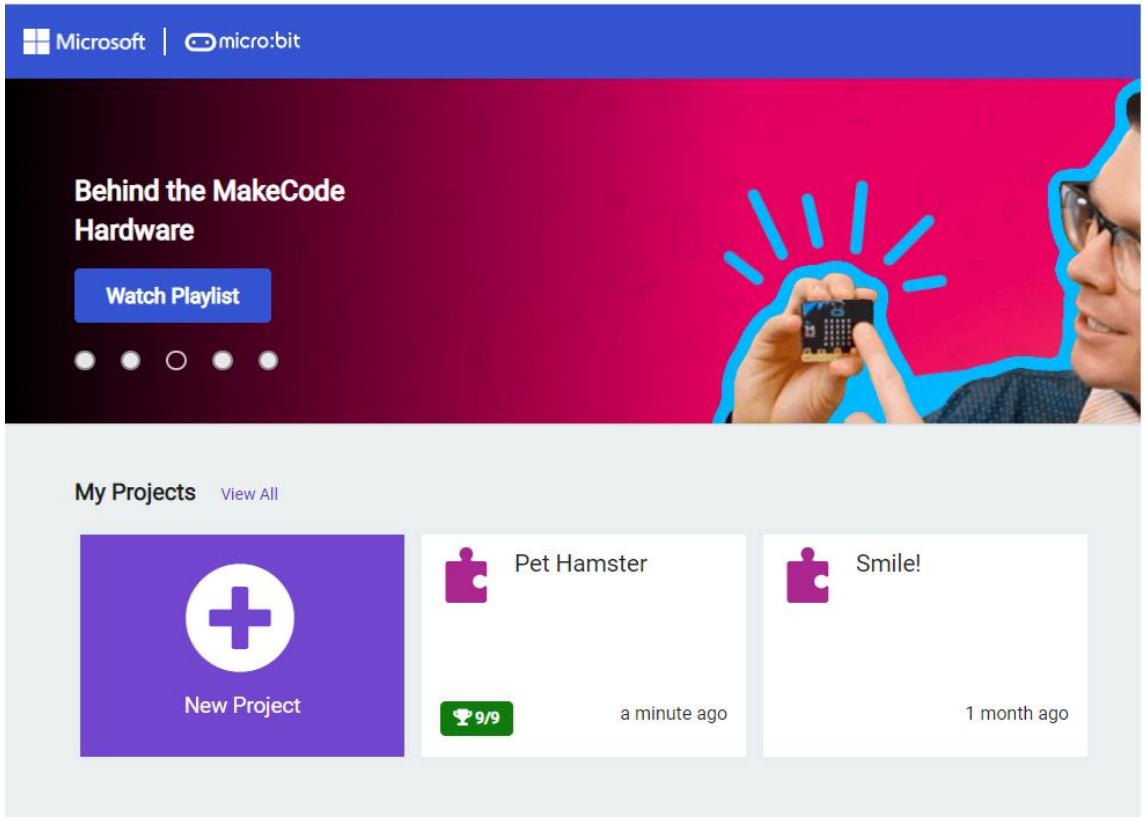
Battery socket
Plug battery pack into the socket to make it mobile.

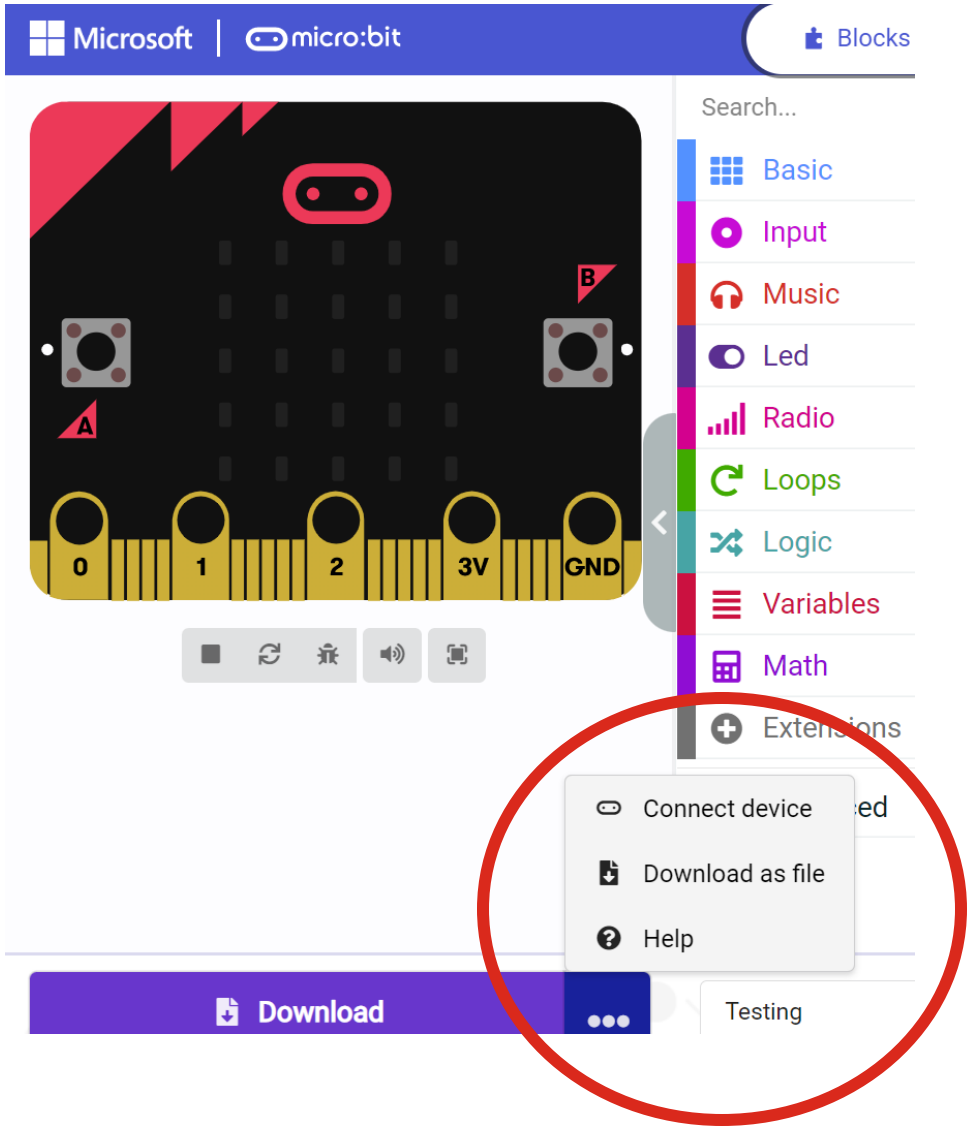
USB interface chip
Send and receive data to and from the micro:bit.

Compass
Measure the magnetic fields to find North.

Speaker (new)
Send and receive data to and from the micro:bit.

Connecting and coding the micro:bit





https://makecode.microbit.org/

Coding the micro:bit

Introduction videos to get started

Tell the world how you're feeling

Create a step counter

Water bottle alert

Coding the micro:bit

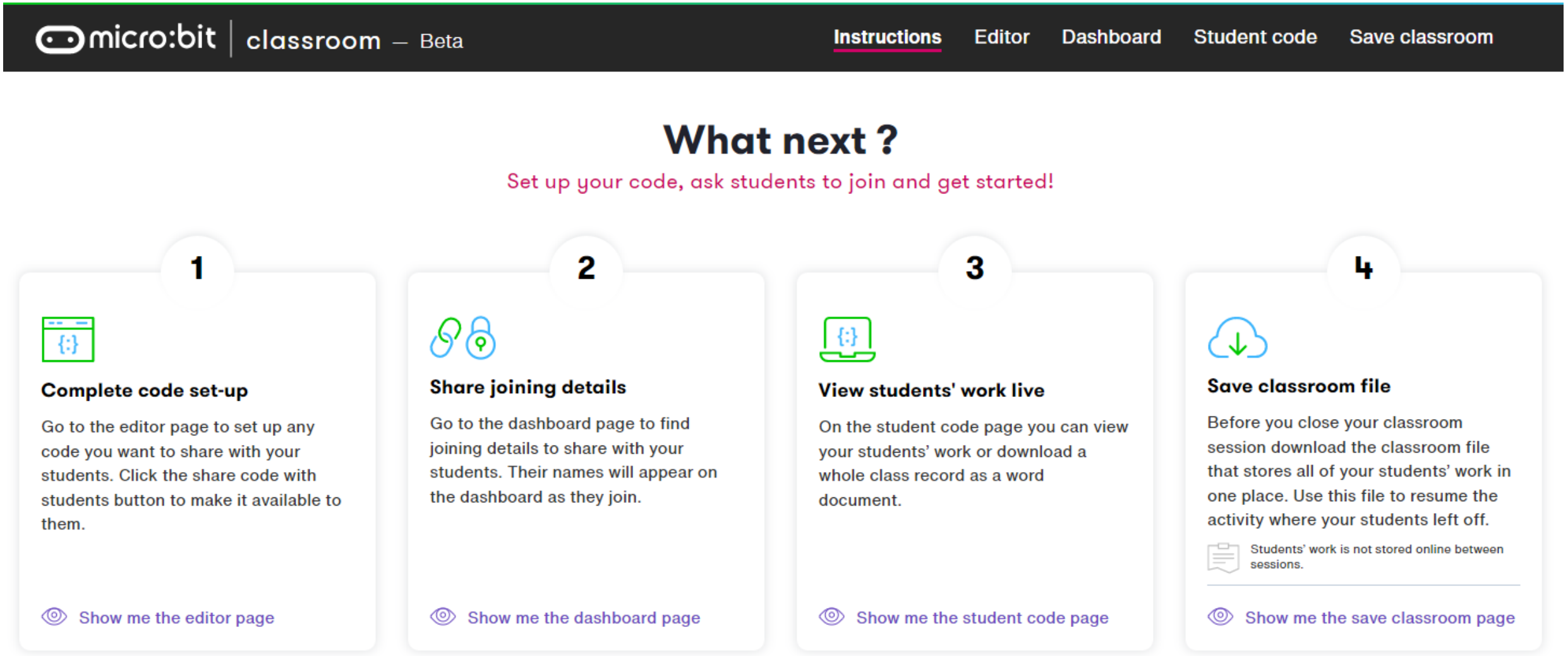
Beginner activities

Dice (Mathematics)
https://microbit.org/projects/make-it-code-it/dice/

Magic 8 Ball (Mathematics)
https://microbit.org/projects/make-it-code-it/magic-8ball/

Scratch paint (Art)
https://microbit.org/projects/make-it-code-it/scratch-paint/

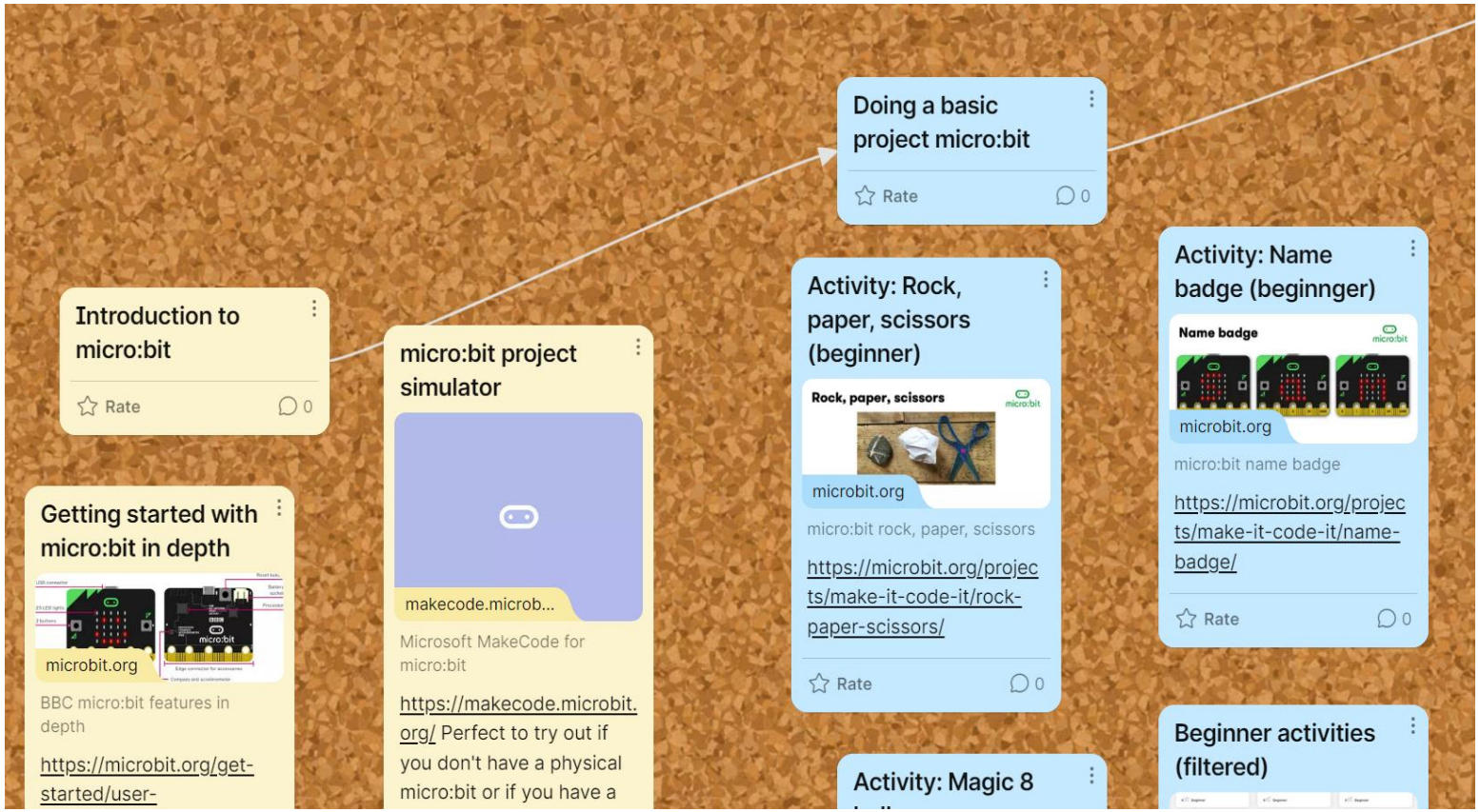
micro:bit classroom



https://classroom.microbit.org/

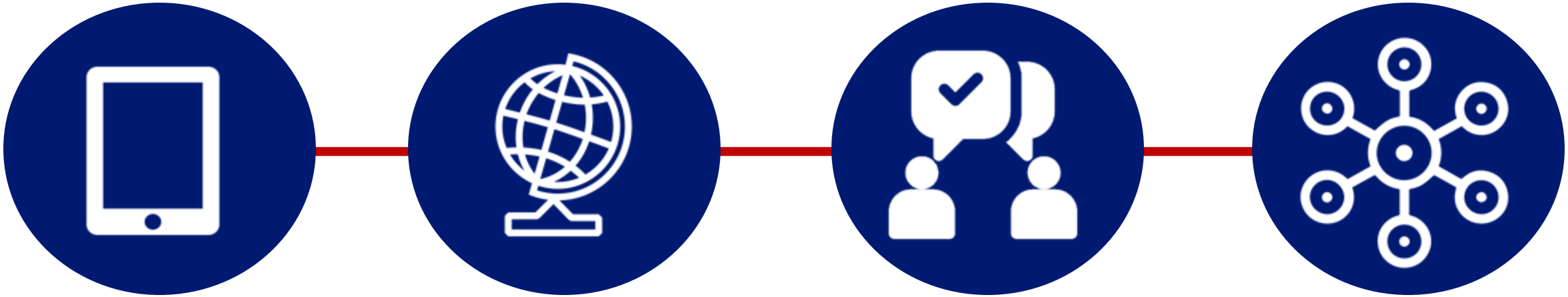
micro:bit Resources

Padlet to explore



https://padlet.com/catherinenewington/microbit

Creating a unit of work



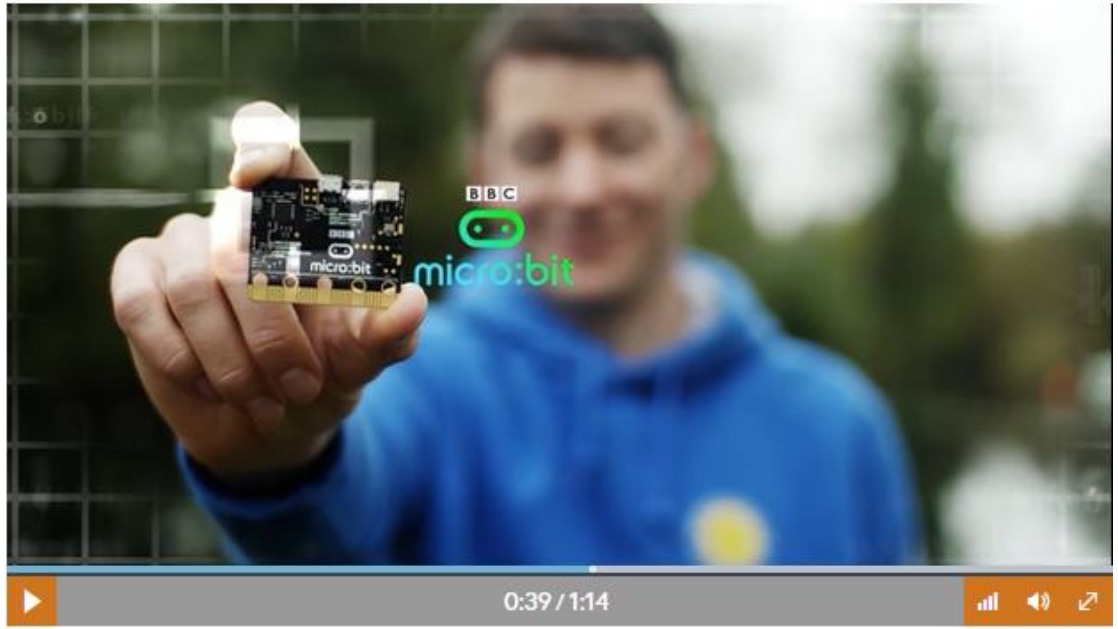
The impact of technology on society. How changes to technology have supported growth.

Bringing real life examples and adapting them to the classroom.

Allows students to explore real life scenarios to create authentic learning purposes.

See relevance when learning about topics.

Technology in our real world



Electronic scoreboard and game timer

Fatigue test

Series
https://education.theiet.org/secondary/stem-activities/microbit/

Channel
https://tv.theiet.org/?landscapesearchresult

Creating a unit of work

Assessment – Australian Digital Technologies Curriculum			
Content Description	**Session**	**Assessment Piece**	**Assessment Statement**
Investigate how data is transmitted and secured in wired, wireless and mobile networks, and how the specifications affect performance (ACTDIK023)	N/A		
Investigate how digital systems represent text, image and audio data in binary (ACTDIK024)	N/A		
Acquire data from a range of sources and evaluate authenticity, accuracy and timeliness (ACTDIP025)	N/A		
Analyse and visualise data using a range of software to create information, and use structured data to model objects or events (ACTDIP026)	N/A		
Define and decompose real-world problems taking into account functional requirements and economic, environmental, social, technical and usability constraints (ACTDIP027)	2 & 8	Existing Evacuations and Student Design	Students evaluated the micro:bit uses for camping and hiking. They investigated the functional requirements of the technology.
Design the user experience of a digital system, generating, evaluating and communicating alternative designs (ACTDIP028)	10	Creating of student digital solution	Students designed a new purpose of the micro:bit. They took into consideration the user experience when generating a design.
Design algorithms represented diagrammatically and in English, and trace algorithms to predict output for a given input and to identify errors (ACTDIP029)	9	Flowchart	Students created a flowchart that includes commands and processes that were needed to carry out their design using a micro:bit. Prior to programming, students used the flowchart to predict and identify any potential errors within their program.
Implement and modify programs with user interfaces involving branching, iteration and functions in a general-purpose programming language (ACTDIP030)	3-10	Programming the micro:bit	Students programmed a general-purpose programming language to code and create a digital solution using a micro:bit. Their code used functions such as branching and iteration.
Evaluate how student solutions and existing information systems meet needs, are innovative, and take account of future risks and sustainability (ACTDIP031)	11	Evaluations: Existing and student digital solutions	Students evaluated existing technologies and student designs to look how technology is meeting needs and innovative.
Plan and manage projects that create and communicate ideas and information collaboratively online, taking safety and social contexts into account (ACTDIP032)	1	Work completed using online collaboration tools	Students used online learning platforms to communicate ideas when evaluating, coding and designing a digital solution to support hiking and camping,

Creating a unit of work

micro:bit Your Fashion Accessory (5-6)

- Looked at how technologies have the fashion industry (3D fashion printers!)
- Compared the components of the micro:bit to other devices (laptops, mobile devices)
- Investigated how data is stored
- Learn to code using the micro:bit but focus of tasks specific to fashion/ skills – disco lights, clap hearts, name badge, teleporting ducks explicit teaching for branching user input and other coding commands.
- Students design new purpose for the micro:bit. They create a digital solution through drawings/flowcharts. If time and ability persists, students code their digital solution.
- Students evaluate their digital solution based on a set criteria (questions and prompts).

Creating a unit of work

Assessment – Australian Digital Technologies Curriculum			
Content Description	**Session Number**	**Assessment Piece**	**Assessment Statement**
Examine the main components of common digital systems and how they may connect together to form networks to transmit data (ACTDIK014)	2 & 3	Explanation of common components	Students identified and explained common components found in digital systems. They created a Venn Diagram to compare common components found in their laptop to a micro:bit.
Examine how whole numbers are used to represent all data in digital systems (ACTDIK015)	4	Explanation of binary code	Students explained how data was stored in a digital system. They identified the represented of data that can be found within a micro:bit.
Acquire, store and validate different types of data, and use a range of software to interpret and visualise data to create information (ACTDIP016)	N/A		
Define problems in terms of data and functional requirements drawing on previously solved problems (ACTDIP017)	12		
Design a user interface for a digital system (ACTDIP018)	13		
Design, modify and follow simple algorithms involving sequences of steps, branching, and iteration (repetition) ACTDIP019	6-11 & 14		
Implement digital solutions as simple visual programs involving branching, iteration (repetition), and user input (ACTDIP020)	15		
Explain how student solutions and existing information systems are sustainable and meet current and future local community needs (ACTDIP021)	16		
Plan, create and communicate ideas and information, including collaboratively online, applying agreed ethical, social and technical protocols. (ACTDIP022)	1	Throughout the unit	Students identified and explain the purpose of creating and adhering to protocols when using digital devices. Throughout the term, they followed these protocols when working collaboratively in group projects that were completed using online platforms

Creating a unit of work

micro:bit Helping Your Community (5-6)

- Looked at how technologies help the wider community and those with specific needs.
- Compared the components of the micro:bit to other devices (laptops, mobile devices).
- Learn to code using the micro:bit but focus of tasks specific to fashion/ skills – clap lights, step counter, night light, tilt alarm explicit teaching for branching and user input.
- Students design new purpose for the micro:bit. They create a digital solution through drawings/flowcharts.
- Students evaluate their digital solution based on a set criteria (questions and prompts).

Creating a unit of work

Session Number	Session Topic Focus	Learning Intention and Success Criteria	Introduction/Teacher Instruction	Whole Class Activity
3.	Evaluating technologies	**Learning Intention** Students evaluate technologies used for helping the community by answering questions and prompts. **Success Criteria** I can evaluate digital solutions based on how they have solved a problem.	Discuss with the students how technology can be used to help communities. Students create a list of technologies they use and evaluate if these are technologies are helping local and wider communities.	Provide students with examples of different technologies that are used to support communities. In small groups students will choose a technology and create a presentation to the class that explains how the technology is helping the community. In their presentation they include possible ways the micro:bit could be used to support their community.
Session Resources	**Student Resources** •		**Teacher Resources** • AARP High Tech Innovations for Low Vision • The Blind Guide – Evolutionary Technology for the Blind • Deafness forum of Australia Hearing A-Z • Automobility Top 7 Devices and Apps for Wheelchair Users	
4.	Creating a Digital Solution (Clap Lights)	**Learning Intention** Students will follow instructions and guidance to create a digital solution for the micro:bit. **Success Criteria** I can follow a set of instructions to create a clap lights with the micro:bit	Discuss with the students how a clap lights operates. Recap with students the concept of user input.	Brainstorm the different answers and results found in a magic 8 ball. Discuss the accuracy and probability when shaking and using a magic 8 ball. Students read through lesson materials and follow instructions to create a clap lights. Students brainstorm ways this activity could be adapted to meet the needs of their community.
Session Resources	**Student Resources** • ACS Student Resource: Flowcharts • ACS Student Resource: Algorithms		**Teacher Resources** • ACS Teacher Information: Visual Programming • Teacher Resource: Algorithms • Teacher Resource: Algorithms Image • micro:bit Project – Clap Lights	

Creating a unit of work

Introduction to micro:bit (7-8)

- Skilled based unit of work. (no real world relevance!)
- Compared the components of the micro:bit to other devices (laptops, mobile devices).
- Learn to code using the micro:bit in block coding first, to ensure students are on the same page/ similar skill level.
- Move into python coding.
- Look at how technology has changed over time (think Tamagotchi).Students think about how they could remix one of the projects completed and improve the technology with it. Interface, images etc.

Creating a unit of work

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Acquire data from a range of sources and evaluate authenticity, accuracy and timeliness (ACTDIP025)	N/A		
Analyse and visualise data using a range of software to create information, and use structured data to model objects or events (ACTDIP026)	N/A		
Define and decompose real-world problems taking into account functional requirements and economic, environmental, social, technical and usability constraints (ACTDIP027)	10	Digital solution design	Students took a micro:bit project and redesigned the digital solution to improve the functionality and user experience.
Design the user experience of a digital system, generating, evaluating and communicating alternative designs (ACTDIP028)	10	Digital solution design	Students took a micro:bit project and redesigned the digital solution to improve the functionality and user experience.
Design algorithms represented diagrammatically and in English, and trace algorithms to predict output for a given input and to identify errors (ACTDIP029)	N/A		
Implement and modify programs with user interfaces involving branching, iteration and functions in a general-purpose programming language (ACTDIP030)	5 - 9	Programming the micro:bit	Students programmed in python to create a digital solution using a micro:bit. Their code contained functions such as branching and iteration and other common functions.
Evaluate how student solutions and existing information systems meet needs, are innovative, and take account of future risks and sustainability (ACTDIP031)	11	Evaluations: Existing and student digital solutions	Students evaluated existing technologies and student designs to look how technology is meeting needs and innovative.
Plan and manage projects that create and communicate ideas and information collaboratively online, taking safety and social contexts into account (ACTDIP032)	1	Work completed using online collaboration tools	Students used online learning platforms to communicate ideas when coding, creating their digital solution design and evaluating their design.

Creating a unit of work

Learn to code with micro:bit (5-6)

- Skilled based unit of work. (no focus on real world relevance!)
- Compared the components of the micro:bit to other devices (laptops, mobile devices).
- How data is stored and represented on the micro:bit
- Learn to code using the micro:bit in block coding. Complete diagrams/flowcharts before they code
- Tasks increase in difficulty.
- Focus on branching and iteration and user input.

Creating a unit of work

Key Preparation
ACS ICT Educators Community ACS has resources to support the teaching of the Digital Technologies Curriculum from Foundation to Year 10. Access our community and resources by joining for free via: https://www.acs.org.au/ict-educators.html. Contact the ICT Educators via our email: icteducators.communities@acs.org.au. **ACS Resources** Resources have been created to help teachers and students unpack and understand topics found within the Digital Technologies Curriculum. These give brief explanations of the topic and the expectations to teach the topic at the curriculum year level. It is intended the information is presented in a way that will set the foundation for further research. **micro:bit** This unit has been focused onto use robotics throughout the unit. The unit has been focused on using micro:bit. The ideas and activities within the unit can be adapted to meet the needs of the schools and the available robotics. Investigation into the suitable of activities will need to occur if different robotics are used. Dedicate time to familiarise yourself with the micro:bit coding platform and sessions • micro:bit Education Foundation – Introduction to the BBC micro:bit • Micro:bit Introduction • Micro:bit Set up your micro:bit • Micro:bit User Guide

Key Understandings	Key Questions
Students will: ▪ Identity the common components that make up a micro:bit ▪ Explain how connecting micro:bit to a laptop creates a network. ▪ Follow a series of steps and code to create different uses of the micro:bit. ▪ Redesign and improve a current micro:bit solution. ▪ Evaluate the student digital solution.	▪ What are the common components of a digital system? How ▪ How is this similar/different to a micro:bit ▪ How do you connect a micro:bit? How does connecting the micro:bit Create a network? ▪ How is data stored and represented in a micro:bit ▪ What instructions do you need to follow to code the micro:bit?

Key Vocabulary
Online collaboration, protocols, ethical, social and technical protocols, components of digits systems, CPU, storage, motherboard, power connector, monitor, network, data transmission, connections, Bluetooth, Wi-Fi, cable, whole numbers, binary code, algorithms, sequence of steps, branching user input and iteration, visual programming

ACS Community

ACS ICT Educators Program provides support to implement the Digital Technologies Curriculum with confidence.

https://www.acs.org.au/ict-educators.html

Complimentary access for educators