Unit Overview

This unit of work investigates how digital technology is being used to assist with tasks related to camping and hiking. Students will complete a range of tasks that focus on using technology to assist with camping and hiking. Talks include (but not limited to): step counter, digital compass, automatic torch, temperature gauge.

Students will move into designing and creating their own digital solution to use for camping and hiking. They will be introduced to range of other technologies that are used for hiking and camping. Using those examples they will design and code another technology using the mirco:bit.

Other Curriculum Targeted Areas

Other curriculum areas can be targeted and assessed within this unit.
Other areas of interest may include:
- Design and Technology

Further investigation into these areas is required to ensure they align with the following activities. Activities may need to be modified to ensure content descriptions and achievement standards are met.

Australian Curriculum Alignment

The following sessions have been created using the Australian Curriculum: Digital Technologies Curriculum. Tasks may need to be modified to ensure state Digital Technologies Curriculum content descriptions and achievement standards are met. ACS has support and documents to help align this unit to other Digital Technology Curricular.

Session

'Session' has been used to define the order of tasks to complete the unit. It does not define a set time required to complete the task. Time allocated to complete a session is the teacher's discretion. This allows for flexibility for the teacher to drive the duration of the task and make modifications if necessary. Sessions can be merged into one set period or sessions may run over multiple periods.

MICRO:BIT – A CAMPING COMPANION
Levels 7-8

Key Preparation
Robotics
This unit has been focused onto use robotics throughout the whole session. The unit has been focused on using micro:bit ideas and activities can be adapted to meet the needs of the schools and robotics that are to be used. Investigation to the coding when using other robotics will need to occur.
Programming within the micro:bit Platform
For the purpose of this unit we have created sessions around students coding in micro:bit Python. However, this will be up to the discretion and professional judgement of the teacher based on the skills and abilities of the students. Modifications for those sessions and assessment may be made based on the professional judgements of the teachers. Sessions (including material and activities) may need to be modified. ACS has resources to support the teaching of the Digital Technologies Curriculum from Foundation to Year 10. Access the via: https://www.acs.org.au/ict-educators.html
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.

Key Understandings	Key Questions
Students will: ■ Analyse how current technologies can be utilised to support hiking and camping. ■ Follow a series of steps and code to create different uses of the micro:bit ■ Using the micro:bit lesson ideas design and develop a purpose to use micro:bit for camping and hiking. ■ Evaluate and analyse their digital solution based on a set criterion.	■ How can technology used to help people when camping and hiking? ■ What instructions do you need to follow to code the micro:bit? ■ What is the purpose of your design? ■ What code will you need to include to ensure your design works correctly? ■ What will a plan of your code look like? ■ What resources will you use to help you code your project using micro:bit? ■ How will you evaluate your design?

Key Vocabulary
Collaboration, protocols (ethical, social and technical protocols), digital solutions, functional requirements, constraints (social, technical, economic environmental), user experience, general purpose programming, algorithms, branching, loops, variables, iteration, user input, design thinking, user interface,

Session Number	Session Topic Focus	Learning Intention and Success Criteria	Introduction/Teacher Instruction	Whole Class Activity
1.	Collaboration	**Learning Intention** Students will generate and adhere to protocols when working in online spaces. **Success Criteria** I can create a guideline that I will abide by when using digital technology to work with technology and in small groups.	Introduce students to a digital collaborative space. Discuss the right and wrong way to use this space.	Each group creates a guideline to include social, ethical and technical protocols to abide by during their time working on their project and working with others in the class.
Session Resources	**Student Resources** • ACS Student Resource: Online Protocols		**Teacher Resources** • ACS Teacher Resource: Online Collaboration	
2.	Evaluating technologies	**Learning Intention** Students evaluate technologies used for camping and hiking purposes 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 t help campers and hikers. 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 or taken when hiking and camping. In small groups students will choose a technology and evaluate and critique the technology answering a set of evaluation questions and prompts. Each group will report back to the class and discuss the technologies.
Session Resources	**Student Resources** • Selection of technologies used for hiking and camping (see teacher resources) • Evaluation Questions and Prompts		**Teacher Resources** • Life Straw • BioLite energy – Camp Stove • The Verge Blog Article - How camping technology made us feel at home in nature • Seattle Sports Solar Power Camp Shower • America's State Parks – The Best Backpacking Thermometers for 2020 • Buckshot Pro Ultra • My Petzl Light mobile app and NAO Headlamp	

Session Number	Session Topic Focus	Learning Intention and Success Criteria	Introduction/Teacher Instruction	Whole Class Activity
3.	Creating a Digital Solution (step counter)	**Learning Intention** Students will follow instructions and guidance to create a digital solution for the micro:bit. **Success Criteria** I can follow instructions and use the resources to code a digital step counter.	Introduce students to the basic functions of micro:bit. Demonstrating the how the software and hardware interact with each other.	Students read through lesson materials and follow instructions to create and code a digital step counter.
Session Resources	**Student Resources** • Introduction video to micro:bit • micro:bit at home: step counter show		**Teacher Resources** • micro:bit Education Foundation – Introduction to the BBC micro:bit • micro:bit Python Guide • micro:bit Lesson – Step Counter	
4.	Creating a Digital Solution (compass)	**Learning Intention** Students will follow instructions and guidance to create a digital solution for the micro:bit **Success Criteria** I can follow instructions and use the resources to code a digital compass.	Brainstorm the benefits of using a compass when camping/hiking. Introduce students to the activity to code the micro:bit to create a digital compass	Students read through lesson materials and follow instructions to create and code a digital compass.
Session Resources	**Student Resources** • micro:bit lesson - Compass • micro:bit Educational Foundation – Compass		**Teacher Resources** • Instructables micro:bit Compass Lesson	

Session Number	Session Topic Focus	Learning Intention and Success Criteria	Introduction/Teacher Instruction	Whole Class Activity
5.	Creating a Digital Solution (automatic torch)	**Learning Intention** Students will follow instructions and guidance to create a digital solution for the micro:bit **Success Criteria** I can follow instructions and use the resources to code a digital torch.	Brainstorm the benefits of creating a automatic light when camping/hiking. Introduce students to the activity to code the micro:bit to create an automatic torch. When the area gets dark the torch will automatically turn on.	Students read through lesson materials and follow instructions to create and code an automatic digital torch. Tip – put a clear water bottle (full of water) on top of the LEDS when micro:bit is lit up. The water will allow the light to 'glow further'
Session Resources	**Student Resources** • micro:bit Education Foundation – LEDs • micro:bit Education Foundation – micro:bit light sensing		**Teacher Resources** • micro:bit Lesson – Data Handling Sensor • micro:bit Lesson – Nightlight • micro:bit Lesson – Night Safety	
6.	Creating a Digital Solution (thermometer)	**Learning Intention** Students will follow instructions and guidance to create a digital solution for the micro:bit **Success Criteria** I can follow instructions and use the resources to code a digital thermometer.	Brainstorm the benefits and purpose of using a thermometer when camping and hiking. Introduce students to the activity to code the micro:bit to create a thermometer.	Students read through lesson materials and follow instructions to create and code a digital thermometer.
Session Resources	**Student Resources** • micro:bit Education Foundation – micro:bit temperature sensing		**Teacher Resources** • micro:bit Lesson – Max to Min Thermometer • micro:bit Lesson - thermometer	

Session Number	Session Topic Focus	Learning Intention and Success Criteria	Introduction/Teacher Instruction	Whole Class Activity
7.	Creating a Digital Solution (heart rate monitor)	**Learning Intention** Students will follow instructions and guidance to create a digital solution for the micro:bit. **Success Criteria** I can follow instructions and use the resources to code a digital heart rate monitor.	Brainstorm the benefits and purpose of using a heart rate monitor when camping and hiking. Introduce students to the activity to code the micro:bit to create a heart rate monitor.	Students read through lesson materials and follow instructions to create and code a digital heart rate monitor.
Session Resource	**Student Resources** - micro:bit Education Foundation – Clap hearts – reveal the micro:bit heart beat - micro:bit – First Steps		**Teacher Resources** micro:bit Lesson - Heart Rate Monitor	
8.	New Digital Solution	**Learning Intention** Students design a new purpose for micro:bit for hiking and camping. **Success Criteria** I can create a new design and idea that can help hikers and campers.	Recap on the different uses of micro:bit for camping and hiking. Students evaluation the purposes and discuss pros, cons and improvements they could make.	Using the evaluation prompts and questions, students create new uses for camping and hiking with micro:bit. Students present and explain their ideas.
Session Resource	**Student Resources** Student Design Brainstorm		**Teacher Resources** - micro:bit Projects - Make Code micro:bit - Digital Technologies Hub - Video 5: Creating digital solutions: Generating and designing (algorithms)	

Session Number	Session Topic Focus	Learning Intention and Success Criteria	Introduction/Teacher Instruction	Whole Class Activity
9.	Creating a design and flowchart	**Learning Intention** Students will create a flowchart that outlines the functions the code will complete in order to complete the required task for their micro:bit hiking and camping digital solution. **Success Criteria** I can create a flowchart that outlines the commands my design need in order for it	Introduce students to the concept of creating a flowchart Use the example flowchart from one the of activities completed that was previously completed in the unit to demonstrate and explain how flowchart is used to	Students plan out their code for their micro:bit by creating a flowchart. To support the development of their flowchart students can be encouraged to use code that was used in previous hands on micro:bit activities.

Session Resource	**Student Resources** • Flowchart example from a previous micro:bit session • ACARA Computational Thinking Poster • SmartDraw - What is a Flowchart – Flowchart Symbols, Flowchart Types and More	**Teacher Resources** • CSER – An overview of flowcharts • MUO - How to Create Stunning Flowcharts in Microsoft Word • Codecademy – What is Pseudocode and How Do You Use It?

Session Number	Session Topic Focus	Learning Intention and Success Criteria	Introduction/Teacher Instruction	Whole Class Activity
10.	Programming	**Learning Intention** Students will program their micro:bit to complete their design task. **Success Criteria** I can code the micro:bit to create a new digital solution used for hiking and camping.	Students share their flowcharts and explain the functions and commends of their flowcharts. This activity will help them identify any coding issues and ensure they are aware of how their program will operate.	Students use their flowchart and code from previous activities to code their micro:bit.

Session Resource	**Student Resources**	**Teacher Resources** • micro:bit Python Guide

Session Number	Session Topic Focus	Learning Intention and Success Criteria	Introduction/Teacher Instruction	Whole Class Activity
11.	Evaluation	**Learning Intention** Students will evaluate their micro:bit design based on a set criterion. **Success Criteria** I can evaluate my design by following a set of questions and prompts.		Students complete a range of questions and prompts to evaluate their digital systems.
Session Resource	**Student Resources** • Key Questions: Final Evaluation		**Teacher Resources**	

Existing Digital Solutions Evaluation		
Topic	**Questions**	**Evaluation**
App Basics	• What is the name of the device/ digital solution and who or what company was responsible for created it?	
App explanation	• In 3 sentences or less explain the idea behind the digital solution. . • What is the primary function of the device?	
Problem solving	• What problem is the device trying to help solve? • What need is it meeting? • How is this innovative?	
Functional requirements	• What are the functional requirements (what are the must haves of the app to make it work) of a digital device like to operate?	
Technical constraints	• What issues do you think hikers/campers could have when using technology like this? Battery life, wet weather, lack of mobile network range	
User Experience and Usability	• Is your experience using this app a positive one? • Are there any errors or glitches in the app? • What seemed out of place? Did you like where buttons and links were placed? • Any buttons or functions that didn't work properly? Any broken links? • Looking at the design, what are 3 things you like about the app? • What are 2 things you did not like about the app and explain your answer.	
Reflection	• Does it remind you of any technology you have used? • What will you take away from this design?	

Student Design Brainstorm		
Topic	**Questions**	**Evaluation**
Digital solution explanation	Explain your idea. What is your idea? How would the user use your solution? On a scale of 1 – 10 (1 being lowest, 10 highest), how do you rate your idea	
Problem solving	What problem are you solving for the user? How would it benefit the user?	
Functional requirements	Briefly explain how you how your solution works. What other components do you need	
Technical constraints	What issues could come up based on the digital platform you are using? If you have lots of pictures and videos storage is a technical issue.	
User Experience and Usability	What issues could come up for your user? How can you stop those issues from happening?	
	How would you rate using your digital solution (again from 1 – 10).	

Final Evaluation	
Questions/Prompts	**Evaluation**
Self-Evaluation • Explain your digital solution. • What is the purpose of your digital solution? • How does your design and solution help campers and hikers? • How could it meet the needs of others? • What makes this digital solution innovative? • What are the potential risks that could occur if campers/hikers used your digital solution? • If you were to develop this solution again, what would you do differently? • Where there any design features that you liked from the other • What challenged you? How did you overcome those challenges?	

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 Evaluations and Student Design	Students evaluated uses of technology based on how they have solved a problem and based on a set of questions to answer.
Design the user experience of a digital system, generating, evaluating and communicating alternative designs (ACTDIP028)	10	Creating of student digital solution	
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 micro:bits. Their code used functions such s 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,