Blue-Bots: Are we there yet?

Year level band: 3-4

Description: Students expand on their experience with algorithms and programming with a Bee-Bot and introduce new skills such as wirelessly connecting to a device. With the Blue-Bot, students are now able to investigate how to make their algorithms more efficient by including iteration (repetition) and 45 degree turns. During this lesson students will take a familiar literacy text to create a personalised mat to be used with the Blue-Bot.

Resources:

- Blue-Bots (1 per group of 3 students)
- iPads/computers (1 per group), with apps installed:
  - Blue-Bot
- Bee-Bot / Blue-Bot mats
- Poster paper, pens, markers, etc
- Literacy text, such as "Are we there yet?" by Alison Lester (Or another story which is currently being studied in class and adjust lesson as required.)

Prior Student Learning:

- Students may have had experience working with Blue-Bot's little brother, the Bee-Bot.
- Students will have been studying the literacy text prior to lesson.

Australian Curriculum Alignment Summary
In this lesson students have the opportunity to expand on their previous knowledge of a Bee-Bot and are introduced to a the Blue-Bot. Students will explore the additional features that a Blue-Bot offers and learn how to control this robot with their iPad/computer. Students are able to use the app with its visual programming platform to develop their programming and computational thinking skills.

Students will then create their own Blue-Bot/Bee-Bot mat to challenge fellow students.

Year	Content Descriptors
3-4	Implement simple digital solutions as visual programs with algorithms involving branching (decisions) and user input (ACTDIP011)
	Define simple problems, and describe and follow a sequence of steps and decisions (algorithms) needed to solve them (ACTDIP010)

Element	Summary of tasks
Learning hook	Teacher to discuss the book “Are we there yet?” and ask students to retell the main events in the story. The teacher may like to use a map of Australia to mark the places Grace visited on her holiday. Then the teacher will ask students if they remember using a Bee-Bot. Ask students to recall how you program a Bee-Bot. Teacher says today I have brought along Bee-Bot’s big brother. His name is Blue-Bot.” What do you notice about Blue-Bot? What is the same and what is different? Teacher could use a Venn Diagram to show students’ thinking. Allow students time to explore the Blue-Bot on its own to further consider how the Blue-Bot is different to the Bee-Bot.
Achievement Standards	By the end of Year 4, students outline and define needs, opportunities or problems. They collect, manipulate and interpret data from a range of sources to support decisions. Students generate and record design ideas for an audience using technical terms and graphical and non-graphical representation techniques including algorithms. They plan a sequence of steps (algorithms) to create solutions, including visual programs.
Learning Map (Sequence)	● Students identify the main components and functions of a Blue-Bot. ● Students consider the key elements of a story and how these can be represented. ● Students consider the limitation of the robot and how to ensure a challenge mat is achievable for a user. ● Students consider their audience and make appropriate design choices. ● Students create algorithmic solutions and test their design. ● Students work collaboratively with others to achieve their goals.
Learning input	Bring the students back together and discuss what they have found. Ask the students if they can add anything to the discussion about the differences between the two robots. Focus on functions, such as being able to visually see their program, being able to debug an existing program and the option of making a 45 degree turn. It would also be useful to discuss how some functions can be turned off in the app to make a challenge more difficult or to add levels of difficulty. Give students an existing mat to work with. Ask students to identify or give them a challenge to try and achieve by creating an algorithm on the app. The app allows you to select an existing mat or take a photo of a mat to work with on the app. - Were you able to take advantage of new features, such as making a 45 degree turn? - Would your algorithm change if we were to remove the 90 degree turn? How?

	- Are you able to make your algorithm more efficient by including repetition?
Learning construction	During this part of the lesson, the students are asked to design their own Blue-Bot mat to align with the story “Are we there yet?”. Students can use poster paper to map out what their mat will look like. Students will need to consider design elements such as how the Blue-Bot moves and turns eg it will move 15cm each time, as well as consider the key parts of the story. Students are encouraged to having varying levels within their mat. For example, in one level the user only needs to use the forward and the left and right turn buttons to achieve the goal. In the next level, the user needs to now include 45 degrees and maybe the backwards button and the third level could have functions removed. When students have completed the mat design, they can use the Blue-Bot app to take a photo and begin testing. It is important that testing happens early in the design stage to ensure changes can be made easily.
Learning demo	Students are now given the opportunity to have a go at each other’s mat to see if they can complete the challenges that have been set.
Learning reflection	Students reflect on what they have learnt about Blue-Bot and how he is different to Bee-Bot. Teacher facilitate discussion about challenges and achievements of creating their own Blue-Bot mats.

Assessment:

Formative assessment:

- Teacher observe students contributions to discussions
- Use questioning to elicit student understanding of the functions of the Blue-Bot
- Teacher observes student contributions to group work
- Collect screenshot evidence of visual program (algorithm) in BlueBot App
- Use screen record function to gather evidence.
- Import into Draw and Tell, SeeSaw, Explain Everything, Movie Maker or similar.
- Peer review

	Quantity of knowledge			**Quality of understanding**	
Criteria	**Pre-structural**	**Uni-structural**	**Multi-structural**	**Relational**	**Extended abstract**
Algorithm Construction	Design not implemented.	Design works with	Design allows for Blue-Bot functions to be used in	Design allows for all Blue-Bot functions to be used in	Design allows for all Blue-Bot functions to be used in algorithm program, and

		basic algorithm.	algorithm program.	algorithm program.	going beyond the design brief.
Technical Terms	When describing algorithm, no specific vocabulary is used	The terms instruction may be used as a general description	The terms algorithm is used as a general description	The terms algorithm is used confidently with specific reference to learner's work	Specific vocabulary like decisions and repetition is used, going beyond the set language

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

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

Further Resources:

- Digital Technologies Hub: www.digitaltechnologieshub.edu.au
- CSER: https://csermoocs.adelaide.edu.au

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