**Getting to Know Bee-Bot**

*Please refer to the online lesson plan on the DT Hub to access all website links and additional resources.*

**Year level band:** F-2

**Description:** Students are introduced to the Bee-Bot as a robotic device. They learn about what the Bee-Bot is, the functions and how the Bee-Bot can be used for specific purposes. They learn how to develop a sequence of steps for the Bee-Bot to follow. This lesson idea was created by Rebecca Vivian.

**Resources:**

* Bee-Bots (one per group of 3 students)
* Bee-Bot mats (mixture of pictures on them from maps to streets and grids.)
* Large sheets of paper/cardboard
* Textas
* Rulers

**Prior Student Learning:**

**Math:** Students have done some work on 2D shapes.

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| **Digital Technologies Summary**  In this lesson, students get to know the Bee-Bot robotic device, including Bee-Bot functions and how it can be used for different purposes. Students will have had opportunities to create a range of digital solutions through guided play and integrated learning, using robotic toys for navigation.  They begin to develop their design skills by conceptualising algorithms as a sequence of steps for carrying out instructions, such as identifying steps in a process or controlling robotic devices. Students are able to use data as an input for their robotic device. | |
| **Year** | **Content Descriptors** |
| **F-2** | Recognise and explore digital systems (hardware and software) for a purpose (AC9TDIFK01).  Identify and explore digital systems and their components for a purpose (AC9TDI2K01).  Follow and describe algorithms involving a sequence of steps, branching (decisions) and iteration (repetition) (AC9TDI2P02). |

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| **Element** | **Summary of tasks** |
| **Learning hook** | The teacher brings out the Bee-Bot and shows it to the class. The teacher asks students to identify what they see on the Bee-Bot (noticing buttons, eyes, the colour, wheels, etc).  The class discuss and imagine what the Bee-Bot is for and what it does. Students either brainstorm these ideas on large sheet of paper. For early years children, this is facilitated on the board by the teacher.  The teacher allows a short time of experimentation with a Bee-Bot and for the children to try and test the Bee-Bot on the floor. |
| **Learning map (sequence)** | * Students identify features of Bee-Bot and imagine how the Bee-Bot can be used for different purposes. * Students work in teams to design algorithms for a Bee-Bot using verbal instructions for another to follow. * Students work in teams to implement their algorithm by inputting instructions into the robot and using listening skills. * Students can debug their algorithms. |
| **Learning input** | The teacher brings the students back together and facilitates a discussion about what they have discovered during their play with the Bee-Bot.   * What did the Bee-Bot do? * What happened when the buttons were pressed? * What did you see and hear?   The teacher refers to their previous brainstorm about what the Bee-Bot can do and asks: is there anything new they can add to this?  The children are given a Bee-Bot each and are asked to examine different parts of the Bee-Bot, and in particular the buttons on the top. The teacher points to the buttons and they identify and repeat what they are (e.g. forward, backward, etc).  The teacher gives a short demonstration with the Bee-Bot, emphasising the importance of the ‘clear’ button. The teacher says that they are going to work together to get the Bee-Bot to move in the shape of a square; but first, they need to figure out what to tell the Bee-Bot! The teacher asks the students to recall the shape of a square. The teacher draws it on the whiteboard.  Without using the Bee-Bot, the class stands up. They move in the shape of a square. The teacher now asks students to call out the instructions of a square to make one of the students move in that shape. The teacher records these on the whiteboard. They develop the instructions and then move through the sequences to test their instructions. The teacher introduces these instructions as an “algorithm” and asks students to repeat.  Once they are happy with the instructions, as a class, they now give the instructions to the Bee-Bot to follow. One of the students enters the instructions into the Bee-Bot on the floor.  They observe the Bee-Bot: Did it make a square? |
| **Learning construction** | Students are now invited to make the Bee-Bot move in the shape of a rectangle. The teacher asks them to recall the shape of a rectangle.  Students work in small groups to make the Bee-Bot move in the shape of a rectangle using verbal instructions, with one person saying the instructions and the other putting the instructions into the Bee-Bot. Students are all asked to have a turn at putting the instructions into the Bee-Bot and calling out the instructions. |
| **Learning demo** | Students demonstrate their Bee-Bot moving to another class and evaluate if it was the shape of the rectangle. |
| **Learning reflection** | The class comes back together and they discuss the instructions for making the rectangle. The teacher selects a student to demonstrate and they record the instructions on the board.  As a class they compare the instructions between the square and rectangle. What do they notice is different? What is the same?  They enter the instructions into the Bee-Bot and check that it moves in the correct shape.  Students reflect on what they have learned about the Bee-Bot. What did they learn about the Bee-Bot? What would they like to do next time with the Bee-Bot?  Students record their reflection by drawing a Bee-Bot and giving it a name. They write their sentences on the picture (For Foundation students, the teacher facilitates writing it for them while moving around the room). |

**Resources**

* Download entire lesson Plan (PDF version/ Microsoft Word version.
* Computer Science Education Research Group (CSER)
* For exemplars on student learning achievement and portfolios, see the ACARA website.
* Teacher Activity Card overview (Word version/ PDF version)
* 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
  + F-6 Digital Technologies: Foundations
    - Unit 2: Algorithms & Programming
    - Unit 3: English Connections

**Assessment:**

Formative Assessment:

* Teachers observe students using the Bee-Bots, creating their algorithms and debugging.
* Use questioning to elicit student understanding of the functions of the Bee-Bot and their algorithmic thinking.
* The teacher moves around the room and asks students as they are using the Bee-Bot to explain what the Bee-Bot is and how they are using it.
* Observing the Bee-Bot drawing and the features that they have included on the Bee-Bot - can you see buttons?

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|  | **Quantity of knowledge** | | | **Quality of understanding** | |
| **Criteria** | **Pre-structural** | **Unistructural** | **Multistructural** | **Relational** | **Extended abstract** |
| Algorithms | Algorithm not implemented. | Algorithm partially complete. | Algorithm complete but incorrect solution. | Algorithm is complete and makes the intended shape. | Algorithm is complete and students go beyond to make a new shape. |
| Digital  System | Unable to identify the purpose of the Bee-Bot. | Identifies the purpose of the BeeBot. | Identifies the purpose of the Bee-Bot and some of the features and functions. | Identifies the purpose of the Bee-Bot and all of the features and functions. | Identifies the purpose of the Bee-Bot and all of the features and functions, as well as new imagined purposes for using the Bee-Bot.. |
| Vocabulary | 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 |



This lesson has been inspired by “Tania S” from our CSER MOOC F-6 Community in the lesson “Exploring with Bee-Bot”. Author: Rebecca Vivian

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International License[.](http://creativecommons.org/licenses/by-nc/4.0/) Computer Science Education Research (CSER) Group, The University of Adelaide.