Bee-Bot Balloon Pop

Lesson idea: Glenys Goffett (F-6 CSER MOOC 2016)

Year level band: 3-4

Description: During this lesson students will be required to consider the functions of the Bee-Bot and how a user can interact with this device. Students are asked to design a course challenge for another user which will result in the Bee-Bot, with a pin attached, reversing into a balloon to pop it. Students will need to consider the algorithmic solution to this task in order to test whether their challenge is achievable by a user and to then debug as required.

Resources:

- Bee-Bots
- You Tube video of lesson exemplar by Glenys Goffett https://youtu.be/7BMXic_5pBg
- Craft supplies (eg cardboard, scissors, glue, sticky tape, paper, etc)
- Balloons
- Pins
- Bee-Bot rulers
  http://rebeccasictshowcase.weebly.com/uploads/8/8/9/6/8896545/6003136.jpg?555 (please check ruler size is 15cm when printed)

Bee-Bot Ruler
A Bee-bot moves 15 cm with each step.

Prior Student Learning:

Digital Technologies: Students may have had previous experience using the Bee-Bots, however, this is not necessary.

Digital Technologies Summary

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
3-4	Define simple problems, and describe and follow a sequence of steps and decisions (algorithms) needed to solve them (ACTDIP010)
	Design and Technologies • Select and use materials, components, tools, equipment and techniques and use safe work practices to make designed solutions (ACTDEP016) • Evaluate design ideas, processes and solutions based on criteria for success developed with guidance and including care for the environment (ACTDEP017)

ICT Capabilities
- Generate ideas, plans and processes
- Generate solutions to challenges and learning area tasks

Critical and creative thinking
- Imagine possibilities and connect ideas
- Consider alternatives

Numeracy
- Estimate and calculate

Element	Summary of tasks
Learning hook	Teacher to explain to students that they will be designing a challenge where another student will be required to try and solve. This will involve students designing and making a course for the Bee-Bot which will finalise with the popping of a balloon. A pin will be attached to the back of the Bee-Bot for the purpose of popping the balloon. Therefore the challenge will need to end with the bee reversing into the balloon. The challenge will be to make this as challenging as possible, however, it still needs to be achievable. If students are not familiar with the Bee-Bot, it will be important to give a small demonstration and instructions on how to use these. https://youtu.be/52ZuenJlFyE
Achievement Standards Learning Map (Sequence)	By the end of Year 4, 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.
	- Students plan and construct in teams a challenge - Students identify and record an algorithmic solution - Students test and debug
Learning input	In the planning stage of this task, students will work in groups to design their course, considering things such as materials, Bee-Bot movement (eg. Length of each move), level of difficulty within the course, etc. Students will also be asked to write the algorithm to a possible solution to their course. This will then need to be tested and debugged after the course has been created to ensure this is a working solution to the problem.
Learning construction	Once students have completed the planning stage of this task, they will then begin constructing their course. This will require them to build, test and reassess throughout the process.
Learning demo	At the completion of construction stage, students will then ask other students to

	attempt their course and try and pop the balloon.
	There is a possibility of using a buddy system in this stage, where younger students are invited to learn about the Bee-Bots and attempt the courses.
	Encourage students to assess their solution algorithm and compare this to the attempts that are made. What new thinking has arisen?
Learning reflection	Students are given a chance to think about and describe what happened in their courses and to talk about what worked and what didn't. What parts of the challenge were the hardest? Did the solution algorithm be achieved? Students discuss what happened in their algorithm and what they would do differently next time. How could you have made your course more challenging or extended the course?

Assessment:

Formative Assessment:

- Teachers observe students using the Bee-Bots, planning and constructing their course and creating their algorithms, including debugging.
- Using questioning to elicit students understanding of the functions of the Bee-Bot and their understanding of what would make a course more difficult for a user.
- You might take photos of the students' algorithms to document their progress. Videos of discussions and testing would also be useful in the testing stage.

	Quantity of knowledge			Quality of understanding	
Criteria	**Pre-structural**	**Uni-structural**	**Multi-structural**	**Relational**	**Extended abstract**

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	No design elements eg does not include turns, etc	Limited design elements	Uses a number of design elements, including require the user to move	Uses many design elements, which may include more than one solution	Uses a large number of design elements, which includes a number of possible solutions

			forward, backwards and turn		
Vocabulary	When describing algorithm, no specific vocabulary is used	The terms instruction may be used as a general description	The term algorithm is used as a general description	The term algorithm is used confidently with specific reference to learner's work, including directional language	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

Additional Resources:

Digital Technologies Hub: www.digitaltechnologieshub.edu.au

CSER: https://csermoocs.adelaide.edu.au

CSER Group, The University of Adelaide