Blue Bot Kit

Computational thinking and map making with Blue Bots.

Year level band: 3-4

Description: Students use Bluebots to develop computational thinking skills. Students will create a scaled map of their classroom using technical terms. Students will use an iPad to explore a sequence of steps to navigate the Bluebot about the map. This activity can be integrated with Mathematics and Design and Technology.

Resources:

- Blue Bots
- iPad with *Bluebot* app installed
- Large size butcher's paper
- Marker pens or similar
- Masking tape
- Measuring devices inc. tape measures and rulers

Prior Student Learning:

Digital Technologies: Students are have explored and are familiar with the use of iPads.

Mathematics: Students have done work on scale and measurement.

Design and Technologies: Students have looked at building plans, from newspapers of real-estate websites, and identified different technical aspects of them. They have identified some technical terms used in map design.

By the end of Year 4, students will have had opportunities to create a range of digital solutions, such as interactive adventures that involve user choice, modelling simplified real-world systems and simple guessing games.

Using the concept of abstraction, students define simple problems using techniques such as summarising facts to deduce conclusions. They record simple solutions to problems through text and diagrams and develop their designing skills from initially following prepared algorithms to describing their own that support branching (choice of options) and user input. Their solutions are implemented using appropriate software including visual programming languages that use graphical elements rather than text instructions. They explain, in general terms, how their solutions meet specific needs and consider how society may use digital systems to meet needs in environmentally sustainable ways.

Year	Content Descriptors
Years 3-4	Digital Technologies Digital systems: Explore and use a range of digital systems with peripheral devices for different purposes, and transmit different types of data (ACTDIK007)

	Investigating and defining: Define simple problems, and describe and follow a sequence of steps and decisions (algorithms) needed to solve them (ACTDIP010)
	Design Technologies Generate, develop, and communicate design ideas and decisions using appropriate technical terms and graphical representation techniques (ACTDEP015)
	Mathematics Use simple scales, legends and directions to interpret information contained in basic maps (ACMMG090)
General Capabilities By the end of year 4 Critical and creative thinking	Creating with ICT: Generate solutions to challenges and learning area tasks: create and modify simple digital solutions, creative outputs or data representation/transformation for particular purposes. Managing and operating ICT: Select and use hardware and software: identify and independently operate a range of devices, software, functions and commands, taking into consideration ergonomics when operating appropriate ICT systems, and seek solutions when encountering a problem. Manage digital data: manage and maintain digital data using common methods Analysing, synthesising and evaluating reasoning and procedures: Apply logic and reasoning: identify and apply appropriate reasoning and thinking strategies for particular outcomes. Evaluate procedures and outcomes: explain and justify ideas and outcomes.

Element	Summary of tasks
Learning hook	The students watch the YouTube video; “Program your teacher to make a Jam Sandwich (Sandwich Bot) Junior Computer Science”, https://www.youtube.com/watch?v=leBEFaVHllE, or, the teacher can do the activity themselves live in the classroom. The teacher introduces the concept of abstraction. Abstraction is using only essential information required to complete the task. In this case it is highly analysing the task and finding the essential requirements. eg. pick up jar with right hand to waist level. place left hand on jar lid, clasp lid with left hand fingers, etc. it doesn’t refer to colour, temperature or taste of the items which are non-essential data. My First Robotic Steps: Students write a program to navigate each other using step and turn commands to move each other about the class, starting at ‘A’ and finishing at ‘B’. The important part of this activity is introducing the computational thinking strategy of: ● Abstraction by defining the abstract concepts of ‘a step’ and ‘a turn’. ● Decomposition by breaking the journey into a series of actions. ● Pattern recognition by analysing their series of actions. ● Algorithms as they can reduce the amount of data in their program by introducing new symbols beyond ‘step’ and ‘turn’. ● De-bugging, which involves finding errors in algorithms. Using iPads or similar, use the Blue Bot app go through a number of activities in the explore modes and then onto the challenge modes.
Achievement Standards and content descriptor. Learning Map (Sequence)	By the end of Year 4, students describe how a range of digital systems (hardware and software) and their peripheral devices can be used for different purposes. *Explore and use a range of digital systems with peripheral devices for different purposes, and transmit different types of data (ACTDIK007).* Students define simple problems, design and implement digital solutions using algorithms that involve decision-making and user input. They explain how the solutions meet their purposes. *Follow, describe and represent a sequence of steps and decisions (algorithms) needed to solve simple problems (ACTDIP004).*
	● Groups connect their iPad to their Blue Bot using Bluetooth. ● Students work in teams to work through the challenges 1-3. ● Groups create a scaled map of their classroom. ● Groups share their ideas with others and receive their feedback ● Individuals reflect upon their learning.
Learning input	The teacher facilitates a discussion about the features a scaled map using technical terms, such as referring to scale legend, direction, and graphical representation. The class also discuss physical size required for scaled maps, for example consideration of whether the mat is large

	enough for the Bluebot to navigate and identifying scale and ***plan view*** of drawings.
Learning construction	Students collaborate in groups of 2-3 students to construct a scaled map of their classroom using the: large size butcher's paper, marker pens or similar, measuring devices including tape measures and rulers. Groups use the *choose map icon* and to photograph their scale map. The teacher reintroduces and uses the computational thinking strategy. This reiterates what they learnt earlier. This aids the transfer of knowledge from the activities on the iPad to their own scaled map. Students collaboratively test challenges they would like to propose to their peers by recording an algorithm and testing moving the BlueBot on the mat they have created, taking note to avoid map obstacles. Students work in teams, to construct their own algorithm using arrows on paper to navigate the Bluebot about their map and swap mats and instructions with another teams.
Sharing their learning	Groups share with the other groups their mat designs and explain and justify their ideas and outcomes using technical terms, such as referring to scale legend, direction, and graphical representation. Groups express their 'best' way to overcome challenges and things that did and did not work for them. Other groups offer feedback on how to improve their designs.
Learning reflection	Students are given a chance to think about and describe what happened in their Bluebot algorithm and to talk about what they learned and how they might change or extend their algorithm for next time.

Assessment:

Formative Assessment:

- Teachers observe students collaborating and using appropriate measuring devices to construct scaled maps of their room.
- Monitor the groups progress though the Bluebot challenges on the iPads.
- You might take photos of the students' final algorithms to document their progress, or record the Bluebot in their final demonstration.

	Quantity of knowledge			**Quality of understanding**	
Criteria	**Pre-structural**	**Uni-structural**	**Multi-structural**	**Relational**	**Extended abstract**
Digital Systems	No Digital System used	Able to work through app challenges and explore the use of Bluebots independently.	Use iPads and Bluebots together for a given purpose transmitting data between the two.	Use IPads and Bluebots together to overcome multiple challenges transmitting data between to two.	Introduce other devices into the system beyond one iPad and Bluebot, ie. Makey makey's, Lego mindstorm, etc.
Algorithms	No algorithm shown	Algorithm only shows a limited number of instructions which are not linked.	Algorithm has enough instructions to complete the task but not linked or not linked in the correct sequence.	Algorithm has instructions linked in the correct sequence to achieve the task.	Algorithm brings in prior learning and/or independent learning beyond the task and possibly includes repetition.
Design and technology	No ideas shared.	Limited ideas shared with simple map and no technical language used.	The group shares ideas using their map and some technical terms.	Students clearly express their ideas using technical terms verbally and on the map.	Students express their ideas clearly using multiple mediums and an extended use of technical terms to describe their map and algorithms.
Mathematics and use of technical terms	Unable to interpret any information from the map.	Able to identify some information from their maps without referring to scale legend, direction	Able to identify most information from their maps referring to scale legend, direction and vocabulary relating to the digital system.	Able to identify information from their maps referring to scale legend, direction and technical vocabulary relating to the map construction and digital system.	Clearly identifies information from their map and Able to identify all information from their maps referring to scale legend, direction and vocabulary relating to the digital system. Formulates ideas on other ways to express this information.

CSER Professional Learning:

This lesson plan corresponds to professional learning in the following CSER Digital Technologies MOOCs:

F-6 Digital Technologies: Foundations

- Unit 7: Algorithms and Programming
- Unit 8: Visual Programming

F-6 Digital Technologies: Extended

- Unit 2: Algorithms & Programming

See: http://csermoocs.adelaide.edu.au/moocs

Further Resources

https://www.digitaltechnologieshub.edu.au/docs/default-source/making_difference/St-Hilda's-school/using-blue-bots-in-the-primary-school.pptx

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